Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR ARTS, COMMERCE & SCIENCE COLLEGE, NEW PANVEL (AUTONOMOUS)

Re-accredited 'A+' Grade by NAAC
'College with Potential for Excellence' Status Awarded by UGC
'Best College Award' by University of Mumbai

Program: B.A.

Revised Syllabus of F.Y.B.A. English (Optional)
Choice Based Credit System (60:40)
w.e.f. Academic Year 2022-23

Details of the Course

Sr. No.	Heading	Particulars
1	Title of Course	Introduction to Literature Paper I (Semester I and II)
2	Eligibility for Admission	12th Arts, Commerce and Science of all recognised Boards
3	Passing marks	40%
4	Ordinances/Regulations (if any)	
5	No. of Semesters	Two
6	Level	U.G.
7	Pattern	Semester (60:40)
8	Status	Revised
9	To be implemented from Academic year	2022-23

Preamble of the Syllabus:

English plays an important role in the life of every learner because it is an international language. Knowledge of English is considered as one of the most significant facets of one's personality. There is passionate desire in the mind of students to learn English in order to achieve global identity in today's competitive and digital world.

There is an indispensible relationship between literature and society. Every writer is endowed with keen observation, perception, creative and imaginative skills in the process of creation of literary masterpieces. The study of literature has two powerful and resourceful functions of providing delight and inculcation of moral and social values. It also reforms and transforms to the learners through one of the most inspirational and mesmerizing stories and poems. Therefore, the realm of English literature is not only appealing but also stirring especially to the students.

The learners have tremendous sense of curiosity to delve, understand, visualize and appreciate various genres of English literature and accomplish aesthetic pleasures. The learners experience sense of astonishment, suspense, venture, adventure, bravery, pity and fear towards the protagonist reflected in the poems, stories, plays and novels. The hero or heroine in the English literature is an embodiment of virtues which are imitated by the students. As a result, everybody is Hamlet.

It is through the study of English literature, the leaners are gifted with universal truths, human values, insights and develop healthy relationship with regards to people and nature. The syllabus aims at empowering to the students with literary beauty of world classics and enhance their linguistic confidence and create renaissance in academic and professional life.

Bachelor of Arts (B.A.) in English is a under graduate course of department of English, Changu Kana Thakur Arts, Commerce & Science

college, New Panvel (Autonomous) The Choice Based Credit and Grading System to be implemented through this curriculum would enable the students to explore new horizons and its applications in English. The learners pursuing this course of English literature can accomplish knowledge and skills necessary for better employability and professionalism in 21st century.

Objectives of the Course:

- To acquaint students with the salient characteristics of various literary genres.
- To develop analytical skills and critical thinking through close reading of literary texts.
- To cultivate appreciation of language as an artistic medium and to help them understand the importance of forms, elements and style that shape literary works.
- To enable students to understand that literature is an expression of human values within a historical and social context.
- To familiarize the students with the world famous literary works.

Course Outcome: By the end of the course, a student should develop the Ability:

- To Describe prominent elements of stories and types of novels
- To Identify thematic concerns reflected in the domains of English literature
- To Examine salient features of novella as a genre in English Literature
- To Explain moral, social and human values through the literary works
- To Interpret poetic and dramatic forms with suitable illustrations
- To Perceive the relationship between society and literature

- **Title of the Paper: Introduction to Literature**

F. Y. B. A. English

For the subject of English there shall be two papers for 45 lectures each comprising of three units of 15 Lectures each.

Semester-I

1. Paper-I (Introduction to Literature) Unit-I will be on Terms
2. Paper-I Unit-II will be on Short Stories
3. Paper- I Unit-III will be on Novel

Semester-II

1. Paper-I (Introduction to Literature) Unit-I will be on Terms
2. Paper-I Unit-II will be on Poetry
3. Paper-I Unit-III will be on Play

Scheme of Examination for Each Semester:

Internal Evaluation: 40%

Sr.No.	Particular	Marks
01	One periodical class test/online examination to be conducted in the given semester	20 Marks
02	Any two tools out of these (10 Marks each) 1. Group/individual Survey Project 2. Presentation and write up on the selected topics of the subjects 3. Case studies/Test based on tutorials 4. Book Review/Poetry Appreciation/ Open Book Test 5. Quiz	20 Marks

Semester End Examination: 60 Marks will be as follows -:

I	**Theory:**	
	Each theory paper shall be of two and half hour duration.	
	All questions are compulsory and will have internal options. All questions carry equal marks	
	Q-1	From Unit – I Short Notes (With Internal Options) 12 Marks

	Q-2	From Unit – II (Essay having Internal Options.) 12 Marks
	Q-3	From Unit – III (Essay having Internal Options.) 12 Marks
	Q-4	From Unit – II (Short Notes any Two out of Four) 12 Marks
	Q-5	From Unit – III Short Notes any Two out of Four) 12 Marks

Choice Based Credit System (CBCS)
F. Y. B. A. English Syllabus
To be implemented from the Academic year 2022-2023
SEMESTER I

Course Code	Unit	Topics	Credits	Lectures
UAR1ENG1	**I Terms**	**Section A:** Elements of Novel and Short Story: Plot, Character, setting, **Section B:** Types of Novel: Picaresque, Epistolary, Stream of Consciousness, Realistic, Gothic	**03**	**15**
	II Short Stories	• O' Henry: "The Last Leaf" • Waman Hoval: "The Storeyed House" • Oscar Wilde: "The Nightingale and the Rose" • Edgar Allan Poe: "The Tell-tale Heart" • Katherine Mansfield: "The Doll's House" • Kate Chopin: "The Story of an Hour		**15**

	III Novel	• Earnest Hemingway: The Old Man and The Sea OR • Robert Louis Stevenson: Dr. Jekyll and Mr. Hyde		**15**

Choice Based Credit System (CBCS)
F. Y. B. A. English Syllabus
To be implemented from the Academic year 2022-2023
SEMESTER II

Course Code	Unit	Topics	Credits	Lectures
UAR2ENG1	**I Terms**	**Section A:** Types of Verse: :Lyric, Sonnet, Ballad, Satire and Ode **Section B:** Types of Drama: Tragedy, Comedy and Melodrama	**3**	**15**
	II Poetry	• Sonnet: William Shakespeare: 116: "Let Me Not to the Marriage of True Minds" • Satire: Oliver Goldsmith: "Elegy on the Death of Mad Dog" • Ode: John Keats: "Ode to Autumn" • Ballad: Thomas Campbell: " Lord Ullin's Daughter" • Lyric: Robert Frost: "Stopping by Woods on a Snowy Evening"		**15**
	III Play	• Vijay Tendulkar: "Silence the Court is in Session" OR • John Millington Synge: "Riders to the Sea"		**15**

Reference Books:

1. Abrams, M.H. *Glossary of Literary Terms*. India, Macmillan Publishers, 2000. Albert, E. *History of English Literature*, India, Oxford University Press, 2009. Athenian Society. *Drama, Its History*, England, Nabu Press, 2012.
2. Auger, Peter. *The Anthem Glossary of Literary Terms and Theory,* India, Anthem Press, , 2011. Brooks, Cleanth and Warren, Robert Penn. *Understanding Fiction*, Prentice Hall.
3. Bennett, Andrew and Nicholas Royle. *Introduction to Literature Criticism and Theory*. Great Britain: Pearson Education Limited, 2004.
4. Cavanagh, Dermot Alan Gillis, Michelle Keown, James Loxley and Randall Stevenson (Ed). *The Edinburgh Introduction to Studying Literature.* Edinburgh: Edinburgh University Press, 2010.
5. Chakrabarti, Piyas. *Anthem Dictionary of Literary Terms and Theory.*Delhi: Anthem Press, 2006. Edmond Gore and Alexander Holmes. *What is Poetry*? England, Nabu Press, 2010. Ford, Boris. The Pelican Guide to English Literature, Volume I to X
6. Forster, E M. *Aspects of the Novel*, (1954) London: Rosetta Books, 2002.
7. Fowler, Roger. (Ed.). *A Dictionary of Modern Critical Terms*. (Rev.Ed.) London: Routledge & Kegan Paul, 1987.
8. Gibson Arthur. *What is Literature*, Peter Lang Pub Inc, 2007.
9. Hudson, W.H., 2011, *An Outline History of English Literature*, India, G K Publishers Pvt. Ltd McKeon, Michael. *Theory of the Novel: A Historical Approach*. Baltimore: John Hopkins University Press, 2000.
10. Prasad, B. . *Background of the Study of English Literature*, Chennai, Macmillan, 1999.
11. Rees, R.J. *English Literature: An Introduction to Foreign Readers*, New Delhi: Macmillan, 1982. Turco , Lewis. *The Book of Literary Terms*, UK, University Press of New England, 1999.
12. Widdowson, Peter. The Palgrave Guide to English Literature and its Contexts 1500-2000, Hampshire: Palgrave, Macmillan, 2004

Choice Based Credit System (CBCS)
F. Y. B. A. Communication Skills in English Syllabus
To be implemented from the Academic year 2022-23
SEMESTER I

Course Code	Unit	Topics	Credits	Lectures
UAR1CS1	**I Basic Language Skills: Grammar**	a. Parts of Speech b. Tenses c. Types of Verbs		**09**
	II Listening Skills	a. Concept of listening b. Types of listeners c. Effective ways of listening	**03**	**09**
	III Reading Skills: Comprehension (unseen passage)	The following skills to be acquired: • Reading with fluency and speed • Skimming and scanning • Identifying relevant information • Isolating fact from opinion • Understanding concepts and arguments • Identifying distinctive features of language		**09**
	IV Writing Skills (Formal Correspondence): Letters	a. Job Application Letter (with Resume) b. Statement of Purpose c .Request for information under Right to Information Act (RTI)		**09**
	V. Writing Skills: Essay	a. Expository b. Persuasive c. Reflective/Descriptive		**09**

Choice Based Credit System (CBCS)
F. Y. B. A. Communication Skills in English Syllabus
To be implemented from the Academic year 2022-2023
SEMESTER II

Course Code	Unit	Topics	Credits	Lectures
UAR2CS1	**I Basic Language Skills: Vocabulary building**	a. Antonyms, Synonyms b. Suffixes, Prefixes, Root words c. Homophones, homonyms Collocation	**3**	**09**
	II Speaking Skills	a. Group Skills b. Interview c. Public Speaking		**09**
	III Writing Skills: E-mails	a. Inquiry b. Invitation c. Congratulation		**09**
	IV Report Writing	a. Eye-witness Report b. Activity Report c. Newspaper Report		**09**
	V Creative Writing	This unit attempts to cover those aspects of writing that go beyond the boundaries of technical or professional forms of writing and encourage the learner to explore the artistic and imaginative elements of writing. a. Story writing b. Dialogue writing c. Blog Writing		**09**

Reference Books:

1. Bellare, Nirmala. *Reading Strategies*. Vols. 1 and 2. New Delhi. Oxford University Press, 1998.

2. Bhasker, W. W. S & Prabhu, N. S.: *English through Reading*, Vols. 1 and 2. Macmillan, 1975.

3. Blass, Laurie, Kathy Block and Hannah Friesan. *Creating Meaning*. Oxford: OUP, 2007.

4. Brown, Ralph: *Making Business Writing Happen: A Simple and Effective Guide to Writing Well*. Sydney: Allen and Unwin, 2004.

5. Buscemi, Santi and Charlotte Smith, *75 Readings Plus.* Second Edition New York: McGraw-Hill, 1994.

6. Doff, Adrian and Christopher Jones .*Language in Use (Intermediate and Upper Intermediate).* Cambridge: CUP, 2004.

7. Doughty, P. P., Thornton, J. G, *Language in Use.* London: Edward Arrold, 1973.

8. Freeman, Sarah: *Written Communication*. New Delhi: Orient Longman, 1977.

9. Glendinning, Eric H. and Beverley Holmstrom. Second edition. *Study Reading: A Course in Reading Skills for Academic Purposes*. Cambridge: CUP, 2004

10. Grellet, F. *Developing Reading Skills,* Cambridge: Cambridge University Press, 1981.

11. Hamp-Lyons, Liz and Ben Heasiey. Second edition. *Study Writing: A Course in Writing Skills for Academic Purposes*. Cambridge: CUP, 2006

12. Jakeman, Vanessa and Clare McDowell. *Cambridge Practice Test for IELTS 1.* Cambridge: CUP, 1996.

13. Maley, Alan and Alan Duff. Second Edition. *Drama Techniques in Language Learning.* Cambridge: CUP, 1983.

14. Mohan Krishna & Banerji, Meera: *Developing Communication Skills.* New Delhi: Macmillan India, 1990.

15. Mohan Krishna & Singh, N. P. *Speaking English Effectively.*New Delhi: Macmillan India, 1995.

16. Narayanaswami, V. R. *Organised Writing*, Book 2. New Delhi: Orient Longman.

17. *Reading & Thinking in English,* Four volumes, (vol. 1 for the lowest level, vol. 4 for the highest level). The British Council Oxford University Press, 1979-1981.

18. Sasikumar, V., Kiranmai Dutt and Geetha Rajeevan. *A Course in Listening and Speaking* I& II. New Delhi: Foundation Books, Cambridge House, 2006.

19. Savage, Alice, et al. *Effective Academic Writing*. Oxford: OUP, 2005.

20. Widdowson, H. G.*: English in Focus. English for Social Sciences.*

Choice Based Credit System (CBCS)
F. Y. B. A. Effective Communication Skills in English for Personality Development Syllabus
To be implemented from the Academic year 2022-2023
SEMESTER I

Course Code	Unit	Topics	Credits	Lectures
	1. Academic Skills	**a. Fundamentals of English Grammar:** Subject- Verb Concord, Tenses, Types of Sentences, Auxiliary Verbs, Direct- Indirect Speech, Question Tags, and Common Errors in English. **b. Communication Theory:** Nature and Definition, Importance of Communication, Elements of Communication, Process of Communication, Verbal and Non-Verbal Communication facial expressions, gestures, postures, silence. **c. Barriers to Communication:** Psychological, Semantic Physical Barriers **d. Employment Communication:** Introduction, Resume, Formats of Resume, Job Application Letter and Bio-data. **e. Group Discussion:** Introduction, Seating	**02**	**15**

		Arrangement for Group Discussion, Difference Between Group Discussion and Debate, Traits, Types of Group Discussion Topic Based and Case Based Group Discussion.		
	2. Soft Skills	**a. Introduction to Soft Skills and Hard Skills**: Nature, Definition and importance of soft skills and hard skills **b. Personality Development:** Knowing Your-self, Positive Thinking, Integrity, Honesty, Leadership, Decision Making, Critical Thinking and Physical Fitness. **c. Presentation Skills:** Theory, Nature, Guidelines for preparing a Presentation, Selection of the Topic, Making Power Point Presentation. **d. Job Interviews**: Introduction, Definition of Interview, Types of Interviews, Guidelines for Job Interviews, Interview Tips, Frequently Asked Questions during Interviews, **e. Public Speeches:** Nature of Speeches, Planning a Speech, Preparing the Speech, Delivering the Speech, Qualities of Leader.	**02**	**15**

Reference Books:

1. Bellare, Nirmala. *Reading Strategies*. Vols. 1 and 2. New Delhi. Oxford University Press, 1998.

2. Bhasker, W. W. S & Prabhu, N. S.: *English through Reading*, Vols. 1 and 2. Macmillan, 1975.

3. Blass, Laurie, Kathy Block and Hannah Friesan. *Creating Meaning*. Oxford: OUP, 2007.

4. Brown, Ralph: *Making Business Writing Happen: A Simple and Effective Guide to Writing Well*. Sydney: Allen and Unwin, 2004.

5. Buscemi, Santi and Charlotte Smith, *75 Readings Plus.* Second Edition New York: McGraw-Hill, 1994.

6. Doff, Adrian and Christopher Jones .*Language in Use (Intermediate and Upper Intermediate).* Cambridge: CUP, 2004.

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8. Freeman, Sarah: *Written Communication*. New Delhi: Orient Longman, 1977.

9. Glendinning, Eric H. and Beverley Holmstrom. Second edition. *Study Reading: A Course in Reading Skills for Academic Purposes*. Cambridge: CUP, 2004

10. Grellet, F. *Developing Reading Skills,* Cambridge: Cambridge University Press, 1981.

11. Hamp-Lyons, Liz and Ben Heasiey. Second edition. *Study Writing: A Course in Writing Skills for Academic Purposes*. Cambridge: CUP, 2006

12. Jakeman, Vanessa and Clare McDowell. *Cambridge Practice Test for IELTS 1.* Cambridge: CUP, 1996.

13. Maley, Alan and Alan Duff. Second Edition. *Drama Techniques in Language Learning.* Cambridge: CUP, 1983.

14. Mohan Krishna & Banerji, Meera: *Developing Communication Skills.* New Delhi: Macmillan India, 1990.

15. Mohan Krishna & Singh, N. P. *Speaking English Effectively.*New Delhi: Macmillan India, 1995.

16. Narayanaswami, V. R. *Organised Writing*, Book 2. New Delhi: Orient Longman.

17. *Reading & Thinking in English,* Four volumes, (vol. 1 for the lowest level, vol. 4 for the highest level). The British Council Oxford University Press, 1979-1981.

18. Sasikumar, V., Kiranmai Dutt and Geetha Rajeevan. *A Course in Listening and Speaking* I& II. New Delhi: Foundation Books, Cambridge House, 2006.

19. Savage, Alice, et al. *Effective Academic Writing*. Oxford: OUP, 2005.

20. Widdowson, H. G.*: English in Focus. English for Social Sciences.*

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Program: B.A.

Revised Syllabus of F.Y.B.A. Economics

Choice Based Credit & Grading System (60:40)

w.e.f. Academic Year 2022-2023

Sr. No.	Heading	Particulars
1	Title of Course	Economics
2	Eligibility for Admission	12^{th} Arts of all recognised Board
3	Passing marks	40%
4	Ordinances/Regulations (if any)	
5	No. of Semesters	Two
6	Level	U.G.
7	Pattern	Semester (60:40)
8	Status	Revised
9	To be implemented from Academic year	2022-2023

Revised Syllabus of Courses of F.Y.B.A. Programme at Semester I & II with Effect from the Academic Year 2022-2023

Preamble

This course is designed to introduce the students to elementary concepts in microeconomics. The student should be able to use these concepts to understand the relevance of microeconomics to the real world. The student should be able to build on these concepts in the future to develop deeper understanding of the Economy as well as the revised syllabus is framed to understand the economic theory and its relevance in decision making.

COURSE CODE	PAPER TITLE	CREDITS	MARKS
UAR1EC1	Micro Economics	**03**	**100**

COURSE CONTENT

SN	Modules	No. of Lectures
1	**Module - I**	12
2	**Module - II**	12
3	**Module - III**	12
4	**Module - IV**	12
	Total	**48**

University of Mumbai

॥ विद्या विनयेन शोभते ॥

Janardan Bhagat Shikshan Prasarak Sanstha's

Changu Kana Thakur

Arts, Commerce and Science College, New Panvel
Autonomous

Revised Scheme of Evaluation for

Continuous Assessments and Semester End Examinations

for

Under-graduate Programmes

under

Faculty of Arts

Under Autonomous status with

Choice Based Credit System (CBCS)

(To be implemented from Academic Year 2022-2023)

Revised Scheme of Examination
Faculty of Arts
(Under-graduate Programmes)

Choice Based Credit System (CBCS)

❖ **Revised Scheme of Examination**

The performance of the learners shall be evaluated into two components. The learner's Performance shall be assessed by Internal Assessment with 40% marks in the first component by conducting the Semester End Examinations with 60% marks in the second component. The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below:-

A) Internal Assessment: 40 % 40 Marks

Sr. No.	Particular	Marks
01	One periodical class test / online examination to be conducted in the given semester	20 Marks
02	Any two tools out of these (10 Marks each) **1. Group/ Individual Survey Project** 2. Presentation and write up on the selected topics of the subjects 3. Case studies / Test based on tutorials 4. Book Review /Poetry Appreciation/ Open Book Test **5. Quiz**	20 Marks

(For Courses with Practical)

Sr. No.	Particular		Marks
01	**Practical Examination**		20 Marks
	Journal	05 Marks	
	Viva Voce	05 Marks	
	Laboratory Work	10 Marks	
02	Any two tools out of these (10 Marks each) 1. Group/ Individual Survey Project 2. Presentation and write up on the selected topics of the subjects / Case studies. 3. Test on Practical Skills 4. Open Book Test 5. Quiz		20 Marks

Question Paper Pattern

(Periodical Class Test/ online examination for the Courses at Under Graduate Programmes)

Maximum Marks: 20

Duration: 30 Minutes

Particular	Marks
Match the Column / Fill in the Blanks / Multiple Choice Questions/ True/False/Answer in One or Two Lines (Concept based Questions) (1 Marks each)	20 Marks

B) Semester End Examination: 60 % 60 Marks

- Duration: The examination shall be of 2 hours duration.

Question Paper Pattern

Theory question paper pattern
1. There shall be five questions each of 12 marks (24 marks with internal options). 2. All questions shall be compulsory with internal options. 3. Question may be subdivided into sub-questions a, b, c… and the allocation of marks depends on the weightage of the unit.

➢ Passing Standard

The learners to pass a course shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment and Semester End Examination. The learners shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 24 Out of 60) separately, to pass the course and minimum of Grade D, wherever applicable, to pass a particular semester. A learner will be said to have passed the course if the learner passes the Internal Assessment and Semester End Examination together.

Note: 1) It is noted that the concerned regulation of the College is amended and implemented to all Semesters i.e. Semester I to Semester VI to all undergraduate programmes, under faculty of Arts, Commerce and Science with effect from the academic year 2022 - 2023.

2) This revised scheme of evaluation is discussed in detail, finalised and accepted.

Programme outcomes (POs) for
B. A.

Sr. No.	Attributes	Programme Outcomes
PO1.	Disciplinary Knowledge	Demonstrate a blend of conventional discipline knowledge and its applications to the modern world. Execute strong theoretical and practical understanding generated from the chosen programme and equip the students with a strong academic perspective.
PO2.	Critical Thinking, Cognitive skills and Problem Solving	Exhibit the skill of critical thinking and use higher order cognitive skills to approach problems situated in their social environment, propose feasible solutions and help in its implementation. The students will be able to comprehend, learn, process and apply knowledge in day to day life.
PO3.	Analytical Skills and Effective Communication	Ability to analyse and evaluate different concepts of problems of society and make students able to develop oral and written communication skills in literature.
PO4.	Competencies for employment and Research	Equip with strong work attitudes and Employment skills that will enable them to work independently as well as collaboratively. Seeks opportunity for research and higher academic achievements in the chosen field and allied subjects.
PO5.	Individuality and Teamwork	Able to work collaboratively and effectively with diverse groups towards personal and common goals. Develop leadership qualities among the learners.
PO6.	Effective Citizenship and Ethics	Demonstrate empathetic social concern and equity centred national development; ability to act with an informed awareness of moral and ethical issues and commit to professional ethics as well as to accomplish their duties and responsibilities as citizens successfully.
PO7.	Social competence	Express oneself clearly and precisely to build good interpersonal relationships in personal and professional life.
PO8.	Environment sustainability	Understand the impact of the scientific solutions in societal and environmental contexts and demonstrate the knowledge of, and need for environmental conservation and sustainability through action.
PO9.	Self-directed and Life-long learning	Acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological changes.
PO10.	Community engagement	Help students to share gifts, pursue justice and demonstrate through communicative solutions, concern for the poor and marginalised

Programme outcomes (PSOs) for
B. A. Economics

Name of the Programme B.A.	Programme Coordinator Dr. B. S. Patil	Head of the Department Dr. B. S. Patil
After completing the programme in Economics, students will able to:		
PSO1	Demonstrate progressive knowledge of Economics, finance, taxation, business, Indian economy, Demography, Statistical methods.	
PSO2	Develop managerial career skills applying both quantitative and qualitative knowledge to their future careers business, industry and officers in different sectors of the economy	
PSO3	Develop proficiency with the ability to engage in competitive exams like MPSC, UPSC, IES, ISS, Research analyst's, Bank POs and other courses.	

Programme Code BA1001

Micro Economics – I, Sem – I

Course Outcomes

	After completing the course, student will able to:	Bloom Taxonomy Level (BTL)
CO1	**Understand** basic theories of micro economics.	Understand
CO2	**Define** ten principle of economics	Remember
CO3	**Calculate** the market demand and market supply.	Evaluate
CO4	**Analyse** the consumer's behaviour with the help of indifference curve.	Analyse

SYLLABUS

Module –I: Introduction to microeconomics **(lectures 12)**

Micro economics: meaning, scope, nature, importance and limitations- Basic economic problems – distinguish between micro economics and macroeconomics – positive economics and normative economics – concepts of equation, functions, graph, diagrams, line-slope and intercepts.

Module –II: Ten Principles of Economics **(lectures 12)**

Trade-offs faced by the individuals – significance of opportunity cost in decision making – thinking at the margin- responses to incentives-benefits from exchange- organization of economic activities through markets and its benefits – role of government in improving market outcomes – dependence of standard of living on production- growth in quantity of money and inflation- inflation and unemployment trade-off.

Module –III: Demand and Supply **(lectures 12)**

Demand – Demand function – Law of Demand – Determination of Demand – Supply - Supply function - Law of Supply - Determination of Supply – Elasticity of Demand

Module –IV: Market Structure **(lectures 12)**

Concept of Market – Types of Market – Feature of Perfect Competition, Monopoly, Oligopoly, Monopolistic Competition, Imperfect Competition – Equilibrium Condition of various Market.

Reference Books

Micro Economics - Paper I
1. N.Gregory Mankiw, Principles of Microeconomics, 7th edition, Cengage Learning, 2015
2. Sen Anindya (2007), Microeconomics: Theory and Applications, Oxford University Press, New Delhi.
3. Salvatore D. (2003), Microeconomics: Theory and Applications, Oxford University Press, New Delhi.
4. M.L.Jhingan "Microeconomics theory" 5th edition (2006) Vrinda publication (P) Ltd.

Programme Code BA1002

Micro Economics – I, Sem – II

Course Outcomes

Cos	After completing the course, student will able to:	Bloom Taxonomy Level (BTL)
CO1	**Relate** types of production and producers equilibrium.	Remember
CO2	**Explain** cost and revenue and interrelationship.	Understand
CO3	**Develo**p theories of factor pricing.	Apply
CO4	**Compare** equilibrium in different market structures.	Analyse

SYLLABUS

Module I: Production Analysis **(12 Lectures)**

Production Function: Concept, Linear-Non Linear, Short and Long Run Production function, Concepts of Total, Average and Marginal Product; Law of Variable Proportion and Returns to Scale,Iso –Cost, Isoquant and Producer's Equilibrium

Module II: Cost & Revenue Analysis **(12 lectures)**

Concepts of Costs: Money and Real Cost, Social Cost, Private Cost, Explicit and Implicit Cost, Sunk Cost, Variable Cost, Opportunity Cost; Relationship between Average, Marginal and Total Cost; Derivation of Short Run and Long Run Cost Curves; Concepts of Revenue: Types and Interrelationship

Module III: Factor pricing **(12 lectures)**

Marginal Productivity Theory of Distribution; Rent: Ricardian Theory of Rent, Modern Theory of Rent, Quasi Rent; Wages: Modern Theory of Wages; Collective Bargaining; Supply Curve of Labour; Interest: Classical Theory of Interest, Loanable Funds Theory of Interest; Profit: Risk and Uncertainty Theory, Innovation Theory.

Module IV: Capital Budgeting **(12 Lectures)**

Meaning and Importance – Need for Capital Budgeting – Difficulties - Steps of Capital Budgeting - Investment Criteria –Payback Period – Net Present Value Method – Internal Rate of Return Methods.

Reference Books

Micro Economics - Paper I

1. Reference 1. A. Koutsoyainnis, (2015), Modern Microeconomics, 2nd edition, Palgrave Macmillan.
2. Paul Samuelson and W. Nordhaus, (2009), Economics, 19th edition: Economics, McGrawHill Publications.
3. Mankiw M.G (2015), Principles of Micro economics 7 th edition - Cengage Learning.
4. Anindya Sen, (2006), Microeconomics, OUP India Publisher.
5. M.L.Jhingan, (2006), "Microeconomics Theory", 5 th edition,Vrinda Publication (P) Ltd. 6. H.L.Ahuja, (2016), "Advance Economics Theory" S.Chand & Company Ltd.

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Changu Kana Thakur

Arts, Commerce and Science College, New Panvel Autonomous

Department of Hindi

Bachelor of Arts (B.A.) *Revised Syllabus for*

F.Y.B.A.-Hindi- Compulsory Paper

Choice Based Credit System (CBCS)

(60:40)

(To be implemented from Academic Year 2022-2023)

University of Mumbai

॥ विद्या विनयेन शोभते ॥

Janardan Bhagat Shikshan Prasarak Sanstha's

Changu Kana Thakur

Arts, Commerce and Science College, New Panvel Autonomous

Department of Hindi

Bachelor of Arts (B.A.) *Revised Syllabus for*

Academic Yeas-2022-2023

Board Studies in Hindi

Sr. No.	Name	Designation	Position
1	Prof. (Dr.) S.K. Patil	Principal	Member (Faculty)
2	Dr. U.T. Bhandare	Head, Department of Hindi	Chairman
3	Dr. (Mrs.) G.S. Tanwar	Assistant Professor	Member (Faculty)
4	Dr. Bisen Jogendrasingh Motisingh	Professor	Member (Faculty)
5	Dr. Hubnath Pandey	Professor	Member (Faculty)
6	Dr.Balkavi Suranje	Professor	Member (Faculty)
7	Dr. Sunita M. Sakhare	Associate Professor	Member (Faculty)
8	Dr. Gharat Arjun Janu	Associate Professor	Member (Faculty)
9	Mr. V. N. Ekambe	Rotary President,	Member (Faculty)

10	(Mrs.). Kavita Shaema	Ex-P.G.Students	Member (Faculty)

University of Mumbai

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Janardan Bhagat Shikshan Prasarak Sanstha's

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Affiliated to University of Mumbai

CONTENT

Bachelor of Arts (B.A.) *Revised Syllabus for Academic Yeas-2022-2023*

Sr.No.	*Class*	*Course Name of the paper*	*Paper No.*	*Paper Code*	*Credits*
1.	*FYBA*	Compulsory Hindi	Compulsory	*UAR1HNC*	*04*
2.	*FYBA*	Compulsory Hindi	Compulsory	*UAR2HNC*	*04*
3.	*FYBA*	*Optional Hindi*	*I*	*UAR1HN1*	*04*
4.	*FYAB*	*Optional Hindi*	*I*	*UAR1HN2*	*04*

Revised Scheme of Examination
Faculty of Arts
(Under-graduate Programmes)

Choice Based Credit System (CBCS)

❖ **Revised Scheme of Examination**

The performance of the learners shall be evaluated into two components. The learner's Performance shall be assessed by Internal Assessment with 40% marks in the first component by conducting the Semester End Examinations with 60% marks in the second component. The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below:-

A) Internal Assessment: 40 % 40 Marks

Sr. No.	Particular	Marks
01	One periodical class test / online examination to be conducted in the given semester	20 Marks
02	Any two tools out of these (10 Marks each) 1. Group/ Individual Survey Project 2. Presentation and write up on the selected topics of the subjects 3. Case studies / Test based on tutorials 4. Book Review /Poetry Appreciation/ Open Book Test 5. Quiz	20 Marks

(For Courses with Practical)

Sr. No.	Particular		Marks
01	**Practical Examination**		20 Marks
	Journal	05 Marks	
	Viva Voce	05 Marks	
	Laboratory Work	10 Marks	

02	Any two tools out of these (10 Marks each) 1. Group/ Individual Survey Project 2. Presentation and write up on the selected topics of the subjects / Case studies. 3. Test on Practical Skills 4. Open Book Test 5. Quiz	20 Marks

Question Paper Pattern

(Periodical Class Test/ online examination for the Courses at Under Graduate Programmes)

Maximum Marks: 20

Duration: 30 Minutes

Particular	Marks
Match the Column / Fill in the Blanks / Multiple Choice Questions/ True/False/Answer in One or Two Lines (Concept based Questions) (1 Marks each)	20 Marks

B) Semester End Examination: 60 % 60 Marks

- Duration: The examination shall be of 2 hours duration.

Question Paper Pattern

Theory question paper pattern
1. There shall be five questions each of 12 marks (24 marks with internal options). 2. All questions shall be compulsory with internal options. 3. Question may be subdivided into sub-questions a, b, c… and the allocation of marks depends on the weightage of the unit.

➢ **Passing Standard**

The learners to pass a course shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment and Semester End Examination. The learners shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 24 Out of 60) separately, to pass the course and minimum of Grade D, wherever applicable, to pass a particular semester. A learner will be said to have passed the course if the learner passes the Internal Assessment and Semester End Examination together.

Note: 1) **It is noted that the concerned regulation of the College is amended and implemented to all Semesters i.e. Semester I to Semester VI to all undergraduate programmes, under faculty of Arts, Commerce and Science with effect from the academic year 2022 - 2023.**

2) This revised scheme of evaluation is discussed in detail, finalised and accepted.

Semester-I

F.Y.B.A. Compulsory Hindi (अनिवार्य हिंदी)

Name of the Programme	**:**	**B.A.**
Name of the Course	**:**	**Compulsory Hindi (अनिवार्य हिंदी)**
Course Code	**:**	**UAR1HNC**
Total Lectures	**:**	**60**
Total Credit	**:**	**04**

List of Test Books

१. काव्य-कथा माला-संपादक-प्रोफेसर (डॉ.) उद्धव तुकाराम भंडारे, डॉ.गीतिका तंवर, विद्यापीठ प्रकाशन, मुबई

पाठ्यक्रम के लिए निर्धारित रचनाएँ

ईकाई-□ **व्याख्यान-१५**

१. बीती विभावरी जाग री-जयशंकर प्रसाद
२. जागो फिर एक बार-सूर्यकांत त्रिपाठी निराला
३. मैं नहीं चाहता चिर सुख-सुमित्रानन्दन पंत
४. कलगी बाजरे की-अज्ञेय

पाठ्यक्रम के लिए निर्धारित रचनाएँ

ईकाई-□□ **व्याख्यान-१५**

१. भूल गलती-गजानन माधव मुक्तिबोध
२. दस्ताने-सर्वेश्वरदयाल सक्सेना
३. सन्नाटा-भवानीप्रसाद मिश्र
४. मैं चाहती हूँ-निर्मल पुतुल

पाठ्यक्रम के लिए निर्धारित रचनाएँ

ईकाई-□□□ **व्याख्यान-१५**

१. ममता-जयशंकर प्रसाद
२. नमक का दारोगा-मुंशी प्रेमचन्द
३. शरणागत-वृंदावनलाल वर्मा
४. परदा-यशपाल

व्याकरण

ईकाई-□□ **व्याख्यान-१५**

१. भारतीय संविधान सामान्य परिचय
२. पत्र-लेखन
   १.आवेदन पत्र
   २.शिकायत पत्र
   3.संपादक के नाम पत्र
३. लिंग परिवर्तन
४. वचन परिवर्तन
५. पर्यायवाची शब्द
६. विलोम शब्द
७. भाववाचक शब्दों की रचना

प्रश्नपत्र का प्रारूप
Semester-I
F.Y.B.A. Compulsory Hindi (अनिवार्य हिंदी)

कुल अंक ६०

समय : २ घंटे

प्रश्न १. सन्दर्भ सहित व्याख्या:- १५

अ) (ईकाई एक में से विकल्प के साथ)

आ) (ईकाई दो में से विकल्प के साथ)

प्रश्न २. दीर्घोत्तरी प्रश्न १५

अ) (ईकाई एक और दो में से विकल्प के साथ)

प्रश्न ३.	दीर्घोत्तरी प्रश्न	१५
	अ) (ईकाई तीन में से विकल्प के साथ)	
प्रश्न ४.	व्याकरण	१५
	अ) पत्र-लेखन (दो में से एक) अथवा संविधान की भूमिका	०५
	आ) कोष्ठक की सूचनानुसार निम्नलिखित प्रश्नों के उत्तर लिखिए :	
	१.लिंग परिवर्तन (चार में से दो)	०२
	२.वचन परिवर्तन (चार में से दो)	०२
	३.पर्यायवाची शब्द (चार में से दो)	०२
	४.विलोम शब्द (चार में से दो)	०२
	५.भाववाचक शब्दों की रचना (चार में से दो)	०२

आंतरिक मूल्यांकन

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१.	कक्ष परीक्षा	२०
२.	इनमें से किन्हीं दो विषयों की परियोजना (प्रत्येक 10 अंक)	२०
	१.समूह/व्यक्तिगत सर्वेक्षण परियोजना	
	२.चयनित विषयों पर प्रस्तुतिकरण और लेखन	
	३.ट्यूटोरियल पर आधारित केस स्टडी / टेस्ट	

४.पुस्तक समीक्षा / कविता प्रशंसा / ओपन बुक टेस्ट

५.प्रश्नमंजूषा

Semester-II

F.Y.B.A. Compulsory Hindi (अनिवार्य हिंदी)

Name of the Programme	**:**	**B.A.**
Name of the Course	**:**	**Compulsory Hindi (अनिवार्य हिंदी)**

Course Code	**:**	**UAR2HNC**
Total Lectures	**:**	**60**
Total Credit	**:**	**04**

List of Test Books

१. काव्य-कथा माला-संपादक-प्रोफेसर (डॉ.) उद्धव तुकाराम भंडारे, डॉ.गीतिका तंवर, विद्यापीठ प्रकाशन, मुबई

पाठ्यक्रम के लिए निर्धारित रचनाएँ

ईकाई-I व्याख्यान-१५

१. मलबे का मालिक-मोहन राकेश
२. पिता-ज्ञानरंजन
३. पगडंडियों का जमाना-(व्यंग्य) हरिशंकर परसाई
४. भाषा और पर्यावरण-(कहानी) अनुपम मिश्र

पाठ्यक्रम के लिए निर्धारित रचनाएँ

ईकाई-II व्याख्यान-१५

१. बच्चे गवाह नहीं होते-(कहानी) पंकज बिष्ट
२. सत्यजित राय के पूर्वज-जयनारायण प्रसाद
३. सलाम- (कहानी) ओमप्रकाश वाल्मीकि
४. घीसा (रेखाचित्र) महादेवी वर्मा

पाठ्यक्रम के लिए निर्धारित रचनाएँ

ईकाई-III व्याख्यान-१५

१. वो हिम्मत करके पहले-जहीर कुरैशी
२. हस्ती के दोहे-हस्तीमल हस्ती

३. सूर्य का स्वागत-दुष्यंत कुमार
४. कविताओं वाली नदी-वन्दना टेटे

ईकाई-IV **व्याकरण** व्याख्यान-१५

१. अनुवाद
२. सूचना का आधिकार
३. वाक्य के भेद (रचना एवं अर्थ के आधार पर)
४. अशुद्धि शोधन १. शब्दगत २.वाक्यगत
५. उपसर्ग
६. प्रत्यय
७. मुहावरों तथा कहावतों का अर्थ एवं प्रयोग

प्रश्नपत्र का प्रारूप
Semester- II
F.Y.B.A. Compulsory Hindi (अनिवार्य हिंदी)

कुल अंक ६०

समय : २ घंटे

प्रश्न १. सन्दर्भ सहित व्याख्या:- १५

अ) (ईकाई एक में से विकल्प के साथ)

आ) (ईकाई दो में से विकल्प के साथ)

प्रश्न २.	दीर्घोत्तरी प्रश्न	१५
	अ) (ईकाई एक और दो में से विकल्प के साथ)	
प्रश्न ३.	दीर्घोत्तरी प्रश्न	१५
	अ) (ईकाई तीन में से विकल्प के साथ)	
प्रश्न ४.	व्याकरण	१५
	अ) अनुवाद (दो में से एक) अथवा सूचना का अधिकार	०५
	आ) कोष्ठक की सूचनानुसार निम्नलिखित प्रश्नों के उत्तर लिखिए :	
	१.वाक्य के भेद (रचना एवं अर्थ के आधार पर) (चार में से दो)	०२
	२.अशुद्धि शोधन: शब्दगत तथा वाक्यगत (चार में से दो)	०२
	३.उपसर्ग (चार में से दो)	०२
	४.प्रत्यय (चार में से दो)	०२
	५.मुहावरों तथा कहावतों का अर्थ एवं प्रयोग (चार में से दो)	०२

आंतरिक मूल्यांकन

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१.	कक्ष परीक्षा	२०
२.	इनमें से किन्हीं दो विषयों की परियोजना (प्रत्येक 10 अंक)	२०
	१.समूह/व्यक्तिगत सर्वेक्षण परियोजना	
	२.विषयों के चयनित विषयों पर प्रस्तुतिकरण और लेखन	

३.ट्यूटोरियल पर आधारित केस स्टडी / टेस्ट

४.पुस्तक समीक्षा / कविता प्रशंसा / ओपन बुक टेस्ट

५.प्रश्नमंजूषा

सन्दर्भ ग्रंथ सूची

अनु क्र	किताब का नाम	लेखक/संपादक का नाम	प्रकाशक का नाम
१.	हिंदी व्याकरण	कामता प्रसाद गुरु	संस्करण-१९८४-नागरी प्रचारणी सभा, वाराणसी
२	हिंदी व्याकरण मीमांसा	काशीराम शर्मा	चतुर्थ संस्करण-२०१६, राधाकृष्ण प्रकाशन प्रा.लि,

			७/३१, दरियागंज, नई दिल्ली
३.	हिंदी व्याकरण के नवीन क्षितिज	डॉ.रविन्द्र कुमार पाठक	दुसरा संस्करण-२०१२-भारतीय ज्ञानपीठ, दिल्ली-११०००३
४.	अभिनव व्यावहारिक पत्र-लेखन	डॉ.अनिल सिंह	पहला संस्करण-१९९९, ज्योति प्रकाशन, उल्लास नगर-४
५.	अकादमिक हिंदी व्याकरण	डॉ.भंडारे उद्धव	अकादमिक बुक इंडिया, दिल्ली ११००९०
६.	प्रयोजनमूलक हिंदी तथा भाषा कम्प्यूटिंग	संपादक डॉ.जमादार ए.एच.तथा प्रा.जान अहेमद के.जे.	अभिजित पब्लिकेशन, लातूर-४१३५१२
७.	सामयिक हिंदी निबन्ध	राजेन्द्र भटनागर	संस्करण- २०१०-सामयिक प्रकाशन, ३३२०-२१, जतवाडी, नेताजी सुभाष मार्ग, दरियागंज, नई दिल्ली-११०००२
८.	अच्छी हिंदी कैसे लिखें	संत समीर	पहला संस्करण-२०१३, प्रभात प्रकाशन, नई दिल्ली-११०००२
९.	निबंधमाला: हिंदी निबन्ध	डॉ.भंडारे उद्धव	अकादमिक बुक इंडिया, दिल्ली ११००९०

University of Mumbai

॥ ivaVa ivanayaona SaaoBato ॥

Janardan Bhagat Shikshan Prasarak Sanstha's

Changu Kana Thakur

Arts, Commerce and Science College, New Panvel
Autonomous

Revised Scheme of Evaluation for

Continuous Assessments and Semester End Examinations

for

Under-graduate Programmes

under

Faculty of Arts

Under Autonomous status with

Choice Based Credit System (CBCS)

University of Mumbai

॥ ivaVa ivanayaona SaaoBato ॥

Janardan Bhagat Shikshan Prasarak Sanstha's

Changu Kana Thakur

Arts, Commerce and Science College, New Panvel
Autonomous

Department of Hindi

Bachelor of Arts (B.A.) *Revised Syllabus for*

F.Y.B.A.-Hindi- Optional -I

Choice Based Credit System (CBCS)

(60:40)

(To be implemented from Academic Year 2022-2023)

University of Mumbai

II ivaVa ivanayaona SaaoBato II

Janardan Bhagat Shikshan Prasarak Sanstha's

Changu Kana Thakur

Arts, Commerce and Science College, New Panvel Autonomous

Department of Hindi

Bachelor of Arts (B.A.) *Revised Syllabus for*

Academic Yeas-2022-2023

Board Studies in Hindi

Sr. No.	Name	Designation	Position
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4	Dr. Bisen Jogendrasingh Motisingh	Professor	Member (Faculty)
5	Dr. Hubnath Pandey	Professor	Member (Faculty)
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9	Mr. V. N. Ekambe	Rotary President,	Member (Faculty)
10	(Mrs.). Kavita Shaema	Ex-P.G.Students	Member (Faculty)

Revised Scheme of Examination

Faculty of Arts
(Under-graduate Programmes)

Choice Based Credit System (CBCS)

❖ **Revised Scheme of Examination**

The performance of the learners shall be evaluated into two components. The learner's Performance shall be assessed by Internal Assessment with 40% marks in the first component by conducting the Semester End Examinations with 60% marks in the second component. The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below:-

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(For Courses with Practical)

Sr. No.	Particular		Marks
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	Journal	05 Marks	
	Viva Voce	05 Marks	
	Laboratory Work	10 Marks	
02	Any two tools out of these (10 Marks each) 1. Group/ Individual Survey Project 2. Presentation and write up on the selected topics of the subjects / Case studies. 3. Test on Practical Skills 4. Open Book Test 5. Quiz		20 Marks

Question Paper Pattern

(Periodical Class Test/ online examination for the Courses at Under Graduate Programmes)

Maximum Marks: 20

Duration: 30 Minutes

Particular	Marks
Match the Column / Fill in the Blanks / Multiple Choice Questions/ True/False/Answer in One or Two Lines (Concept based Questions) (1 Marks each)	20 Marks

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- Duration: The examination shall be of 2 hours duration.

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Theory question paper pattern
1. There shall be five questions each of 12 marks (24 marks with internal options). 2. All questions shall be compulsory with internal options. 3. Question may be subdivided into sub-questions a, b, c… and the allocation of marks depends on the weightage of the unit.

Passing Standard

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Note: 1) It is noted that the concerned regulation of the College is amended and implemented to all Semesters i.e. Semester I to Semester VI to all undergraduate programmes, under faculty of Arts, Commerce and Science with effect from the academic year 2022 - 2023.

2) This revised scheme of evaluation is discussed in detail, finalised and accepted.

Semester-I

F.Y.B.A. Optional Hindi-I (ऐच्छिक हिंदी)

Name of the Programme	**:**	**B.A.**
Name of the Course	**:**	**Optional Hindi (ऐच्छिक हिंदी)**
Course Code	**:**	**UAR1HN1**
Total Lectures	**:**	**60**
Total Credit	**:**	**04**

List of Test Books

१. श्रेष्ठ हिंदी कहानियाँ (कहानी संग्रह) १९९०-२००० सं. उमा शंकर चौधरी/ जोती चावला, पीपल्स पब्लिशिंग हॉउस प्रा. लिमिटेड

२. शेष यात्रा-उषा प्रियंवदा (उपन्यास) राजकमल प्रकाशन,

पाठ्यक्रम के लिए निर्धारित कहानियाँ

ईकाई-I व्याख्यान-१२

१. शवयात्रा-ओमप्रकाश वाल्मीकि
२. बाजार में रामधन-कैलास बनवासी
३. बिल्लियाँ बतियाती हैं- एस.आर.हरनोट

ईकाई-II व्याख्यान-१२

१. टोपी-संजय सहाय
२. सिफैलोटस-रघुनन्दन त्रिवेदी
३. नालन्दा पर गिध्द-देवेन्द्र

पाठ्यक्रम के लिए निर्धारित उपन्यास- शेष यात्रा-उषा प्रियंवदा

ईकाई-III व्याख्यान-१२

१. उषा प्रियंवदा का जीवन परिचय
२. शेष यात्रा उपन्यास की कथावस्तु
३. शेष यात्रा उपन्यास-पात्र परिचय
४. औपन्यासिक तत्वों के आधार पर चर्चा एवं अन्य प्रश्नोत्तर

ईकाई-IV व्याख्यान-१२

१. शेष यात्रा उपन्यास की समस्याएं
2. शेष यात्रा उपन्यास में प्रवासी जीवन
3. शेष यात्रा उपन्यास में जीवन संघर्ष
४. शेष यात्रा उपन्यास में अस्तित्व की कशमकश

ईकाई-V व्याकरण व्याख्यान-१२

१. संज्ञा
2. सर्वनाम
3. विशेषण
४. क्रिया
५. क्रिया विशेषण
६. लिंग

प्रश्नपत्र का प्रारूप

Semester-I

F.Y.B.A. Optional Hindi-I (ऐच्छिक हिंदी)

कुल अंक ६०

समय : २ घंटे

प्रश्न १.	सन्दर्भ सहित व्याख्या (ईकाई एक और दो में से विकल्प के साथ)	१२
प्रश्न २.	सन्दर्भ सहित व्याख्या (ईकाई तीन और चार में से विकल्प के साथ)	१२
प्रश्न ३.	दीर्घोत्तरी प्रश्न (ईकाई एक और दो में से विकल्प के साथ)	१२
प्रश्न ४.	दीर्घोत्तरी प्रश्न (ईकाई तीन और चार में से विकल्प के साथ)	१२
प्रश्न ५.	कोष्ठक की सूचनानुसार निम्नलिखित प्रश्न्नों के उत्तर लिखिए	१२
	१. संज्ञा (चार में से दो)	२
	२. सर्वनाम (चार में से दो)	२
	३. विशेषण (चार में से दो)	२
	४. क्रिया (चार में से दो)	२
	५. क्रिया विशेषण (चार में से दो)	२
	६. लिंग (चार में से दो)	२

	आंतरिक मूल्यांकन	४०
१.	कक्ष परीक्षा	२०
२.	इनमें से किन्हीं दो विषयों की परियोजना (प्रत्येक 20 अंक)	२०
	१.समूह/व्यक्तिगत सर्वेक्षण परियोजना	

२.चयनित विषयों पर प्रस्तुतिकरण और लेखन

३.ट्यूटोरियल पर आधारित केस स्टडी / टेस्ट

४.पुस्तक समीक्षा / कविता प्रशंसा / ओपन बुक टेस्ट

५.प्रश्नमंजूषा

Semester-II

F.Y.B.A. Optional Hindi-I (ऐच्छिक हिंदी)

Name of the Programme	**:**	**B.A.**
Name of the Course	**:**	**Optional Hindi (ऐच्छिक हिंदी)**

Course Code	**:**	**UAR2HN1**
Total Lectures	**:**	**60**
Total Credit	**:**	**04**

List of Test Books

१. गद्य विविधा

२. भगदड–डॉ.दामोदर खडसे (उपन्यास)
प्रथम संस्करण-१९९६, राधा कृष्ण प्रकाशन, दिल्ली

पाठ्यक्रम के लिए निर्धारित रचनाएँ

ईकाई-I व्याख्यान-१२

१. रज़िया (रेखाचित्र) रामवृक्ष बेनीपुरी
२. ऋषिकेश मुखर्जी के साथ ढाई दिन (संस्मरण)
मनोहर शाम जोशी
३. पहला सफेद बाल (व्यंग्य) हरिशंकर परसाई

ईकाई-II व्याख्यान-१२

१. ऋण जल धन जल (रिपोर्ताज अंश) फणीश्वरनाथ रेणु

२. पत्र मणि पुतुल के नाम (निबन्ध) कुबेरनाथ राय
३. आवारा मसीहा (जीवनी अंश) विष्णु प्रभाकर

पाठ्यक्रम के लिए निर्धारित उपन्यास- भगदड़- डॉ.दामोदर खडसे

ईकाई-III व्याख्यान-१२

१. डॉ. दामोदर खडसे का जीवन परिचय
२. भगदड़ उपन्यास की कथावस्तु
३. औपन्यासिक तत्वों के आधार पर चर्चा
४. भगदड़:उपन्यास का उद्देश्य

ईकाई-IV व्याख्यान-१२

१. भगदड़ उपन्यास के पात्रों का परिचय
२. भगदड़ उपन्यास की समस्याएँ
३. महानगर में उपन्यास में महानगरीय बोध
४. भगदड़ उपन्यास की भाषा शैली

ईकाई-V व्याकरण व्याख्यान-१२

१. संबंधसूचक
2. समुच्चयबोधक
3. विस्मयाधिबोधक
४. काल
५. वचन
६. समास

प्रश्नपत्र का प्रारूप

Semester-II

F.Y.B.A. Optional Hindi-I (ऐच्छिक हिंदी)

कुल अंक ६०

समय : २ घंटे

प्रश्न १. सन्दर्भ सहित व्याख्या (ईकाई एक और दो में से विकल्प के साथ) १२

प्रश्न २. सन्दर्भ सहित व्याख्या (ईकाई तीन और चार में से विकल्प के साथ) १२

प्रश्न ३. दीर्घोत्तरी प्रश्न (ईकाई एक और दो में से विकल्प के साथ) १२

प्रश्न ४.	दीर्घोत्तरी प्रश्न (ईकाई तीन और चार में से विकल्प के साथ)	१२
प्रश्न ५.	कोष्ठक की सूचनानुसार निम्नलिखित प्रश्न्नों के उत्तर लिखिए	१२
१.	संबंधसूचक (चार में से दो)	२
२.	समुच्चयबोधक (चार में से दो)	२
३.	विस्मयाधिबोधक (चार में से दो)	२
४.	काल (चार में से दो)	२
५.	वचन (चार में से दो)	२
६.	समास (चार में से दो)	२

आंतरिक मूल्यांकन

४०

१.	कक्ष परीक्षा	२०
२.	इनमें से किन्हीं दो विषयों की परियोजना(प्रत्येक 10 अंक)	२०

१.समूह/व्यक्तिगत सर्वेक्षण परियोजना

२.चयनित विषयों पर प्रस्तुतिकरण और लेखन

३.ट्यूटोरियल पर आधारित केस स्टडी / टेस्ट

४.पुस्तक समीक्षा / कविता प्रशंसा / ओपन बुक टेस्ट

५.प्रश्नमंजूषा

सन्दर्भ ग्रंथ सूची

अन् क्र	किताब का नाम	लेखक/संपादक का नाम	प्रकाशक का नाम
१.	श्रेष्ठ हिंदी कहानियाँ १९९० -२०००	उमा शंकर चौधरी/ जोति चावला	पीपुल्स पब्लिकेशन हॉउस प्रा.लि.
२	भगदड	डॉ.दामोदर खडसे	प्रथम संस्करण-१९९६, राधा कृष्ण प्रकाशन दिल्ली
३.	शेष यात्रा- उपन्यास	उषा प्रियंवदा	राजकमल प्रकाशन
४.	हिंदी उपन्यास साहित्य की परंपरा साठोत्तरी उपन्यास	डॉ.पारुकांत देसाई	२००२, चिंतन प्रकाशन कानपूर
५.	अकादमिक हिंदी व्याकरण	डॉ.भंडारे उद्धव	अकादमिक बुक इंडिया, दिल्ली ११००९०
६.	आधुनिक हिंदी साहित्य को अहिन्दी लेखकों का योगदान	डॉ.विलास गुप्ते	प्रथम संस्करण,१९७३, नवगीत प्रकाशन, मुंबई

७.	हिंदी उपन्यास कला	प्रताप नारायण टंडन	१९६५, हिंदी समिति सुचना विभाग, लखनऊ
८.	हिंदी साहित्य युग और प्रवृत्तियाँ	डॉ,शिवकुमार शर्मा	१२ वां. संस्करण,१९९०, अशोक प्रकाशन दिल्ली
९.	निबंधमाला: हिंदी निबन्ध	डॉ.भंडारे उद्धव	अकादमिक बुक इंडिया, दिल्ली ११००९०

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR ARTS, COMMERCE & SCIENCE COLLEGE, NEW PANVEL (AUTONOMOUS)

Re-accredited 'A+' Grade by NAAC
'College with Potential for Excellence' Status Awarded by UGC
'Best College Award' by University of Mumbai

Program: B.A

Revised Syllabus of F.Y.B.A. History
Choice Based Credit & Grading System (60:40)
w.e.f. Academic Year 2022-23

Sr. No.	Heading	Particulars
1	Title of Course	History
2	Course Code	BAUGHIS-I
3	Eligibility for Admission	12th Pass of all recognised Board
4	Passing marks	40%
5	Ordinances/Regulations (if any)	--
6	No. of Semesters	Two
7	Level	U.G.
8	Pattern	Semester (60:40)
9	Status	Revised
10	To be implemented from Academic year	2022-23

Preamble of the Syllabus

The Department of History was established in Changu Kana Thakur Arts, Commerce and Science College New Panvel (Autonomous), in 22nd September 1997-98. Since its inception, along with academics, it has excelled in establishing Co-Curricular and extra-curricular activities. The Choice Based Credit & Grade System implemented through this curriculum will help in the enhancement of the deep sense of nationalism, love and affection for the country and its countrymen. Importance of non-violence, agitations for achieving freedom from the British Imperialism and the constitutional development throughout the period stands out as an important fact of this new syllabus. To help establish a sound knowledge about the Modern History to the students of First Year has been its main motto. The syllabus is also designed keeping in mind about the needs and requirements of the Competitive Exam aspirants too. The new and the upgraded syllabus are based on the disciplinary approach with vigour and depth, taking care that the syllabus does not burden the young minds as such. A greater care has been taken to match its standards with syllabus of other Universities. Some other important shades of the Syllabus include the conceptual understanding, Socio-religious Reform Movement, obtaining basic ideas of the Subaltern movements towards empowerment etc.

Course Code: BAUGHIS-I

Course Title: History of Modern India (1857 C.E. - 1947 C.E.)

Academic Year: 2022-23

Objectives:

- To understand the impact of Revolt of 1857 and the rise of political insights with the emergence of Provincial Associations and Indian National Congress.
- To analyse the air of Indian Nationalism through the Gandhian and Non Gandhian movements.
- To study the reforms generated by the Socio-Religious Movements in the Indian scenario.
- To identify the role played by Education, Press and Transport in shaping the Indian Society.
- To gain insights regarding the Land Revenue policy, Industrial Policy, Trade and Commerce policies as well as the Drain Theory.
- To have a better understanding of various suppressed factions of society such as women, Dalit's, peasants and labours.

Learners Outcome:

- Illustrate the importance of revolt of 1857 and its significance to create awareness about the freedom
- Adopt the process of healthy nationalism and secularism by studying work of social reformers and freedom fighters.
- Analyse the role of western education and Newspapers in freedom struggle in India
- To study the development of Subaltern factors in the History of Modern India.

F. Y. B. A. History

For the subject of History there shall be two papers for 60 lectures each comprising of four units of 15 L each.

Semester-I

1. Paper- I Unit-I will be on Political Awareness.
2. Paper- I Unit-II will be on Indian Nationalism
3. Paper- I Unit-III will be on Gandhian Era
4. Paper- I Unit-IV Will be on Towards Independence

Semester-II

1. Paper-I Unit-I will be on Reform Movements
2. Paper-I Unit-II will be on Modern education, press, Communication.
3. Paper-I Unit-III will be on British rule and Indian Economy
4. Paper-I Unit-III will be on Subaltern Movement

Scheme of Examination for Each Semester

The performance of the learners shall be evaluated into two components. The learner's Performance shall be assessed by Internal Assessment with 40% marks in the first component by conducting the Semester End Examinations with 60% marks in the second component. The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below:-

A) Internal Assessment: 40 **%** **40 Marks**

Sr. No.	Particular	Marks
01	One periodical class test / online examination to be conducted in the given semester	**20 Marks**
02	Any two tools out of these (10 Marks each) 1. Group/ Individual Survey Project 2. Presentation and write up on the selected topics of the subjects 3. Case studies / Test based on tutorials 4. Book Review /Poetry Appreciation/ Open Book Test 5. Quiz	**20 Marks**

Question Paper Pattern
(Periodical Class Test/ online examination for the Courses at Under Graduate Programmes)

Maximum Marks: 20
Duration: 30 Minutes

Particular	Marks
Match the Column / Fill in the Blanks / Multiple Choice Questions/ True/False/Answer in One or Two Lines (Concept based Questions) (1 Marks each)	**20 Marks**

B) Semester End Examination: 60 % 60 Marks

- Duration: The examination shall be of 2 hours duration.

Question Paper Pattern

Theory question paper pattern
1. There shall be **five** questions each of **12 marks** (**24 marks** with internal options). 2. All questions shall be compulsory with internal options. 3. Question may be subdivided into sub-questions a, b, c… and the allocation of marks depends on the weightage of the unit.

➢ **Passing Standard**

The learners to pass a course shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment and Semester End Examination. The learners shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 24 Out of 60) separately, to pass the course and minimum of Grade D, wherever applicable, to pass a particular semester. A learner will be said to have passed the course if the learner passes the Internal Assessment and Semester End Examination together.

Note: 1) It is noted that the concerned regulation of the College is amended and implemented to all Semesters i.e. Semester I to Semester VI to all undergraduate programmes, under faculty of Arts, Commerce and Science with effect from the academic year 2022 - 2023.

2) This revised scheme of evaluation is discussed in detail, finalised and accepted.

Choice Based Credit System (CBCS)
F.Y.B. A. History Syllabus
To be implemented from the Academic year 2022-23
SEMESTER I
HISTORY OF MODERN INDIA (1857 C.E-1947C.E)
Course Code: BAUGHIS-I (Credit- 03)

Module I: Growth of Political Awareness (15 Lectures)

A. Revolt of 1857: Causes and Consequences

B. Emergence of the Provincial Associations

C. Foundation of the Indian National Congress

Module II: Trends in Indian Nationalism (15 lectures)

A. Moderates

B. Extremists

C. Revolutionary Nationalist

Module III: Gandhian Movement (15 Lectures)

A. Gandhian Ideology of Satyagraha, Non- Violence and Non Co-operation Movement

B. Civil Disobedience Movement

C. Quit India Movement

Module IV: Towards Independence and Partition (15 Lectures)

A. Constitutional Development (1909-1935)

B. Indian National Army and Naval Mutiny (1942-1947)

C. Towards Independence

References:

English Reference Books:-

1. Aloysius G., Nationalism Without Nation in India, OUP, New Delhi, 1998.

2. Bandyopadhyay Sekhar, From Plassey to Partition: A History of Modern India, Orient Longman, New Delhi, 2004.

3. Bhattachaterjee Arun, History of Modern India, (1707-1947), Ashish Publishing House, New Delhi,1976.

4. Chakravarti Aroop, The History of India (1857- 2000) Pearson, New Delhi, 2012

5. Chandra Bipin et al., India's Struggle for Independence, Penguin,

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7. Chandra Bipin, Rise and Growth of Economic Nationalism in India, Delhi,1966.

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14. Desai A.R., Social Background of Indian Nationalism, 5 th Edition, Popular Prakashan, Bombay, 1976.

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26. Seal Anil, The Emergence of Indian Nationalism: Competition and Collaboration in the Later Nineteenth Century, Cambridge University Press, 1971.

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31.Tirtha K., History of Modern India, Shikhar Publications, Delhi, 1st edition-2017

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33. Wolpert, S.A., Tilak and Ghokle, Revolution and Reform in the making of Modern India,University of California Press,1962

BOOKS IN MARATHI:

१. बारगळ बा. सा., ढवळे, आर्वाचीन भारताचा इतिहास, विद्या प्रकाशन, नागपूर प्रथम आवृत्ती-१९९६

२. चंद्र बिपीन आणि इतर; स्वातंत्र्य लढा, श्री साईनाथ प्रकाशन, नागपूर.

३. ग्रोवर,भालेकर; आधुनिक भारताचा इतिहास; एस. चांद प्रकाशन

४. जोशी प्र. न.; भारतीय स्वातंत्र्याचा इतिहास, स्नेहवर्धन पब्लिशिंग हाउस,पुणे, द्वितीय आवृत्ती,१९९७.

५. कोलारकर श. गो., आधुनिक भारताचा इतिहास(१८५७ ते १९६०), श्री. मंगेश प्रकाशन, नागपूर, द्वितीय आवृत्ती-१९९८.

६. पवार जयसिंगराव; आधुनिक हिंदुस्थानचा इतिहास; विद्या प्रकाशन, नागपूर.

७. सरकार सुमित, आधुनिक भारत, राजकमल पब्लिकेशन्स, नवी दिल्ली, २००९

८. वैद्य सुमन,कोठेकर;स्वतंत्र भारताचा इतिहास, श्री साईनाथ प्रकाशन, नागपूर.

Choice Based Credit System (CBCS)
F.Y.B. A. History Syllabus
To be implemented from the Academic year 2022-23
SEMESTER II

HISTORY OF MODERN INDIA

(1857 C.E- 1947 C.E)

Course Code: BAUGHIS-I (Credit- 03)

Module I: Socio-Religious Reform Movement (15 Lectures)

A. Brahmo Samaj, Arya Samaj and Ramakrishana Mission

B. Satyashodhak Samaj, Aligarh Movement and Singh Sabha Movement.

C. Impact of Reform Movements

Module II: Education, Press & Communication (15 Lectures)

A. Promotion of Western Education and Impact on Indian Society

B. Development of Press

C. Modern Transport and Communication

Module III: Impact of British Rule on Indian Economy (15 Lectures)

A. Agricultural Policy during British period Special reference Revenue System

B. Growth of Trade, Commerce and Industries

C. Drain Theory

Module IV: Subaltern Movement (15 Lectures)

A. Peasants and Tribes

B. Dalit's and Labours

C. Women

References:

English Reference Books:-

1. Aloysius G., Nationalism Without Nation in India, OUP, New Delhi, 1998.

2. Bandyopadhyay Sekhar, From Plassey to Partition: A History of Modern India, Orient Longman, New Delhi, 2004.

3. Bhattachaterjee Arun, History of Modern India, (1707-1947), Ashish Publishing House, New Delhi,1976.

4. Chakravarti Aroop, The History of India (1857- 2000) Pearson, New Delhi, 2012

5. Chandra Bipin et al., India's Struggle for Independence, Penguin,

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7. Chandra Bipin, Rise and Growth of Economic Nationalism in India, Delhi,1966.

8. Chattergy Partho, The Nation and its Fragments, OUP, New Delhi,1933.

9. Chopra P.N., Puri B.N., Das M. N., Pradhan A.C., A Comprehensive History of Modern India, Sterling Publishers, 2003.

10. Chakrabarthy, Bidyut and Pandey, Rajendra Kumar, Modern Indian Political Thought, Text & Context, Sage Publications, 2009

11. Chandra, Bipin, History of Modern India, Orient Black Swan Publications, 2009

12. Chaudhari, K. C, History of Modern India, New Cental Agency Book Ltd, 2011

13. Chaurasia,P.N, Puri B.N, Das M.N, Pradhan A.C., A Comprehensive History of Modern India, Sterling Publishers, 2003

14. Desai A.R., Social Background of Indian Nationalism, 5 th Edition, Popular Prakashan, Bombay, 1976.

15. Ganachari Arvind, Nationalism and Social Reforms in a Colonial Situation, Kalpaz Publication, New Delhi,2005.

16.Gajrani S., History of Modern India, Commonwealth Publications, Delhi, 1st Edition-2013

17. Grover B.L., Grover S., A New Look at Modern Indian History (1707- Present Day), S.Chand And Company, New Delhi,2001.

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19.Keswani K.B., History of Modern India, (1800- 1964), Himalaya Publishing House, Bombay, 1996.

20.Mujumdar R.C., Comprehensive history of India, Vol.3(Part III), People's Publishing house.

21. Mehrotra S.R., Emergence of Indian National Congress, Vikas Publications, Delhi, 1971

22. Nanda S.P., History of Modern India, (1707-Present Time), Dominant Publications, New Dilhi,2012.

23. Pannikar K. N.(ed.), National and Left Movement in India, Vikas Publishing House Pvt. Ltd, New Delhi, 1980.

24. Ray Rajat, Industrialization of India: Growth and Conflict in the Private Corporate Sector,1914-47, OUP, Delhi, 1982.

25. Sarkar Sumit, Modern India 1885-1947, Macmillan, madras,1996.

26. Seal Anil, The Emergence of Indian Nationalism: Competition and Collaboration in the Later Nineteenth Century, Cambridge University Press, 1971.

27. Kulke, Hermann and Rothermund, Dietmar., A history of India, Routledge, Third Edition

28.Markovits, Claude(ed.) A History of Modern India, Anthem Press,1994

29. Nanda, B.R , Ghokle: The Indian Moderates and the British Raj, Oxford University Press,Bombay, 1993

30. Tara chand., History of Freedom Movement in India, Vols. 1-4

31.Tirtha K., History of Modern India, Shikhar Publications, Delhi, 1st edition-2017

31. Tucker,R., Ranade and the roots of Indian Nationalism, Popular Prakashan, Bombay,1977

33. Wolpert, S.A., Tilak and Ghokle, Revolution and Reform in the making of Modern India,University of California Press,1962

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१. बारगळ बा. सा., ढवळे, आर्वाचीन भारताचा इतिहास, विद्या प्रकाशन, नागपूर प्रथम आवृत्ती-१९९६

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University of Mumbai

Revised Syllabus
and
Question Paper Pattern
of Courses of
Bachelor of Commerce (B.Com.)
Programme
First Year
Semester I and II

Under Choice Based Credit, Grading and Semester System

(To be implemented from Academic Year- 2022-2023)

Faculty of Commerce

Bachelor of Commerce (B.Com.)Programme

Under Choice Based Credit, Grading and Semester System

Course Structure

F.Y.B.Com.

(To be implemented from Academic Year- 2022-2023)

No. of Courses	Semester I	Credits	No. of Courses	Semester II	Credits
1	***Elective Courses (EC)***		***1***	***Elective Courses (EC)***	
1A	***Discipline Specific Elective(DSE)Courses***		***1A***	***Discipline Specific Elective(DSE)Courses***	
1	Accountancy and Financial Management - I	**03**	1	Accountancy and Financial Management - II	**03**
1B	***Discipline Related Elective(DRE)Courses***		***1B***	***Discipline Related Elective(DRE)Courses***	
2	Commerce - I	**03**	2	Commerce - II	**03**
3	Business Economics - I	**03**	3	Business Economics - II	**03**
2	***Ability Enhancement Courses (AEC)***		***2***	***Ability Enhancement Courses (AEC)***	
2A	***Ability Enhancement Compulsory Courses (AECC)***		***2A***	***Ability Enhancement Compulsory Courses (AECC)***	
4	Business Communication - I	**03**	4	Business Communication - II	**03**
5	Environmental Studies - I	**03**	5	Environmental Studies - II	**03**
2B	****Skill Enhancement Courses (SEC)***		***2B***	*****Skill Enhancement Courses (SEC)***	
6	Any one course from the following list of the courses	**02**	6	Any one course from the following list of the courses	**02**
3	***Core Courses (CC)***		***3***	***Core Courses (CC)***	
7	Mathematical and Statistical Techniques - I	**03**	7	Mathematical and Statistical Techniques - II	**03**
	Total Credits	**20**		**Total Credits**	**20**

****List of Skill Enhancement Courses (SEC) for Semester I (Any One)***		*****List of Skill Enhancement Courses (SEC) for Semester II (Any One)***	
1	Foundation Course - I	1	Foundation Course - II
2	Foundation Course in NSS - I	2	Foundation Course in NSS - II
3	Foundation Course in NCC - I	3	Foundation Course in NCC - II
4	Foundation Course in Physical Education - I	4	Foundation Course in Physical Education - II
Note: Course selected in Semester I will continue in Semester II			

Bachelor of Commerce (B.Com.) Programme

Under Choice Based Credit, Grading and Semester System

Course Structure

(To be implemented from Academic Year- 2022-2023)

Semester I

Revised Syllabus of Courses of B.Com. Programme at Semester I with Effect from the Academic Year 2022-2023

Elective Courses (EC)-
Discipline Related Elective (DRE) Courses

Commerce I

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Business	12
2	Business Environment	11
3	Project Planning	12
4	Entrepreneurship	10
	Total	**45**

Course Outcome:

CO1: Explain concept of Business , Objectives of Business and New Trends in Business.

CO2: List Constituents of Business Environment, Impact of WTO and Trading Blocs.

CO3: Discover Project Planning, Promotion of Business Unit and statutory Requirement in promoting Business Unit.

CO4: Develop Competencies of Entrepreneurship.

Sr. No.	Modules / Units
1	**Business and Business Environment**
	Introduction: Concept, Functions, challenges of business. Traditional and Modern Concept of business. Steps in setting business objectives, classification of business objectives. **Business Environment:** Concept and Importance of business environment, Inter-relationship between Business and Environment, Constituents of Business Environment, PESTEL Analysis. **International Environment** –Introduction to International Business and significance of International Business, WTO and Trading Blocs and their impact on Indian Business.
2	**Project Planning**
	Introduction: Business Planning Process; Concept and importance of Project Planning; Project Report; feasibility Study types and its importance **Business Unit Promotion:** Concept and Stages of Business Unit Promotion, Location – Factors determining location, and Role of Government in Promotion. **Statutory Requirements in Promoting Business Unit:** Licensing and Registration procedure, Filling returns and other documents, Other important legal provisions.
3	**Entrepreneurship**
	Introduction: Concept and importance of entrepreneurship, factors Contributing to Growth of Entrepreneurship, Entrepreneur and Manager, Entrepreneur and Intrapreneur **The Entrepreneurs:** Types of Entrepreneurs, Competencies of an Entrepreneur, Entrepreneurship Training and Development centers in India. Incentives to Entrepreneurs in India. **Women Entrepreneurs:** Problems and Promotion.
4	**New Trends in Business and Strategy alternative in changing scenario**
	New Trends in Business: Impact of Liberalization, Privatization and Globalization, Strategy alternatives in the changing scenario, Restructuring and turnaround strategies **Strategies for going Global:** MNC, TNC, FDI **Contemporary Aspects in Business:** concept and scope of CSR, Corporate Governance and its' impact.

Bachelor of Commerce (B.Com.) Programme

Under Choice Based Credit, Grading and Semester System

Course Structure

(To be implemented from Academic Year- 2022-2023)

Semester II

Revised Syllabus of Courses of B.Com. Programme at Semester II with Effect from the Academic Year 2022-2023

Elective Courses (EC)-
Discipline Related Elective(DRE) Courses

2. Commerce II

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Concept of Services	12
2	Retailing	12
3	Recent Trends in Service Sector	10
4	E-Commerce	11
	Total	**45**

Course Outcome:

CO1: Explain Concept of service, Marketing Mix for Services and service strategies

CO2: Summarize Retailing, its format and Retail scenario.

CO3: Compare Recent Trends and Conventional Trends in the Service Sector namely ITES sector, Banking Sector and Logistics.

CO4: Evaluate E-Commerce, its Types and Models.

Sr. No.	Modules / Units
1	**Concept of Services**

	Introduction: Meaning, Characteristics, Scope and Classification of Services – Importance and Challenges of service sector in the Indian **Marketing Mix Services:** Consumer expectations, Services Mix, - Product, Place, Price, Promotion, Process of Services delivery, Physical evidence and people **Service Marketing** : Concept, Service Marketing Triangle, Role of Service in Modern Economy, Goods v/s Service Marketing.
2	**Retailing**
	Introduction: Concept of organized and unorganized retailing , Trends in retailing, growth of organized retailing in India, Survival strategies for unorganized Retailers. **Retail Format:** Store format, Non – Store format, Store Planning, design and layout **Retail Scenario:** Retail Scenario in India and Global context – Prospects and Challenges in India. Mall Management – Retail Franchising. FDI in Retailing, Careers in Retailing
3	**Recent Trends in Service Sector**
	ITES Sector: Concept and scope of BPO, KPO, LPO and ERP. **Banking Sector:** Methods of E-Payment (Debit & Credit Cards, Smart Cards, E-Wallets ,NEFT ,RTGS) Payment Gateways , online banking and M- Banking (Importance and risk involved), FDI and its impact on Banking in India, Insurance- Features, Principles, Types, Opportunities and Challenges. IRDA **Logistics:** Net working – Importance – Challenges-Trends in Logistics
4	**E-Commerce**
	Introduction: Meaning, Features, Functions and Scope of E-Commerce-Importance and Limitations of E-Commerce **Types of E-Commerce:** Basic ideas and Major activities of B2C,B2B, C2C. **Present status of E-Commerce in India:** Transition to E-Commerce in India, E-Transition Challenges for Indian Corporates , Government E-Market place, World Wide Web- Concept of Web Server, Web Site, Web page, Principles of Website Design.

Semester I and II

with effect from the Academic Year 2022-2023

Reference Books

Commerce I
● *Business Organisation Management Maheshwari, Rajendra P ,Mahajan, J.P.,International Book House*
● *Business Organisation, Maheshwari, Rajendra P, Mahajan, J.P., International Book House*
● *Introduction To Commerce, Vikram, Amit, Atlantic Pub*
● *A Course Book On Business Environment, Cherunilam,Francis, Himalaya Pub*
● *Business Environment, Cherunilam,Francis, Himalaya Pub*
● *Essentials Of Business Environment, Aswathappa,K., Himalaya Pub*
● *Essentials Of Business Environment, Aswathappa, Himalaya Pub*
● *Strategic Management, Kapoor, Veekkas, Taxmann*
● *Strategic Management, David,Fred R., Phi Leraning*
● *Strategic Management, Bhutani, Kapil, Mark Pub.*
● *Strategic Management, Bhutani, Kapil, Mark Pub.*
● *Entrepreneurship, Hisrich, Robert D, Mc Graw Hill*
● *Entrepreneurship Development, Sharma, K.C., Reegal Book Depot*

Commerce II
● *Service Marketing, Temani, V.K., Prism Pub*
● *Service Marketing, Temani, V.K., Prism Pub*
● *Management Of Service Sector, Bhatia, B S, V P Pub*
● *Introduction To E – Commerce, Dhawan, Nidhi, International Book House*
● *Introduction To Retailing, Lusch,Robert F., Dunne,Patrick M., Carver,James R.,Cengage Learning*
● *Retailing Management, Levy Michael., Weitz Barton A,Tata Mcgraw Hill*

PAPER PATTERN

COMMERCE PAPER I & II

SEMESTER – I & II

W.E.F. 2022-2023

Q.1 Write any Two out of Four **15**

A)

B)

C)

D)

Q.2 Write any Two out of Four **15**

A)

B)

C)

D)

Q.3 Write any Two out of Four **15**

A)

B)

C)

D)

Q.4 Write any Two out of Four **15**

A)

B)

C)

D)

J.B.S.P.Sanstha's

Changu Kana Thakur Arts,Commerce and Science College,

New Panvel

(Autonomous)

Bachelor of Commerce (B.Com) Programme

F.Y.B.Com.

Two Semesters

Course Structure

Under Choice Based Credit System

To be implemented from Academic Year- 2022-2023

Department of Accountancy

Batchler of Commerce (B.Com) Programme

Under Choice Based Credit, Grading and Semester System

Course Structure

FYBCOM

(To be implemented from Academic Year- 2022-2023)

No. of Courses	Semester I	Credits	No. of Courses	Semester II	Credits
1	***Core Courses (CC)***		***1***	***Core Courses (CC)***	
1	Accountancy and Financial Management - 1	**03**	1	Accountancy and Financial Management - 2	**03**
	Total Credits	**03**		**Total Credits**	**03**

Revised Syllabus of F.Y. B.Com Courses of B.Com. Programme at Semester I
with effect from the Academic Year 2022-2023

Elective Courses (EC)

Discipline Specific Elective (DSE) Courses

1. Accountancy and Financial Management - I

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Ind AS 16 – i.e. Property, Plant and Equipment Depreciation – Straight Line and Written Down Value Method	15
2	Final Accounts of Limited Liability Partnership [LLP]	15
3	Departmental Accounts	15
4	Bank Reconciliation Statement (BRS)	15
	Total	**60**

UG - Course Outcomes (Cos)
Semester – I

Name of the Programme B.Com	**Programme Coordinator** **Dr.S.B.Yadav**	**Head of the Department** **Dr. S.B. Yadav**
Subject: Accountancy and Financial Management – I	**Course: Accountancy and Financial Management – I** **Course code - UCM1AF1**	**Course Coordinator – Dr.S.B. Yadav**
	After completing the course, students will be able to;	Bloom Taxonomy Level (BTL)
CO1	Define the accounting standards.	I. Remembering
CO2	Solve LLP concern final account.	III. Applying
CO3	Solve departmental final account.	VI. Creating
CO4	Compare Bank Balance and Cash Balance	V. Evaluating

Sr. No.	Modules / Units
1	**Ind AS 16 – i.e. Property, Plant and Equipment**
	● Ind AS 16 – i.e. Property, Plant and Equipment ● Depreciation – Problems based on Straight Line and Written Down Value Method
2	**Final Accounts of Limited Liability Partnership [LLP]**
	● Statutory provisions ● Final accounts of LLP with all standard adjustments.
3	**Departmental Accounts**
	● Meaning of Departmental Accounts ● Basis of Allocation of Expenses and Incomes/Receipts ● Inter Departmental Transfer : at Cost Price and Invoice Price ● Stock Reserve ● Departmental Trading and Profit & Loss Account and Balance Sheet
4	**Bank Reconciliation Statement (BRS)**
	● Meaning and use of BRS ● Practical problem based on BRS

Revised Syllabus of F.Y.B.COM Courses of
B.Com. Programme
At Semester II
With Effect from the Academic Year 2022-2023

Elective Courses (EC)- Discipline Specific Elective(DSE) Courses

2. Accountancy and Financial Management II

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Accounting from Incomplete Records	15
2	Consignment Accounts	15
3	Branch Accounts	15
4	Inventory Valuation	10
5	Accounting In Computerized Environment	05
	Total	**60**

UG - Course Outcomes (Cos)
Semester – II

Name of the Programme B.Com	Programme Coordinator – Dr.S.B.Yadav	Head of the Department Dr.S.B. Yadav
Subject: Accountancy and Financial Management – I	**Course: Accountancy and Financial Management – I Course code – UCM2AF2**	**Course Coordinator – Dr.S.B. Yadav**
	After completing the course, students will be able to;	Bloom Taxonomy Level (BTL)
CO1	Define the conversion method in incomplete records of accounting.	I. Remembering
CO2	Find del-creder commission in consignment accounts.	I. Remembering
CO3	Construct the Branch Profit or Loss	VI. Creating
CO4	Build new company in tally ERP 9.	VI. Creating

Sr. No.	Modules / Units
1	**Accounting from Incomplete Records**
	• Introduction • Problems on preparation of final accounts of Proprietary Trading Concern (conversion method)
2	**Consignment Accounts**
	• Meaning of Consignment • Accounting for consignment transactions • Valuation of stock • Invoicing of goods at higher price(excluding overriding commission, normal/abnormal losses)
3	**Branch Accounts**
	• Meaning/ Classification of branch • Accounting for Dependent Branch not maintaining full books. • Debtors method Stock and debtors method.
4	**Inventory Valuation**
	• Meaning of inventories Cost for inventory valuation • Inventory systems : Periodic Inventory system and Perpetual Inventory System Valuation: Meaning and importance • Methods of Stock Valuation as per Ind AS – 2 : • FIFO and Weighted Average Method Computation of valuation of inventory as on balance sheet date: If inventory is taken on a date after the balance sheet or before the balance sheet
5	**Accounting In Computerized Environment**
	• Manual vs Computerized Accounting System • Tally ERP 9 • Creation of company • Group • Ledger

Reference Books

Reference Books

Accountancy and Financial Management

• Introduction to Accountancy by T. S. Grewal, S. Chand and Company (P) Ltd., New Delhi Advance Accounts by Shukla & Grewal, S. Chand and Company (P) Ltd., New Delhi

• Advanced Accountancy by R. L Gupta and M Radhaswamy, S. Chand and Company (P) Ltd., New Delhi

• Modern Accountancy by Mukherjee and Hanif, Tata Mc. Grow Hill & Co. Ltd., Mumbai Financial Accounting by LesileChandwichk, Pentice Hall of India Adin Bakley (P) Ltd.

• Financial Accounting for Management by Dr. Dinesh Harsalekar, Multi-Tech. Publishing Co. Ltd., Mumbai.

• Financial Accounting by P. C. Tulsian, Pearson Publications, New Delhi Accounting Principles by Anthony, R.N. and Reece J.S., Richard Irwin Inc.

• Financial Accounting by Monga, J.R. Ahuja, GirishAhujaandShehgal Ashok, Mayur Paper Back

• Compendium of Statement & Standard of Accounting, ICAI.

• Indian Accounting Standards, Ashish Bhattacharya, Tata Mc. Grow Hill & Co. Ltd., Mumbai Financial Accounting by Williams , Tata Mc. Grow Hill & Co. Ltd., Mumbai

• Company Accounting Standards by ShrinivasanAnand, Taxman. Financial Accounting by V. Rajasekaran, Pearson Publications, New Delhi. Introduction to Financial Accounting by Horngren, Pearson Publications.

• Financial Accounting by M. Mukherjee.M. Hanif. Tata McGraw Hill Education Private Ltd; New Delhi

J.B.S.P.Sanstha's

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Question Paper Pattern

(Internal Assessment- 40 Marks)

1. 20 Marks Class Test
2. 10 Marks Assignment (Internal Tool)
3. 10 Marks Quiz (Internal Tool)

1. Maximum Marks: 20 marks [Class Test]

Questions to be set: 20

Duration: 20 Minutes

Question No	Particular	Marks
Q-1	Objective Questions Students to answer all 20 questions *(*Multiple choice/ True or False/ Match the columns/ Fill in the blanks)*	20 Marks

2. 10 Marks Case Study (Internal Tool)

Case Study for 10 Marks Time Limit 30 Minutes

3. 10 Marks Quiz (Internal Tool)

Quiz of 10 Marks on Google Form 10 quiz questions of 1 mark each to be asked based on the course work. Time limit 10 Minutes.

Question Paper Pattern
(Practical Courses)

Maximum Marks: 60

Questions to be set: 04

Duration: 2 Hrs.

All Questions are Compulsory Carrying 15 Marks each.

Question No	Particular	Marks
Q-1 Q-1	Practical Question ***OR*** Practical Question	15 Marks 15 Marks
Q-2 Q-2	Practical Question ***OR*** Practical Question	15 Marks 15 Marks
Q-3 Q-3	Practical Question ***OR*** Practical Question	15 Marks 15 Marks
Q-4 Q-4	*(a) Theory Question* *(b) Theory Question* ***OR*** Short Notes *(Any three out of five)*	7 Marks 8 Marks 15 Marks

Note:
Full length question of 15 marks may be divided into two sub questions of 08 and 07 marks.

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR ARTS, COMMERCE & SCIENCE COLLEGE, NEW PANVEL (AUTONOMOUS)

Re-accredited 'A+' Grade by NAAC
'College with Potential for Excellence' Status Awarded by UGC
'Best College Award' by University of Mumbai

Department of Accounting & Finance

Board of Studies in Accounting & Finance

Program: B.Com. Accounting & Finance

Revised Syllabus of F.Y.B.Com. Accounting & Finance
Sem. I & II
Choice Based Credit & Grading System (60:40)
w.e.f. Academic Year 2022-23

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B. Com. Accounting & Finance Syllabus

Sr. No.	Heading	Particulars
1	Title of Programme	B.Com. Accounting & Finance
2	Eligibility for Admission	HSC / equivalent examination passed from Higher Secondary Education Board
3	Passing marks	45% for General category 40% for Reserved category
4	Ordinances/Regulations (if any)	---
5	No. of Semesters	Six
6	Level	U.G.
7	Pattern	Semester (60:40)
8	Status	Revised
9	To be implemented from Academic year	2022-2023

Programme - B.Com. Accounting and Finance

Preamble

The B.Com. Accounting and Finance programme is started with an aim to produce ethical accounting graduates who have the academic and professional base of knowledge to meet the challenges posed by a dynamic global business environment through our teaching, service and research.

The main objectives of the Program are:

- To inculcate practical approach amongst the learners by using innovative technology in the field of Accounting and Finance.
- To enable learners to be an active instrument in changing business environment in global scenario.
- To produce quality graduates who can apply fundamental and specialist knowledge to critically evaluate business and management issues and provides solutions.
- To prepare the learners to be a true nation builders through the world of Accounting and Finance.
- To equip the learners with fundamental accounting skills and principles necessary for the preparation of books of accounts and financial statements.
- To equip the learners with theoretical and practical skills in ICT to enable them compete favourably in today's knowledge economy.
- To equip learners with communication skills required to effectively run and manage business office.
- To give learners the knowledge that will sharpen their understanding of the systems of Accounting and Finance.
- To describe the scope of financial management as a function of firm, to enable Students understand the decision making process in key financial management areas.

Programme Outcomes

PO1-Disciplinary knowledge: Capable to demonstrate comprehensive knowledge of Accountancy, Commerce and Management.

PO2-Communication Skills: Develop ability to express thoughts and ideas effectively in writing and oral related to business Communication.

PO3-Critical thinking: Ability to recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

PO4-Problem solving: Ability to think rationally, analyse situations and solve problems adequately.

PO5- Research-related skills: Able to create a sense of inquiry and capability for asking relevant and appropriate questions related to Accountancy, Commerce and Management.

PO6- Cooperation/Team work: To work effectively and respectfully in different groups in the society and able to facilitate cooperative efforts as a member of a team.

PO7- Scientific reasoning: Ability to critically analyse, interpret data and draw conclusions with open mind in the field of Accountancy, Commerce and Management.

P08-Information/digital literacy: Ability to use ICT effectively to access, evaluate and analysis of data in the field of accountancy, commerce and management.

P09-Self-directed learning: Create ability to work independently for a project and manage a project through to completion in the field of accountancy, commerce and management.

PO10- Multicultural competence: Able to demonstrate commerce, management values and beliefs to the multiple cultural and global groups.

PO11- Social Interaction: Ability to elicit views of others, mediate disagreements and help reach conclusions in group setting.

Programme Specific Outcomes

Name of the Programme: B. Com. Accounting and Finance	**Programme Coordinator:** Dr. N. E. Koli	**Head of the Department:** Dr. N. E. Koli
	After completing the Programme in B. Com. Accounting and Finance, Student will able to:	
PSO1	Acquire conceptual, fundamental and application based knowledge in accountancy, auditing, finance, taxation, law, economics, commerce, communication, research and information technology.	
PSO2	Apply communication skills, soft skills, group discussion skills and presentation skills for drafting, data processing and presentation with the help of office productivity tools and effective communication techniques.	
PSO3	Prepare, analyse, Evaluate and interpret financial statements and analysing auditing techniques by applying critical thinking skills, analytical skills and problem solving skills.	
PSO4	Develop, estimate and forecast cost of product, budget, tax liability and financial structure of the various forms of organisation and design research	

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester – I & II Syllabus
To be implemented from the Academic year 2022-2023

Course Structure

No. of Courses	Semester I	Credits	No. of Courses	Semester II	Credits
1	***Elective Courses (EC)***		***1***	***Elective Courses (EC)***	
1	Financial Accounting - I	**03**	1	Financial Accounting - II	**03**
2	Cost and Management Accounting - I	**03**	2	Financial Management - I	**03**
3	Business Mathematics	**03**	3	Business Statistics	**03**
2	***Ability Enhancement Courses (AEC)***		***2***	***Ability Enhancement Courses (AEC)***	
2A	***Ability Enhancement Compulsory Course (AECC)***		***2A***	***Ability Enhancement Compulsory Course (AECC)***	
4	Information technology - I	**03**	4	Business Communication - I	**03**
2B	****Skill Enhancement Courses (SEC)***		**2B**	*****Skill Enhancement Courses (SEC)***	
5	Any one course from the following list of the courses	**02**	5	Any one course from the following list of the courses	**02**
3	***Core Courses (CC)***		***3***	***Core Courses (CC)***	
6	Business Law - I	**03**	6	Business Law - II	**03**
7	Business Economics - I	**03**	7	Commerce	**03**
4	***Skill Enhancement Courses (CC)***		***4***	***Skill Enhancement Courses (CC)***	
8	Effective Communication Skills	02	8	Learning Mathematics and Statistics using Software	**02**
	Total Credits	**22**		**Total Credits**	**22**

****List of Skill Enhancement Courses (SEC) for Semester I (Any One)***		*****List of Skill Enhancement Courses (SEC) for Semester II (Any One)***	
1	Foundation Course – I	1	Foundation Course – II
2	Foundation Course in NSS - I	2	Foundation Course in NSS - II
3	Foundation Course in NCC - I	3	Foundation Course in NCC - II
4	Foundation Course in Physical Education - I	4	Foundation Course in Physical Education - II
Note: Course selected in Semester I will continue in Semester II			

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester – I Syllabus
To be implemented from the Academic year 2022-2023

Semester I

Sr. No.	Course Code	Course Title	Credits	L / Week
1	UAF1FA1	Financial Accounting- I	3	4
2	UAF1CMA	Cost & Management Accounting - I	3	4
3	UAF1BMA	Business Mathematics	3	4
4	UAF1IT1	Information technology - I	3	4
5	UAF1BL1	Business Law - I	3	4
6	UAF1EC1	Business Economics – I	3	4
7	UAF1FC1	**Any one course from the following list of the courses** a. Foundation Course – I b. Foundation Course in NSS – I c. Foundation Course in NCC – I d. Foundation Course in Physical Education – I	2	4
8		Effective Communication Skills	2	
		Total	**22**	

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester – I Syllabus
To be implemented from the Academic year 2022-2023

Elective Courses (EC)

1. Financial Accounting - I

1	Preamble of the syllabus
	B.Com. Accounting & Finance is a under graduate programme of Department of Accounting & Finance, Changu Kana Thakur Arts, Commerce & Science College, New Panvel (Autonomous) affiliated to University of Mumbai (MH). The Choice Based Credit, Grading and Semester System to be implemented through this curriculum, would allow students to develop a strong footing in the fundamentals and specialize in the disciplines of his/her liking and abilities. The learners pursuing this programme would have to develop understanding of various aspects of the Financial Accounting. It helps to acquire knowledge regarding accounting standards and its applicability, also to explain concepts and classification of revenue and expenditure with ASG. The performance of the learners shall be evaluated into two components i.e. internal examination and external examination. The learner's Performance shall be assessed by Internal Assessment with 40 marks and external assessment with 60 marks.

2	Objectives of the course
•	To acquire knowledge regarding accounting standards and its applicability
•	To explain concepts and classification of revenue and expenditure with ASG.
•	To prepare various financial statements of manufacturing concern with closing entries
•	To allocate common expenditure of the organization among various department on appropriate basis

3	Course Outcomes
	The Students will be able to
•	Solve practical problems regarding inventory valuation by FIFO and weighted average method.
•	Classify the receipt and expenditure and prepare the final account of manufacturing concern.
•	Calculate the various ratios and prepare the Departmental Final account.
•	Estimate hire purchase price and calculate interest on hire purchase transactions.
•	Demonstrate accounting for foreign exchange transaction under AS-11

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester – I Syllabus
To be implemented from the Academic year 2022-2023

1. Financial Accounting – I
(Course Code - UAF1FA1)

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Accounting Standards Issued by ICAI	15
2	Inventory Valuation	05
3	Final Accounts	15
4	Departmental Accounts	10
5	Accounting for Hire Purchase	10
6	AS-11 Accounting For Foreign Exchange Transaction	05
	Total	**60**

4) Detailed Syllabus

Sr. No.	Modules / Units
1	**Accounting Standards issued by ICAI**
	• **Accounting Standards:** Concepts, Benefits, Procedures for Issue of Accounting Standards Various AS: • **AS – 1: Disclosure of Accounting Policies** (a) Purpose (b) Areas of Policies (c) Disclosure of Policies (d) Disclosure of Change in Policies (e) Illustrations • **AS – 2: Valuation of Inventories (Stock)** (a) Meaning, Definition (b) Applicability (c) Measurement of Inventory (d) Disclosure in Final Account (e) Explanation with Illustrations **AS -12 : Government Grants** (a) Introduction (b) Methods of Accounting for Government Grants (c)Refunds of Government Grant (d) Disclosure • **AS -9 : Revenue Recognition** (a) Meaning, Definition (b) Sale of Goods, Rendering of Services (c) Effects of uncertainties on Revenue Recognition (d) Disclosure (e) Illustration • **AS -10 : Property Plant & Equipment** (a) Meaning (b) Applicability (c) Recognition of Assets (d) Measurement of cost of the Assets (e) Depreciation
2	**Inventory Valuation**
	• Meaning of Inventories • Cost for Inventory Valuation • Inventory Systems : Periodic Inventory System and Perpetual Inventory System • Valuation: Meaning and Importance • Methods of Stock Valuation as per AS – 2: • FIFO and Weighted Average Method • Computation of Valuation of Inventory as on Balance Sheet Date: If Inventory is taken on a Date After the Balance Sheet or Before the Balance Sheet
3	**Final Accounts**
	• Expenditure a) Capital (b) Revenue • Receipts a) Capital (b) Revenue • Adjustments and Closing Entries • Final Accounts of Manufacturing Concerns (Proprietary Firm)
4	**Departmental Accounts**
	• Meaning , Basis of Allocation of Expenses and Incomes / Receipts • Inter Departmental Transfer: At Cost Price and Invoice Price, Stock Reserve • Departmental Trading and Profit and Loss Account and Balance Sheet

5	**Accounting for Hire Purchase**
	• Meaning , Calculation of Interest • Difference between Hire Purchase agreement and instalment payment agreement • Accounting for Hire Purchase Transactions by Asset Purchase Method Based on Full Cash Price, Calculation of Cash Price • Journal Entries, Ledger Accounts and Disclosure in Balance Sheet for Hirer and Vendor • Calculate and record the value of reposed goods and profit on resale of such goods
6	**AS-11 Accounting For Foreign Exchange Transaction**
	• Introduction • In relation to purchase and sale of goods, services, receipts, payments, assets loan and credit transactions. • Computation and treatment of exchange rate differences

5) References Books

Financial Accounting - Paper I

- *Introduction to Accountancy by T.S. Grewal, S. Chand and Company (P) Ltd., New Delhi*
- *Advance Accounts by Shukla and Grewal, S. Chand and Company (P) Ltd., New Delhi*
- *Advanced Accountancy by R.L Gupta and M. Radhaswamy, S. Chand and Company (P) Ltd., New Delhi*
- *Modern Accountancy by Mukherjee and Hanif, Tata Mc. Grow Hill and Co. Ltd., Mumbai*
- *Financial Accounting by Lesile Chandwichk, Pentice Hall of India Adin Bakley (P) Ltd., New Delhi*
- *Financial Accounting for Management by Dr. Dinesh Harsalekar, Multi-Tech. Publishing Co. Ltd., Mumbai*
- *Financial Accounting by P.C. Tulsian, Pearson Publications, New Delhi*
- *Accounting Principles by R.N. Anthony and J.S. Reece, Richard Irwin, Inc*
- *Financial Accounting by Monga, J.R. Ahuja, Girish Ahuja and Ashok Shehgal, Mayur Paper Back, Noida*
- *Compendium of Statement and Standard of Accounting, ICAI*
- *Indian Accounting Standards, Ashish Bhattacharya, Tata Mc. Grow Hill and Co. Ltd., Mumbai*
- *Financial Accounting by Williams, Tata Mc. Grow Hill and Co. Ltd., Mumbai*
- *Company Accounting Standards by Shrinivasan Anand, Taxman, New Delhi*
- *Financial Accounting by V. Rajasekaran, Pearson Publications, New Delhi*
- *Introduction to Financial Accounting by Horngren, Pearson Publications, New Delhi*
- *Financial Accounting by M. Mukherjee and M. Hanif, Tata McGraw Hill Education Pvt. Ltd., New Delhi*
- *Financial Accounting a Managerial Perspective, Varadraj B. Bapat, Mehul Raithatha, Tata McGraw Hill Education Pvt. Ltd., New Delhi*

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester – I Syllabus
To be implemented from the Academic year 2022-2023

Elective Courses (EC)

2. Cost & Management Accounting – I

1	Preamble of the syllabus
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2	Objectives of the course
•	To discuss the meaning evaluation, objectives, Scope, Features of Cost Accounting.
•	To understand the Inventory Management Technique, ABC analysis, and Stock Levels of Material.
•	To describe difference between Employees cost and Direct expenses.
•	To discuss Methods of allocation, apportionment and absorption of overheads and Accounting and control of overheads and production overhead, administrative overhead and selling & distribution overhead.

3	Course Outcomes
	The students will be able to
•	Explain meaning, objectives and scope, features of Cost Accounting.
•	Define the material procurement procedure, and calculate inventory stock level and prepare stock ledger.
•	Calculate employees cost and ascertain direct expenses of various items.
•	Calculate of Various overhead rates.

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester – I Syllabus
To be implemented from the Academic year 2022-2023

2. Cost & Management Accounting - I
(Course Code - UAF1CMA)

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Introduction to Cost Accounting	15
2	Material Cost	15
3	Employee Cost and Direct Expense	15
4	Overheads	15
	Total	**60**

4) Detailed Syllabus

Sr. No.	Modules / Units
1	**Introduction to Cost Accounting**
	• Evolution • Objectives and Scope of Cost Accounting • Importance and Advantages of Cost Accounting • Difference between Cost Accounting and Financial Accounting • Limitations of Financial Accounting • Definitions: Cost, Costing and Cost Accounting • Classification of Cost on Different Bases • Cost Allocation and Apportionment • Coding System • Essentials of Good Costing System • CAS : Introduction to CAS, Objective and Functions of CASB, Overview of Cost Accounting Standards, CAS – 1 Cost Accounting Standard on "CLASSIFICATION OF COST"
2	**Material Cost**
	• Material Cost: The Concept • Material Control Procedure • CAS 6 Material Cost, Inventory Management Technique: VED analysis, FSN analysis, SDE analysis. • Documentation. • Stock Ledger, Bin Card • Stock Levels, ABC analysis, Inventory Turnover Ratio • Economic Order Quantity (EOQ)
3	**Employee Cost and Direct Expense**
	• Meaning and importance of employee cost, attendance and payroll procedure • Meaning and treatment of Idle time and Overtime Cost • Computation of Employee Turnover, • Various methods of remuneration, Incentive system (Wages, Bonus, etc.) • Absorption of wages, Efficiency rating procedure • Direct Expenses; Measurement & Treatment of Direct Expenses • CAS 7 Employee Cost
4	**Overheads**
	• Concept of overheads –Production OH, Administrative OH and Selling & Distribution OH • Methods of allocation, apportionment and absorption of overheads • Treatment of under-absorption and over-absorption of overheads • Accounting and control of overheads • Various methods to calculate overhead rate • CAS 10 Direct Expenses, • CAS 11 Administrative Overheads, • CAS 15 Selling and Distribution overheads.

5) References Books

Cost Accounting - Introduction and Element of Cost – I
• *Lectures on Costing by Swaminathan: S. Chand and Company (P) Ltd., New Delhi* • *Cost Accounting by C.S. Rayudu, Tata Mc. Grow Hill and Co. Ltd., Mumbai* • *Cost Accounting by Jawahar Lal and Seema Srivastava, Tata Mc. Grow Hill and Co. Ltd., Mumbai* • *Cost Accounting by Ravi M. Kishore, Taxmann Ltd., New Delhi* • *Principles and Practices of Cost Accounting by N.K. Prasad, Book Syndicate Pvt. Ltd., Calcutta* • *Cost Accounting Theory and Practice by B.K. Bhar, Tata Mc. Grow Hill and Co. Ltd., Mumbai* • *Cost Accounting Principles and Practice by M.N. Arora, Vikas Publishing House Pvt. Ltd., New Delhi* • *Advanced Cost and Management Accounting: Problems and Solutions by V.K. Saxena and C.D.Vashist, S. Chand and Company (P) Ltd., New Delhi* • *Cost Accounting by S.P. Jain and K.L. Narang, Kalyani Publishers, Ludhiana* • *Modern Cost and Management Accounting by M. Hanif, Tata McGraw Hill Education Pvt. Ltd., NewDelhi*

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –I Syllabus
To be implemented from the Academic year 2022-2023
Core Courses (CC)
3. Business Mathematics – I

1	Preamble of the syllabus
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2	Objectives of the course
•	To compute and compare the ratio and understand the concept and application of inverse ratio.
•	To define determinants and understand relationship between determinants to matrices.
•	To familiarize with the concept of Rate of change of quantities, increasing and Decreasing functions and maxima minima function.
•	To understand and find out the number of ways in which a given number of objects can be select and arranged through permutation and combination.
•	To apply key concepts in logical thinking to solve problems or make appropriate decisions.

3	Course Outcomes
	The Students will be able to ;
•	Demonstrate concept of Ratio, Proportion, Indices and Logarithms.
•	Evaluate matrix operations and determinants of a matrix.
•	Solve various problems of derivatives and apply optimization technique in economic.
•	Define and evaluate permutation and combination.
•	Describe the basic concepts of quantitative ability and logical reasoning Skills.

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester – I Syllabus
To be implemented from the Academic year 2022-2023

3. Business Mathematics
(Course Code - UAF1BMA)

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Ratio, Proportion, Indices and Logarithms	10
2	Matrices and Determinants	15
3	Derivatives and Application of Derivatives	15
4	Elementary Financial Mathematics	15
5	Logical Reasoning	05
	Total	**60**

4) Detailed Syllabus

Sr. No.	Modules / Units
1	**Ratio, Proportion, Indices and Logarithms**
	• Ratio : Definition, Continued Ratio and Inverse Ratio • Proportion : Continued Proportion, Direct Proportion and Inverse Proportion • Indices and Logarithms: Indices, Logarithm, Fundamentals Laws of Logarithms, Logarithms Tables, Antilogarithms, Relation between Indices and logarithms.
2	**Matrices and Determinants**
	• Matrices: Some important definitions and some important results. Matrix operation (Addition, scalar multiplication , matrix multiplication, transpose of a matrix) • Determinants of a matrix of order two or three: properties and results of Determinants • Solving a system of linear equations using Cramer's rule • Inverse of a Matrix (up to order three) using ad-joint of a matrix and matrix inversion method • Case study: Input Output Analysis
3	**Derivatives and Application of Derivatives**
	• **Introduction and Concept:** Derivatives of constant function, logarithmic functions, polynomial and exponential function • **Rules of derivatives**: addition, multiplication, quotient • Second order derivatives • **Application of Derivatives**: Maxima, Minima, Average Cost and Marginal Cost. • Total revenue, Marginal revenue, Average revenue. Average and Marginal profit.Price elasticity of demand
4	**Elementary Financial Mathematics**
	• **Functions:** Algebraic functions and the functions used in business and economics • • • • , Break Even and Equilibrium point. • **Permutation and Combination:**(Simple problems to be solved with the calculator only) • **Liner Equations:** Simultaneous Equation, Quadratic Equation, Cubic Equation, Simple Equation.
5	**Logical Reasoning**
	• **Series:** Number series, perfect square series, perfect cube series, geometric series, alphabet series, letter series, and continued series. • **Coding-Decoding:** letter coding and number coding. • Odd man out

5) References Books

Business Mathematics

- *Mathematics for Economics and Finance Methods and Modelling by Martin Anthony and Norman Biggs, Cambridge University Press, Cambridge low-priced edition, 2000, Chapters 1, 2, 4, 6 to 9 & 10.*
- *Applied Calculus: By Stephen Waner and Steven Constenoble, Brooks/Cole Thomson Learning, second edition, Chapter 1 to 5.*
- *Business Mathematics By D. C. Sancheti and V. K. Kapoor, Sultan Chand & Sons, 2006, Chapter 1, 5, 7, 9 &10.*
- *Mathematics for Business Economics: By J. D. Gupta, P. K. Gupta and Man Mohan, Tata Mc-Graw Hill Publishing Co. Ltd., 1987, Chapters 9 to 11 & 16.*
- *Quantitative Methods-Part-I By S. Saha and S. Mukerji, New Central Book Agency, 1996, Chapters 7 & 12.*
- *Mathematical Basis of Life Insurance By S.P. Dixit, C.S. Modi and R.V. Joshi, Insurance Institute of India, Chapters 2: units 2.6, 2.9, 2.20 & 2.21.*
- *Securities Laws & Regulation of Financial Market: Intermediate Course Paper 8, Institute of Company Secretaries of India, Chapter 11.*
- *Investments By J.C. Francis & R.W. Taylor, Schaum's Outlines, Tata Mc-Graw Hill Edition 2000, Chapters 2,4 & section 25.1.*
- *Indian Mutual Funds Handbook: By Sundar Shankaran, Vision Books, 2006, Sections 1.7, 1.8.1, 6.5 & Annexures 1.1to 1.3.*
- *STATISTICS by Schaum Series.*
- *Operations Research by Gupta and Kapoor*
- *Operations Research by Schaum Series*
- *Fundamentals of Statistics - D. N. Elhance.*
- *Statistical Methods - S.G. Gupta (S. Chand & Co.*
- *Statistics for Management - Lovin R. Rubin D.S. (Prentice Hall of India)*
- *Statistics - Theory, Method & Applications D.S.Sancheti & V. K. Kapoor.*
- *Modern Business Statistics - (Revised}-B. Pearles & C. Sullivan –Prentice Hall of India.*
- *Business Mathematics & Statistics: B Aggarwal, Ane Book Pvt. Limited*
- *Business Mathematics: D C Sancheti & V K Kapoor, Sultan Chand & Sons*
- *Business Mathematics: A P Verma, Asian Books Pvt.: Limited.*

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –I Syllabus
To be implemented from the Academic year 2022-2023

Ability Enhancement Courses
3. Information technology – I

1	Preamble of the syllabus
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2	Objectives of the course
•	To understand the basics of computer and Microsoft office.
•	To provide information about SQL.
•	To develop the knowledge of web and its uses.
•	To enhance the knowledge about different emerging technologies.

3	Course Outcomes
	The students will be able to
•	describe history and parts of computers and demonstrate the knowledge of hardware, software and networks.
•	make use of various office productivity tools such as Microsoft word, Excel, PowerPoint, Access
•	understand the concept of E-commerce and M-commerce in personal and professional life and analyse the impact of e-commerce and m-commerce for developing business models and strategies.
•	describe the use of database and SQL in business organisation.

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F.Y.B.Com. Accounting & Finance Semester –I Syllabus
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4. Information Technology - I
(Course Code - UAF1IT1)

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Introduction to Computers	05
2	Office Productivity Tools –I	15
3	Office Productivity Tools –II	10
4	Introduction to Internet Web	05
5	Electronic Commerce & Mobile Commerce	10
6	Database and SQL	15
	Total	**60**

4. Detailed Syllabus

Sr. No.	Modules / Units
1	**Introduction to Computers**
	• History of Computers, Parts of Computers, Network Infrastructure • **Hardware**: Specifications and Data Storage Management • **Software**: Concept of System Software and Applications • **Networking**: Introduction and types of network topologies
2	**Office Productivity Tools - I**
	• **Word:** Creating, Editing, Formatting and Printing of Documents, Using Tools, Mail merge and Print Review and Set-up • **Spreadsheet:** Create Worksheets and Workbooks, Format Worksheets and Workbooks, Customize Options and Views for Worksheets and Workbooks, Apply Custom Data Formats and Validation, Apply Advanced Conditional Formatting, Filtering, Modify Custom Workbook Elements, Create and Manage Tables, Table Styles, Filter and Sort a Table, Create, Format, Insert Charts, Create, Manage Pivot Table and Charts. **Basic Functions in Spreadsheet –** SUM, AVERGE, MIN & MAX, MEDIAN, COUNT, ABS, SQRT, MOD, INT, ROUND, ROUNDUP,ROUNDDOWN,FLOOR,CEILING, TRUNC, PRODUCT, COLUMN & ROW,DATE, DATEVALUE, DAY, MONTH,YEAR, WEEKDAY, DAYS360, TIME, TIMEVALUE, TODAY, NOW, LEFT, RIGHT,MID, UPPER, LOWER,PROPER, LEN, TRIM, FIXED. **Advanced Functions in Spreadsheet –** VLOOKUP, HLOOKUP, INDEX MATCH, IF, AND, OR, PMT, RATE, PV, FV, SUMIF, CONCATENATE, COUNTA, OFFSET, RANDBETWEEN, PV FUNCTION.
3	**Office Productivity Tools - II**
	• **Access** -Creating a Simple Database and Tables, Table creation using design view ,table wizard ,data sheet view, import table, link table, Forms- Form Wizard design view, columnar, tabular, datasheet, chart wizard. Use of reference • **Power Point**: Create Project Report, Create Slides, create and edit tables in slides Animation, Page Designing, Insert Image, View Page, Print Review and Set-up.
4	**Introduction to Internet and Web**
	• **Internet components** – electronic commerce – e commerce applications – Electronic Data Exchange – Extranet – Payment systems – Risks and security considerations – Legal issues • **Web Browser** - Use of Various Web Browser, Information Searching Tools Downloading, Create New email ID, Sending Data through email Search engine optimisation
5	**Electronic Commerce and Mobile Commerce**
	• **Electronic Commerce :** Meaning, Advantages and Limitations of E-Commerce, The role of Strategy in E-Commerce, Value chains in E-Commerce, Infrastructure for Electronic Commerce Web-Based Tools for Electronic Commerce, Electronic Commerce software, Security Threats to electronic Commerce Implementing Security for

	Electronic Commerce, Electronic Payment Systems, Strategies for Marketing, Sales & Promotion Strategies for Purchasing Logistics & Support Activities, Electronic Markets & Communities, Business Plans for Implementing Electronic Commerce. • **Mobile Commerce :** Introduction, History, Concepts, Characteristics, components, supporting technology, Mobile security, mobile application, payment system, Mobile computing,
6	**Database and SQL**
	• **Introduction:** To Databases, Relational and Non-relational database system MySQL as a Nonprocedural Language. View of data. • **SQL Basics :** Statements (Schema Statements, Data statements, Transaction statements), names (table & column names), data types (Char, Varchar, Text, Mediumtext, Longtext, Smallint, Bigint, Boolean, Decimal, Float, Double, Date, Date Time, Timestamp, Year, Time), Creating Database, inserting data, Updating data, Deleting data, expressions, Built-in-functions- lower, upper, reverse, length, ltrim, rtrim, trim, left, right, mid, concat, now, time, date, curdate, day, month, year, dayname, monthname, abs, pow, mod, round, sqrt Missing data(NULL and NOT NULL DEFAULT values) CREATE,USE, ALTER (Add, Remove, Change columns), RENAME, SHOW, DESCRIBE (CREATE TABLE, COLUMNS, STATUS and DATABASES only) and DROP (TABLE, COLUMN, DATABASES statements), PRIMARY KEY FOREIGN KEY (One and more columns) Simple Validity checking using CONSTRAINTS. • **SQL Simple queries:** The SELECT statement (From, Where, Group By, Having, Order By, Distinct), Filtering Data by using conditions. Simple and complex conditions using logical, arithmetic and relational operators (=, !,=, ,<>, AND, OR, NOT, LIKE) Aggregate Functions- count, sum, avg, max, min. • **Multi-table queries:** Simple joins (INNER JOIN), SQL considerations for multi table queries (table aliases, qualified column names, all column selections self joins). • **Nested Queries (Only up to two levels) :** Using sub queries, sub query search conditions, sub queries & joins, nested sub queries, correlated sub queries, sub queries in the HAVING clause. Simple Transaction illustrating START, COMMIT, and ROLLBACK.

5. Reference Books

	Information Technology in Accountancy - I
	• *Fundamentals of Computers – Rajaram V – Prentice Hall* • *Computer today (3rd edition) – Sanders, Donald H – McGraw Hill* • *Computers and Common sense – Hunt, Roger and Shelly John – Prentice Hall* • *Computers – Subramaniam N – Wheeler* • *Introduction to Computers – Xavier C. – New Age* • *Computer in Business – Sanders D – McGraw Hill* • *Computers and Information Management – S C Bhatnagar t – Prentice Hall* • *Internet for Business – Brummer, Lavrej – Cambridge* • *E-mail for Everyone – Leon Alexis & leon – Methews Jersey Hayden*

Choice Based Credit Grading and Semester System (CBCGS)

F.Y.B.Com. Accounting & Finance Semester –I Syllabus

To be implemented from the Academic year 2022-2023

Core Course (CC)

5. Business Law -- I

1	Preamble of the syllabus
	B.Com. Accounting & Finance is a under graduate programme of Department of Accounting & Finance, Changu Kana Thakur Arts, Commerce & Science College, New Panvel, (Autonomous) affiliated to University of Mumbai (MH). The Choice Based Credit, Grading and Semester System to be implemented through this curriculum, would allow students to develop a strong footing in the fundamentals and specialize in the disciplines of his/her liking and abilities. The learners pursuing this programme would have to develop understanding of various aspects of the Business Law. It helps the learners to provide the brief idea about how bill is enacted into law and legal framework of Indian business law, also to make students aware about the objects and significance of Indian contract Act 1872, Negotiable Instrument Act 1881 & Sale of Goods Act, 1913 and also the benefits and procedure of Consumer Protection Act. The performance of the learners shall be evaluated into two components i.e. internal examination and external examination. The learner's Performance shall be assessed by Internal Assessment with 40 marks and external assessment with 60 marks.

2	Objectives of the course
•	To provide the brief idea about how bill is enacted into law and legal framework of Indian business law.
•	To helps the students to understand the basic rules of agreements, contracts, law of indemnity, guarantee and contract of bailment, pledge and agency.
•	To make students aware about the objects and significance of Sale of Goods Act,1913.
•	To provide knowledge about various provisions related to negotiable instrument act, 1881 along with rules related to Bills of Exchange, promissory notes and checks.

3	Course Outcomes
	The Students will be able to
•	define various components under Law of Contract, Sale of Goods Act, Negotiable Instrument Act and Consumer Protection Act.
•	describe various components of Negotiable Instrument and its uses in Financial transactions.
•	demonstrate the comprehensive knowledge of Indian Contract Act and draft legal agreement & MOU.
•	discuss various aspects of the Sale of Goods Act and prepare Hire Purchase Agreement.

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –I Syllabus
To be implemented from the Academic year 2022-2023

5. Business Law – I
(Course Code - UAF1BL1)

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Introduction of Law	05
2	Law of Contract 1872	12
3	Law of Contract 1872 (special contracts)	08
4	Sale of Goods Act 1930	10
5	Negotiable Instrument Act 1881	10
6	Consumer Protection Act 1986	10
7	Right to Information 2005	05
	Total	**60**

4. Detailed syllabus

Sr. No.	Modules / Units
1	**Introduction of Law**
	• Meaning of law • Characteristics of Law • Significance of Law • Process of Enactment of bill into Law • Relevance of Law to Modern Civilized Society • Sources of Law • Legal Terminology and Maxims • Understanding Citation of Cases
2	**Law of Contract 1872**
	• Nature of Contract • Classification of Contracts • Offer and Acceptance • Capacity of Parties to Contract • Free Consents • Consideration • Legality of Object • Agreement Declared Void • Performance of Contract & Discharge of Contract • Remedies for Breach of Contract
3	**Law of Contract 1872 (special contracts)**
	• Indemnity & Guarantee • Bailment and Pledge • Agency
4	**Sale of Goods Act 1930**
	• Formation of Contract of Sale • Goods and their Classifications • Price, Conditions and Warranties • Transfer of Properties in Goods • Performance of Contract of Sales • Unpaid Seller and his Rights • Sale by Auction • Hire Purchase Agreement
5	**Negotiable Instrument Act 1881**
	• Definition of Negotiable Instruments • Features of Negotiable Instruments • Promissory Note & Bill of Exchange and Cheque • Holder and Holder in due Course • Crossing of a Cheque & Types of Crossing • Dishonour and Discharge of Negotiable Instruments

6	**Consumer Protection Act 1986**
	• Consumer Protection Act 2019 • Salient Features & Definitions • Consumer Rights • Consumer Protection Council • Consumer Disputes Redressal Agencies • Offences and Penalties • Central Consumer Protection Authority • Regulation of E- Commerce • Direct Selling and Multi-level Marketing
7	**Right to Information 2005**
	• Definitions • Right to Information And Obligations of Public Authorities • The Central Information Commission • The State Information Commission

5.Reference Book:

Business Law - Business Regulatory Framework - Paper I

- *Indian Contract Act, Sales of Goods Act and Partnership Act by T.R. Desai, Sarkar and Sons Pvt. Ltd., Kolkata*
- *The Negotiable Instrument Act by J.S. Khergamwala, N.M. Tripathi Pvt. L.td., Mumbai*
- *The Principles of Mercantile Law by Avtar Singh, Eastern Book Company, Lucknow*
- *Business Law by M.C. Kuchal, Vikas Publishing House, New Delhi*
- *Business Law by N.D. Kapoor, Sultan Chand and Sons, New Delhi*
- *Business Law by P.R. Chandha, Galotia, Dew Delhi*
- *Taxmann's Consumer Protection Act 2019 with Rules, Taxmann*
- *Your Guide to the Right to Information Act, 2005, by Lakshmy Chandrasekaran Iyer*

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –I Syllabus
To be implemented from the Academic year 2022-2023

Core Course (CC)
Business Economics

1	Preamble of the syllabus
	This course is designed to introduce the students to the basic study of micro-economics. Business Economics is the application of economic theory and methodology to business. In the syllabus of business economics, students will study the basic tools of analysing the economics for minimization of cost and maximization of profit of the firm. This course is also important for the learners to understand the economic environment at micro level. The subject matter deals with the economic aspects of managerial decisions.

2	Objectives of the course
•	To help the students to understand the basic concepts of Business Economics.
•	To study the nature and scope of Business Economics.
•	To study importance and applications of Business Economics in practical market.
•	Students will be able to identify key economic problems in business firms.

3	Course Outcomes
	The Students will be able to
•	define the concepts related to business economics and its applications.
•	Illustrate the fundamentals of demand and supply.
•	Make use of various production techniques to understand the functioning of productive units in the economy.
•	Interpret different types of market structures in the economy

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –II Syllabus
To be implemented from the Academic year 2022-2023

Business Economics

(Course Code -)

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Introduction	15
2	Demand Analysis:	15
3	Supply and Production Decisions and Cost of Production	15
4	Market structure: Perfect competition and Monopoly and Pricing and Output Decisions under Imperfect Competition	15
	Total	**60**

4. Detailed syllabus

Sr. No.	Modules / Units
1	**Introduction**
	• Scope and Importance of business economics - basic tools- Opportunity cost principle- Basic economic relations – functional relations: equations-Total, average and marginal relations-use of marginal analysis in decision making. Introduction to Survey: Meaning, features- Survey based project.
2	**Demand Analysis**
	Cross and promotional elasticity of demand. The basics of market demand & supply and equilibrium price – shifts in the demand and supply curves and equilibrium. Indifference curve: Meaning, properties. Budget line, consumer's equilibrium. • **Demand Estimation and forecasting:** Meaning and significance-methods of demand estimation: survey and statistical methods. (Numerical illustrations on trend analysis)
3	**Production function**
	• Short run analysis with law of variable proportion-isoquants, ridgelines, and least cost combination of inputs-Long run production function and laws of returns to scale-Expansion path. Cost concepts: Accounting cost and economic cost, implicit and explicit cost, fixed and variable cost- total, average and marginal cost, cost output relationship in the short run and long run (hypothetical numerical problems to be discussed) Break even analysis (with business applications)
4	**Market Structure**
	• Perfect competition and monopoly and pricing and output decisions under imperfect competition:-Short run and long run equilibrium of a competitive firm and of industry-Monopoly- Short run and long run equilibrium of a firm under monopoly. Monopolistic competition: Equilibrium of a firm under monopolistic competition. Oligopolistic markets: Key attributes of oligopoly –price rigidity.

5. Reference Books

Business Economics

- *Mehta, P.L.: Managerial Economics – Analysis, Problem and Cases (S. Chand & Sons, N. Delhi,2000)*
- *Hirchey .M., Managerial Economics, Thomson South western(2003)*
- *Salvatore, D.: Managerial Economics in a global economy (Thomson South Western Singapore,2001)*
- *Frank Robert, Bernanke. Ben S., Principles of Economics (Tata McGraw Hill(ed.3)*
- *Gregory Mankiw., Principles of Economics, Thomson South western (2002reprint)*
- *Samuelson & Nordhaus.: Economics (Tata McGraw Hills, New Delhi,2002)*
- *Pal Sumitra, Managerial Economics cases and concepts (Macmillan, NewDelhi,2004*

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –I Syllabus
To be implemented from the Academic year 2022-2023

Core Course (CC)
Foundation Course –I

1	Preamble of the syllabus
	Foundation Course was introduced with an objective to acquaint the students with concepts of social awareness, appreciate the Unity in Diversity of Indian society and understand factors that have influenced the cultural, economic, environmental, and political factors of Indian society. Keeping in tune with the revised syllabi, the committee has introduced themes in lieu of issues of a rapidly changing Indian society. The revised syllabus is an attempt to make students conscious of their duties, responsibilities, and role in society. Students have the Knowledge of components of society and are aware of the problems in society. Under Credit Based Semester & Grading System (CBSGS) and continuous evaluation consisting of components of External Assessment & Internal Assessment. The external component of theory exams of 60 marks and an internal component of assignments/presentations for 40 marks of Foundational course for B.A./ B.Com./ B.Sc./ B.M.S./ B.Com. Accounting & Finance / Bio-Tech.

2	Objectives of the course
•	To acquaint the students with an overview of Indian Society.
•	To create awareness about the Social Problems Of Indian Society.
•	To direct students to overcome social problems.
•	To Impart knowledge of the Indian Constitution.

3	Course Outcomes
	The Students will be able to
•	Summarize the overview of Indian Society.
•	List various forms of Disparity and social problems in Indian Society.
•	Discuss the concept of Addiction, HIV ,and Elderly Problems.
•	Explain Constitutional Values and Democratic Principles.

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –I Syllabus
To be implemented from the Academic year 2022-2023

Foundation Course –I

(Course Code -)

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	**Overview of Indian Society**	15
2	**Social Issues of Indian Society- I**	15
3	**Social Issues of Indian Society- II**	15
4	**Introduction to Indian Constitution**	15
	Total	**60**

4. Detailed Syllabus

Sr. No.	Modules / Units
1	**Overview of Indian Society**
	A. Introducing the concept of diversity as difference of Indian society through its demographic composition: population distribution according to religion, caste, class, gender and language. B. Introduction to regional variations according to rural, urban and tribal characteristics; C. Concept of Intergroup conflict- Communalism, Regionalism, Casteism and Linguism.
2	**Social Issues of Indian society- I**
	A. Gender Disparity - Explore the disparities arising out of gender with special reference to violence against women, female feticide (declining sex ratio), Transgenders in Indian Society- Status and problems B. Human Trafficking- Concept, Causes and Measures to stop Human Trafficking. C. Concept of Disabilities- Types and Causes
3	**Social Issues of Indian society- II**
	A. Concept of Addiction - Smoking, Alcoholism, Drug Addiction B. HIV- AIDS – Transmission, Prevention, Awareness C. Elderly Problems, Child Labour and Crime among youth and suicide.
4	**Introduction to Indian Constitution**
	A. Preamble (Philosophy of constitution). B. Fundamental Rights and Directive Principles of the State Policy. **C.** Fundamental Duties.

5. References.

Foundation Course I

- *Indian Political System: A Critical Study of the Constitutional Structure and the Emerging Trends of Indian Politics, J C Johari, Anmol Publications, 1996*
- *Understanding Social Inequality, Tim Butler, Paul Watt, Sage Publications (2006)*
- *Social and Economic Problems in India, Naseem Azad, R Gupta Pub (2011)*
- *Indian Society and Culture, Vinita Padey, Rawat Pub (2016)*
- *Social Problems in India, Ram Ahuja, Rawat Pub (2014)*
- *Faces of Feminine in Ancient , medivial and Modern India, Mandakranta Bose Oxford University Press*
- *National Humana rights commission- disability Manual*
- *Rural, Urban Migration : Trends, challenges & Strategies, S Rajagopalan, ICFAI- 2012*
- *Regional Inequilities in India Bhat L SSSRD- New Delhi*
- *Urbanisation in India: Challenges, Opportunities & the way forward, I J Ahluwalia, Ravi Kanbur, P K Mohanty, SAGE Pub (2014)*

- *The Constitution of India, P M Bakshi 2011*
- *The Problems of Linguistic States in India, Krishna Kodesia Sterling Pub*
- *Politics in India: structure, Process and Policy SubrataMitra, Rouutlege Pub*
- *Politics in India, Rajani Kothari, Orient Blackswan*
- *Problems of Communilism in india, Ravindra Kumar Mittal Pub*
- *Combating communalism in India: Key to National Integration, Kawal Kishor Bhardwaj, Mittal Pub*

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –I Syllabus
To be implemented from the Academic year 2022-2023

Core Course (CC)
Foundation Course in National Service Scheme - I

1	Preamble of the syllabus
	Foundation Course in National Service Scheme syllabus is prepared to give a sound knowledge and understanding of NSS to undergraduate students of first year of the F.Y.B.A./B.Com./B.Sc./B.M.S./B.A.F/BioTech. The goal of this syllabus is to make the study of N.S.S. stimulating, interesting and relevant as possible. The syllabus is prepared by keeping in mind the aim to make student capable of studying Foundation course in N.S.S and develop interest in them in relation to community based activities, further aiding the students to evolve in catering to the needs of the community, as and when required. The syllabus has an interdisciplinary tone facilitating the learners to develop an outlook of various aspects of the N.S.S. and its conceptual understanding, development of the organization and how it is helping to grasp and appreciate various facts of our society and societal based works. It will also acquaint students with the qualities like sharing, caring and shouldering the responsibilities which would be beneficial for aiding others in uplifting. Such knowledge is beneficial to assist the learners for overall development. The revised syllabus of National Service Scheme is aimed at rendering a selfless bond between the students and community that will ultimately lead to the nation building. In addition to that, it also reflects the essence of the democratic values that involves constant efforts of the students in building a better world. The syllabus is multifaceted embracing the aims and objectives which are initiated by the UGC since its inception. With the help of the revised syllabus the college strives for maintaining the relationship of the students to their community.

2	Objectives of the course
•	To make students to have an outlook to identify the problems and needs of the community getting the students involved in the problem solving process.
•	To develop the civic responsibility amongst the students.
•	To develop leadership qualities and democratic attitude.
•	To promote understanding of the community and environment in which they dwell.

3	Course Outcomes
	The Students will be able to
•	Explain the working and importance ofNational Service Organization
•	Develop a sense of understanding in the contemporary issues and their redressal mechanisms

•	Examine the gender issues and their redressalmechanisms through a mature lens.
•	Make use of the knowledge of constitution tohave a better view of justice.

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –I Syllabus
To be implemented from the Academic year 2022-2023

Foundation Course in National Service Scheme - I

(Course Code -)

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	**Introduction to National Service Scheme (NSS)**	08
2	**Contemporary Issues and Redressal Mechanism I**	09
3	**Gender related Issues and its Redressal Mechanisms II**	15
4	**Indian constitution and social justice**	13
	Total	**45**

4. Detailed syllabus

Sr. No.	Modules / Units
1	**Introduction to National Service Scheme (NSS)**
	• Historical background and current scenarios. • Organizational Structure of National Service Scheme from college level to National level. • Objectives of National Service Scheme. • Motto, Symbol, Opportunities (Utkarsha and Avhan)and Success stories of • N.S.S activities.
2	**Contemporary Issues and Redressal Mechanism I**
	• Water Scarcity. • Sanitation problems. • Housing problems. **Redressal Mechanisms:** • Rainwater Harvesting. • Swacch Bharat Abhiyan. • Pradhan Mantri Awas Yojana.
3	**Gender related Issues and its Redressal Mechanisms II**
	• Female foeticide and infanticide. • Sexual Abuse (men and women) • Menstrual Taboo • Child Abuse **Redressal Mechanisms:** • PCPNDT Act 1994 • Nirbhaya Act • Right to bleed, • POCSO Act
4	**Indian constitution and social justice**
	• Preamble • Structure and its features. • Fundamental Rights and Duties • Review of Constitutional Amendments towards community development. • Social Justice – the Concept and its Features • Mahatma Jyotirao Phule, Shahu Maharaj, Dr. Babasaheb Ambedkar.

5. Reference Books

Foundation Course in National Service Scheme - I
• *National Service Scheme Manual (Revised) 2006, Government of India, Ministry of YouthAffairs and Sports, New Delhi.* • *University of Mumbai National Service Scheme Manual 2009.* • *Avhan Chancellor's Brigade – NSS Wing, Training camp on Disaster PreparednessGuidelines, March 2012* • *Rashtriya Seva Yojana Sankalpana – Prof. Dr. Sankay Chakane, Dr. Pramod\ Pabrekar,Diamond Publication, Pune.* • *National Service Scheme Manual for NSS District Coordinators, National Service SchemeCell, Dept. of Higher and Technical Education, Mantralaya,* • *Annual report of National Service Scheme (NSS) published by Dept. of Higher and TechnicalEducation, Mantralaya.* • *NSS Cell, Dept. of Higher and Technical Education, Mantralaya, UTKARSHA-Socio andcultural guidelines.*

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –I Syllabus
To be implemented from the Academic year 2022-2023

Core Course (CC)
Foundation Course In Physical Education - I

1	Preamble of the syllabus
	This Course is designed to introduce the students to elementary concepts in Foundation Course In Physical Education.The student should be able to use these concepts to understand the relevance of Foundation Course In Physical Education to the real world. The student should be able to build on these concepts in the future to develop deeper understanding of the Physical Education as well as the revised syllabus is framed to understand the Foundation Course In Physical Education theory, practical and its relevance indecision making.

2	Objectives of the course
•	To understand the basic concepts of Health, Physical Education and Physical Fitness.
•	To familiarize the learner with different types of fitness, its parameters and wellness.
•	To acquire the knowledge pertaining to game and sports of the choice of the learner.
•	To create awareness about own body functions through Physical Education and Exercise.

3	Course Outcomes
	The Students will be able to
•	
•	
•	
•	

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –I Syllabus
To be implemented from the Academic year 2022-2023

Foundation Course In Physical Education - I

(Course Code -)

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	**Introduction to Body Systems**	10
2	**Components of Physical Fitness**	10
3	**Testing Physical Fitness**	10
4	**Effect of Exercise on various Body System**	10
5	**Introduction to Major Games (Kho-Kho, Kabaddi, Badminton, Table Tennis, Athletics jumping, Throwing)**	10
6	**Practical**	10
	Total	**60**

4. Detailed syllabus

Sr. No.	Modules / Units
1	**Introduction to Body Systems**
	• Body Planes and axis. • Skeletal system. • Respiratory system. • Circulatory system.
2	Components of Physical Fitness
	• Concept of components of Physical Fitness • Concept and components of HRPF • Concept and components of SRPF • Importance of Fitness for beginners
3	**Testing Physical Fitness**
	• Test for measuring Cardiovascular Endurance. • Test for measuring Muscular Strength & Endurance • Test for measuring Flexibility. • Test For Measuring Body Composition
4	**Effect of Exercise on various Body System**
	• Effect of exercise on Musculoskeletal system. • Effect of exercise on Circulatory system. • Effect of exercise on Respiratory system. • Effect of exercise on Glandular & Nervous system
5	**Introduction to Major Games (Kho-Kho, Kabaddi, Badminton, Table Tennis, Athletics jumping, Throwing)**
	• Introduction • Fundamental & advance Skills of games. • Rules & Regulation. • Ground Marking
6	**Practical**
	• Harvard Step Test. • Tuttle Pulse Ratio Test. • Phillip's JCR Test. • Sit and Reach Test

5. Reference Books

Foundation Course In Physical Education

- *Adams, William's – Foundation of Physical Education Exercises and Sports Sciences, Lea and Febigor, Philadelphia, 1991.*
- *American College of Sports Medicine, ACSM's, Certification Review.(2006) 2nd Ed., Lippian Cott Williams and Wilkins 2006.*
- *American College of Sports Medicine, ACSM's, Guidelines for Exercise Testing and Priscription. (2013) Ninth Edition, Lippian Cott Williams and Wilkins.*
- *American College of Sports Medicine, ACSM's Resource Manual for Guidelines for Exercise Testing and Priscription. (2006) 5th Ed., Lippian Cott Williams and Wilkins, 2006.*
- *Beashel, P.,& Taylor, J. (1996). Advance Studies in Physical Education and Sports. U.K.: Thomas Nelson and Sons Ltd.*
- *Bucher, C.A. (1995). Foundation of Physical Education (12th Ed.) USA : St. Louis, C.V. Mosloy.*
- *Colfter, G.R., Hamilton, K.E., Magill R.A.,& Hamilton B.J. (1986). Contemporary Physical Education. USA : Wim C. Brown Publisher.*
- *Daryl S. (1994). Introduction to physical education, fitness and sports (2nd ed.). London: Mayfield publishing company.*
- *Dheer, S.D.(1991). Introduction to Health Education. New Delhi : Friends Publication.*
- *Dr. A.K.Uppal& Dr. G. P. Gautam (2004). Physical education and Health. Delhi: Friends publisher.*
- *Dr. Gharote M. L; Teaching Methods for Yogic Practices. – 2nd Ed., Kaivalyadham Samiti, Lonavala- 2001.*

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –I Syllabus
To be implemented from the Academic year 2022-2023

Core Course (CC)

Effective Communication Skills

1	Preamble of the syllabus

2	Objectives of the course
•	To enhance communication skills of the students

3	Course Outcomes
	The Students will be able to
•	Develop an understanding of communication skills to face challenges of real and corporate life
•	Show enhancement in the communication skill
•	Demonstrate Leadership qualities, team-work, decision making

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –I Syllabus
To be implemented from the Academic year 2022-2023

Effective Communication Skills

(Course Code - USC2ECS)

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	**Academic Skills**	15
2	**Soft and Professional Skills**	15
	Total	**30**

4. Detailed syllabus

Sr. No.	Modules / Units
1	**Academic Skills**
	Essentials of Grammar: Parts of speech, Articles, Modals, Sentences and their types., Punctuation marks **Employment Communication**: Introduction, Resume, Curriculum Vitae, Scannable Resume, Developing an Impressive Resume, Formats of Resume, Job Application or Cover Letter. Email Writing **Professional Presentation**: Nature of Oral Presentation, planning a Presentation, Preparing the Presentation, Delivering the Presentation **Job Interviews**: Introduction, Importance of Resume, Definition of Interview, Background Information, Types of Interviews, Preparatory Steps for Job Interviews, Interview Skill Tips, Changes in the Interview Process, FAQ During Interviews **Group Discussion**: Introduction, Ambience/Seating Arrangement for Group Discussion, Importance of Group Discussions, Difference between Group Discussion, Panel Discussion and Debate, Traits, Types of Group Discussions, topic based and Case based Group Discussion, Individual Traits
2	**Soft and Professional Skills**
	Introduction to Soft Skills and Hard Skills **PersonalityDevelopment:**Knowing Yourself, Positive Thinking, Johari'sWindow,Communication Skills, Non-verbal Communication, Physical Fitness Definition **Etiquette and Mannerism**: Introduction, Professional Etiquette,Technology Etiquette **Communication Techniques:** **Ethical Values**: Ethics and Society, Theories of Ethics, Correlation, between Values and behavior, Nurturing Ethics, Importance of Work Ethics, Problems in the Absence of Work Ethics **Leadership and Team Building**: Leader and Leadership, Leadership Traits, Culture and Leadership, Leadership Styles and Trends, Team Building, Types of Teams

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester – I & II Syllabus
To be implemented from the Academic year 2022-2023

Semester II

Sr. No.	Course Code	Course Title	Credits	L / Week
1	UAF2FA2	Financial Accounting - II	3	4
2	UAF2FM1	Financial Management I	3	4
3	UAF2BSA	Business Statistics	3	4
4	UAF2BC1	Business Communication - I	3	4
5	UAF2BL2	Business Law – II	3	4
6	UAF2BEA	Commerce (Business Environment) – I	3	4
7	UAF2FC2	**Any one course from the following list of the courses** a. Foundation Course – II b. Foundation Course in NSS – II c. Foundation Course in NCC – II d. Foundation Course in Physical Education - II	2	4
8		Learning Mathematics and Statistics using Software	2	

		Total	**22**	

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester – II Syllabus
To be implemented from the Academic year 2022-2023

Elective Courses (EC)

1. Financial Accounting – II

1	Preamble of the syllabus
	B.Com. Accounting & Finance is a under graduate programme of Department of Accounting & Finance, Changu Kana Thakur Arts, Commerce & Science College, New Panvel, (Autonomous) affiliated to University of Mumbai (MH). The Choice Based Credit, Grading and Semester System to be implemented through this curriculum, would allow students to develop a strong footing in the fundamentals and specialize in the disciplines of his/her liking and abilities. The learners pursuing this programme would have to develop understanding of various aspects of the Financial Accounting. It helps to exercise final Accounts from incomplete records, ascertainment of missing values by preparing various subsidiary accounts, also to understand and practice various techniques of consignment account. The performance of the learners shall be evaluated into two components i.e. internal examination and external examination. The learner's Performance shall be assessed by Internal Assessment with 40 marks and external assessment with 60 marks.

2	Objectives of the course
•	To exercise final Accounts from incomplete records, ascertainment of missing values by preparing various subsidiary accounts
•	To understand and practice various techniques of consignment account
•	To evaluate branch and branch accounting
•	To understand techniques of computing claim loss and loss of profit

3	Course Outcomes
	The Students will be able to
•	Describe difference in between single entry system and double entry system and to prepare final accounts from incomplete records.
•	Classify application of branch accounting for small branches by debtor method and for big branches by stock and debtor method.
•	Demonstrate transactions between principal and agent and able to apply consignment

	accounting.
•	Discuss basic principles of insurance and able to calculate fire insurance claim regarding goods lost by fire.
•	Simplify AS-16 and AS-26 in detail.

Choice Based Credit Grading and Semester System (CBCGS)
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1. Financial Accounting –II
(Course Code – UAF2FA2)

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Accounting from Incomplete Records	15
2	Consignment Accounts	10
3	Branch Accounts	15
4	Fire Insurance Claims	12
5	Accounting Standards issued by ICAI	08
	Total	**60**

4. Detailed syllabus

Sr. No.	Modules / Units
1	**Accounting from Incomplete Records**
	• Introduction • Problems on Preparation of Final Accounts of Proprietary Trading Concern (Conversion Method)
2	**Consignment Accounts**
	• Accounting for Consignment Transactions • Calculation of commission • Valuation of Stock • Invoicing of Goods at Higher Price • Calculate of normal / Abnormal Losses
3	**Branch Accounts**
	• Meaning / Classification of Branches • Accounting for Dependent Branch Not Maintaining Full Books • Accounting for independent branch • Debtors Method • Stock and Debtors Method • Adjustment and reconciliation of Branch and Head Office Accounts • Inter-Branch transactions • Foreign Branch Accounting, Accounting for Foreign Branches, Integral & Non- Integral Foreign Operation, Techniques of foreign currency translation, Final Accounts
4	**Fire Insurance Claims**
	• Introduction, Claim for loss of stock, Claim for loss of profit, Standing charges, increased cost of working • Computation of amount of claim for loss of stock and loss of profit. • Ascertainment of Claim as per the Insurance Policy
5	**Accounting Standards**
	• **AS 16 - Borrowing Cost** (a)Introduction (b) Qualifying Assets (c) Recognition of Borrowing Cost (d) Suspension and Cession of capitalization (e) Disclosure • **As 26 Intangible Asset** (a)Meaning (b) Applicability (c) Recognition (d) Measurement (e)

	Disclosure

5. Reference Books

Financial Accounting - Special Accounting Areas - Paper II
• *Introduction to Accountancy by T.S. Grewal, S. Chand and Company (P) Ltd., New Delhi* • *Advance Accounts by Shukla and Grewal, S. Chand and Company (P) Ltd., New Delhi* • *Advanced Accountancy by R.L Gupta and M. Radhaswamy, S. Chand and Company (P) Ltd., New Delhi* • *Modern Accountancy by Mukherjee and Hanif, Tata Mc. Grow Hill and Co. Ltd., Mumbai* • *Financial Accounting by Lesile Chandwichk, Pentice Hall of India Adin Bakley (P) Ltd., New Delhi* • *Financial Accounting for Management by Dr. Dinesh Harsalekar, Multi-Tech. Publishing Co. Ltd., Mumbai* • *Financial Accounting by P.C. Tulsian, Pearson Publications, New Delhi* • *Accounting Principles by R.N. Anthony and J.S. Reece, Richard Irwin, Inc* • *Financial Accounting by Monga, J.R. Ahuja, Girish Ahuja and Ashok Shehgal, Mayur Paper Back, Noida* • *Financial Accounting by Williams, Tata Mc. Grow Hill and Co. Ltd., Mumbai* • *Financial Accounting by V. Rajasekaran, Pearson Publications, New Delhi* • *Introduction to Financial Accounting by Horngren, Pearson Publications, New Delhi* • *Financial Accounting by M. Mukherjee and M. Hanif, Tata McGraw Hill Education Pvt. Ltd., New Delhi* • *Financial Accounting a Managerial Perspective, Varadraj B. Bapat, Mehul Raithatha, Tata McGraw Hill Education Pvt. Ltd., New Delhi*

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Elective Courses (EC)

2. Financial Management - I

1	Preamble of the syllabus
	B.Com. Accounting & Finance is a under graduate programme of Department of Accounting & Finance, Changu Kana Thakur Arts, Commerce & Science College, New Panvel, (Autonomous) affiliated to University of Mumbai (MH). The Choice Based Credit, Grading and Semester System to be implemented through this curriculum, would allow students to develop a strong footing in the fundamentals and specialize in the disciplines of his/her liking and abilities. The learners pursuing this programme would have to develop understanding of various aspects of the Financial Management. It helps to explain the various aspects of Financial Management and describe the types of financing, also to calculate time value of money and to know the concepts in valuation. The performance of the learners shall be evaluated into two components i.e. internal examination and external examination. The learner's Performance shall be assessed by Internal Assessment with 40 marks and external assessment with 60 marks.

2	Objectives of the course
•	To explain the various aspects of Financial Management and describe the types of financing
•	To calculate time value of money and to know the concepts in valuation
•	To explain how operating leverage contributes to a firm's business risk and apply financial leverage to form long term financial policies for business
•	To define and measure the cost of capital and calculate WACC

3	Course Outcomes
	The students will be able to

•	Explain the various aspects of Financial Management and to describe the sources of financing
•	Apply the techniques of valuation and calculate time value of money
•	Explain how financial leverage affects on expected ROE, expected EPS and risk borne by the stockholders and to describe how operating leverage contributes to a firm's business risk
•	Measure the cost of individual components of capital and to calculate WACC

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2. Financial Management – I
(Course Code – UAF2FM2)

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Introduction to Financial Management	12
2	Concepts in Valuation	12
3	Leverage	12
4	Types of Financing	12
5	Cost of Capital	12
	Total	**60**

4. Detailed syllabus

Sr. No.	Modules / Units
1	**Introduction to Financial Management**
	• Introduction, Meaning, Importance • Scope and Objectives of financial management, Role & Function of finance executives, • Profit maximisation, wealth maximisation and Value Maximization • financial distress and insolvency, • Agency cost & its mitigation • Agency Problem & Agency cost
2	**Concepts in Valuation**
	• The Time Value of Money • Present Value • Internal Rate of Return • Bonds Returns • The Returns from Stocks • Annuity • Techniques of Discounting • Techniques of Compounding • Simple and Compound Interest: Interest compounded once a year, more than once a year, continuous, nominal and effective rate of interest • Annuity-Present and future value-sinking funds • Depreciation of Assets: Equated Monthly Instalments (EMI)-using flat interest rate and reducing balance method**.**
3	**Leverage**
	• Introduction • EBIT & EPS Analysis • Types of Leverages: Operating Leverage, Financial Leverage & Composite Leverage • Relationship between Operating Leverage and Financial Leverage • Relationship between Operating Leverage and Break-even analysis • Positive and negative leverage • Financial leverage as trading on equity and Double edged sword. • (Including Practical Problems)
4	**Types of Financing**
	• Introduction • Needs of Finance and Sources: Long Term, Medium Term, Short Term • Long Term Sources of Finance • Short Term Sources of Finance • Concept of securitisation • Venture capital financing, lease financing and financing of export trade by banks • Financing in International market • **Consumer Finance and Credit Rating:**

	a) Consumer Finance: • Introduction, Sources, Types of Products, Consumer Finance Practice in India, Mechanics of Consumer Finance, Terms, Pricing, Marketing and Insurance of Consumer Finance, Consumer Credit Scoring, Case for and against Consumer Finance **b) Plastic Money**: • Growth of Plastic Money Services in India, Types of Plastic Cards- Credit card- Debit Card- Smart card- Add-on Cards, Performance of Credit Cards and Debit Cards, Benefits of Credit Cards, Dangers of Debit Cards, Prevention of Frauds and Misuse, Consumer Protection. Indian Scenario. • Smart Cards- Features, Types, Security Features and Financial Applications **c) Credit Rating**: • Meaning, Origin, Features, Advantages of Rating, Regulatory Framework, Credit Rating Agencies, Credit Rating Process, Credit Rating Symbols. Credit Rating Agencies in India, Limitations of Rating
5	**Cost of Capital**
	• Introduction • Definition and Importance of Cost of Capital • Measurement of Cost of Capital • Calculate WACC, Marginal cost of capital and Effective interest rate • (Including Practical Problems)

5.References Books

Financial Management (Introduction to Financial Management) - Paper I
• *Fundamentals of Financial Management by D. Chandra Bose, PHI Learning Pvt. Ltd.* • *Fundamentals of Financial Management by Bhabotosh Banerjee, PHI Learning Pvt. Ltd.* • *Fundamentals of Financial Management by Vyuptakesh Sharma, Pearson Education* • *Fundamentals of Financial Management by J.C. Van Horne, Prentice Hall of India,* • *Financial Management: Text and Problems by M.Y. Khan and P.K. Jain, Tata McGraw Hill,* • *Financial Management: Theory and Practice by Prasanna Chandra, Tata McGraw Hill* • *Financial Management by I.M. Pandey, Vikas Publishing House, New Delhi*

Choice Based Credit Grading and Semester System (CBCGS)
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To be implemented from the Academic year 2022-2023

Elective Courses (EC)
3. Business Statistics

1	Preamble of the syllabus
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2	Objectives of the course
•	To calculate different types of averages, median, mode, quartiles & percentile.
•	To compute different types of deviation like range, quartiles deviation, Mean deviation & Standard deviation.
•	To understand concept & types of correlation, Scatter diagram, Coefficient of correlation & various regression coefficient.
•	To understand concept of index numbers inflation, family budget & moving average, least square time series.

3	Course Outcomes
	The Students will be able to ;
•	Analyse Stastical data using measures of central tendency, dispersion & location.
•	Calculate and interpret the correlation and linear regression equation for a set of data.
•	Acquire knowledge on vital statistics, index numbers and concepts of time series and its application's
•	Calculate probabilities and derive the marginal and conditional distributions of bivariate random variables.

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4. Business Statistics

(Course Code: UAF2BSA)

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Measures of Central Tendency and Dispersion	15
2	Correlation and Regression	15
3	Time Series and Index Number	15
4	Probability and Probability Distribution	15
	Total	**60**

4. Detailed Syllabus

Sr. No.	Modules / Units
1	Measures of Central Tendency and Dispersion
	• Introduction to Statistics: Meaning, Scope, Importance and Limitation, Statistical Investigation, Statistical units, Methods of Investigation. • Collection of Data- Primary and Secondary Data, Editing of Data Classification of data, Frequency Distribution and Statistical Series, Tabulation of Data Diagrammatical and Graphical Presentation of Data. • Measures of central tendency-Mean, Median, Mode (Histogram & Ogive Curve), Quartile, Decile and Percentile. • Dispersion – Range, Quartile Deviation, Mean Deviation, Standard Deviation and its Co- efficient, Co-efficient of Variation and Variance.
2	Correlation and Regression
	• Correlation- Meaning, application, types and degree of correlation, Methods- Scatter Diagram, Karl Pearson's Coefficient of Correlation, Spearman's Rank Coefficient Correlation. • Regression: Meaning, Types of Regression. Regression lines, bxy, byx, etc.
3	Time Series and Index Number
	• Analysis of Time Series - Meaning, Importance and Components of a Time Series. • Decomposition of Time Series: - Moving Average Method and Method of Least square. • Index Number: Meaning, Types and Uses, Methods of constructing Price Index Number, Fixed – Base Method, Chain-Base Method, Base conversion, Base shifting deflating and splicing. Consumer Price Index Number, Fisher's Ideal Index Number, Reversibility Test- Time and Factor.
4	Probability and Random Variable & Expectation
	• Probability- Meaning, Experiment, random experiment, sample space, events, types of events and practical problems. • Random Variable and its types, Mathematical Expectations and Practical Problems.

5.Reference Books

Business Statistics

- *Mathematics for Economics and Finance Methods and Modelling by Martin Anthony and Norman Biggs, Cambridge University Press, Cambridge low-priced edition, 2000, Chapters 1, 2, 4, 6 to 9 & 10.*
- *Applied Calculus: By Stephen Waner and Steven Constenoble, Brooks/Cole ThomsonLearning, second edition, Chapter 1 to 5.*
- *Business Mathematics By D. C. Sancheti and V. K. Kapoor, Sultan Chand & Sons, 2006,Chapter 1, 5, 7, 9 &10.*
- *Mathematics for Business Economics: By J. D. Gupta, P. K. Gupta and Man Mohan, Tata Mc-Graw Hill Publishing Co. Ltd., 1987, Chapters 9 to 11 & 16.*
- *Quantitative Methods-Part-I by S. Saha and S. Mukerji, New Central Book Agency, 1996,Chapters 7 & 12.*
- *Mathematical Basis of Life Insurance By S.P. Dixit, C.S. Modi and R.V. Joshi, InsuranceInstitute of India, Chapters 2: units 2.6, 2.9, 2.20 & 2.21.*
- *Securities Laws & Regulation of Financial Market: Intermediate Course Paper 8, Institute ofCompany Secretaries of India, Chapter 11.*
- *Investments By J.C. Francis & R.W. Taylor, Schaum's Outlines, Tata Mc-Graw Hill Edition 2000,Chapters 2, 4 & section 25.1.*
- *Indian Mutual Funds Handbook: By Sundar Shankaran, Vision Books, 2006, Sections1.7, 1.8.1, 6.5 & Annexures 1.1to 1.3.*
- *STATISTICS by Schaum Series.*
- *Operations Research by Gupta and Kapoor*
- *Operations Research by Schaum Series*
- *Fundamentals of Statistics - D. N. Elhance.*
- *Statistical Methods - S.G. Gupta (S. Chand & Co.*
- *Statistics for Management - Lovin R. Rubin D.S. (Prentice Hall of India)*
- *Statistics - Theory, Method & Applications D.S.Sancheti & V. K. Kapoor.*
- *Modern Business Statistics - (Revised}-B. Pearles & C. Sullivan –Prentice Hall of India.*
- *Business Mathematics & Statistics: B Aggarwal, Ane Book Pvt. Limited*
- *Business Mathematics: D C Sancheti & V K Kapoor, Sultan Chand & Sons*

Business Mathematics: A P Verma, Asian Books Pvt.: Limited

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To be implemented from the Academic year 2022-2023

Core Course (CC)

4. Business Communication-I

1	Preamble of the syllabus
	Business communication plays crucial role in commercial world. It is regarded as the life blood of the internal and external activities performed in the business organizations. The growth of an organization directly or indirectly depends upon the effective methods of communication employed by all the stakeholders. Success and image building in the business arena is determined by different dimensions of communication. Therefore, all the corporate professionals should have command over oral and written communication. Business communication is successful and effective only when all the elements of the communication process are actively involved in it. The desire to communicate is very natural and fundamental amongst all the human beings. Hence, corporate communication is intentional as well as unintentional. Action oriented communication is an amalgamation of verbal as well as non- verbal means of communication. The systematic learning of business communication is capable of creating successful managers, accountants, entrepreneurs and businessmen with sound knowledge and skills needed in today's vibrant, competitive and digital business realm.

2	Objectives of the course
•	To familiarize the students with process of communication and its applications
•	To acquaint the students with different types of communication
•	To demonstrate effective use of technology in communication
•	To develop effective listening skills amongst the students

3	Course Outcomes
	The Students will be able to
•	Demonstrate the outline of theory of Business Communication
•	Analyse formal and informal communication present in business organizations
•	Examine methods of communication and identify different barriers to successful communication
•	Formulate various types of commercial letters effectively

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To be implemented from the Academic year 2022-2023

Business Communication - I
(Course Code – UAF2BC1)
Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Theory of Communication	15
2	Obstacles to Communication in Business World	15
3	Business Correspondence	15
4	Language and Writing Skills	15
	Total	**60**

4. Detailed Syllabus

Sr. No.	Modules / Units
1	**Theory of Communication**
	• **Concept of Communication** Meaning, Definition, Process, Need, Feedback Importance of Communication in Corporate world • **Channels and Objectives of Communication**: **Channels-** Formal and Informal- Vertical, Horizontal and Grapevine. • **Objectives of Communication** Information, Order, Persuasion, Motivation, Warning, and Boosting the Morale of Employees • **Methods and Modes of Communication** Methods: Verbal and Non-verbal, Characteristics of Verbal and Non-verbal Communication, Business Etiquette Technology Enabled Communication: Email, Fax, Video and Satellite Conferencing
2	**Obstacles to Communication in Business World**
	• **Problems in Communication /Barriers to Communication** Physical/ Semantic/Language / Socio-Culture/ Psychological / Barriers, Ways to Overcome these Barriers. • **Listening** Importance of Listening Skills, Types of Listeners, Cultivating good Listening Skills – 4 • **Introduction to Business Ethics** Concept and Interpretation, Importance of Business Ethics, Personal Integrity at the workplace, Business Ethics and media, Corporate Social Responsibility. Teachers can adopt a case study approach and address issues such as the following so as to orient and sensitize the student community to actual business practices: Surrogate Advertising, Patents and Intellectual Property Rights, Dumping of Medical/E-waste, Human Rights Violations and Discrimination on the basis of gender, race, caste, religion, appearance and sexual orientation at the workplace Piracy, Insurance, Child Labour.
3	**Business Correspondence**
	• **Theory of Business Letter Writing** Parts, Structure, Layouts—Full Block, Modified Block, Semi - Block Principles of Effective Letter Writing, • **Personnel Correspondence** Statement of Purpose, Job Application Letter and Resume, Letter of Acceptance of Job Offer, Letter of Resignation, Letter of Appointment, Promotion and Termination, Letter of Recommendation.
4	**Language and Writing Skills**
	• **Commercial Terms used in Business Communication**

	Paragraph Writing: Blog Writing: Advertising: • **Activities** Listening Comprehension Remedial Teaching Speaking Skills: Presenting a News Item, Dialogue and Speeches Paragraph Writing: Preparation of the first draft, Revision and Self – Editing, Rules of spelling. Reading Comprehension: Analysis of texts from the fields of Commerce and Management. • **Particles:** English language laboratory.

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Core Course (CC)
5. Business Law - II

1	Preamble of the syllabus
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2	Objectives of the course
•	To explain the provisions and various aspects of Intellectual Property Rights.
•	To Provide knowledge to the students about various provisions of Limited Liability Partnership Act, 2008.
•	To aware students about various provisions of Industrial Law.
•	To enable the students to examine and discuss the provisions of the Indian Partnership Act, 1932.

3	Course Outcomes
	The Students will be able to
•	Describe various forms of IPR and provision of law with respect to registration of patent, copyright, trade mark.
•	Demonstrate the various provisions of limited liability partnership act 2008.
•	Acquaint knowledge of various acts of industries
•	Design partnership deed as per partnership act 1932.

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4. Business Law - II
(Course Code – UAF2BL2)
Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	The Indian Partnership Act – 1932	10
2	Limited Liability Partnership Act – 2008	08
3	Industrial Law - I	15
4	Industrial Law – II	15
5	Intellectual Property Rights	12
	Total	**60**

4. Detailed Syllabus

Sr. No.	Modules / Units
1	**The Indian Partnership Act – 1932**
	• Concept of Partnership, Kinds of partnership • Partnership and Company • Test for determination of existence for partnership • Registration and effects of non-registration of Partnership • Rights and Duties of Partners • Authority and Liability of partners • Admission, Retirement and Expulsion of Partner • Dissolution of Partnership
2	**Limited Liability Partnership Act – 2008**
	• Nature of Limited Liability Partnership • Incorporation of Limited Liability Partnership • Extent and Limitation of Liability of Limited Liability Partnership and Partners • Contributions • Conversion Into Limited Liability Partnership • Winding Up and Dissolution
3	**Industrial Law - I**
	• Industrial Disputes Act, 1947: Definition, Authorities, Awards, Settlements, Strikes Lockouts, Lay Offs, Retrenchment and Closure • The Trade Union Act,1926: Objectives, Function, Formation, Regulation, Rights, and Liabilities • The Factory Act 1948: Definitions, Provisions pertaining to Health, Safety, and Welfare
4	**Industrial Law – II**
	• Employee State Insurance Act 1948: Definition and Employees Provident Fund • The payment of Wages Act 1948: Objectives, Definition, Authorized Deductions • Employees' Provident Funds and Miscellaneous Provisions Act, 1952
5	**Intellectual Property Rights**
	• IPR definition/objectives • Patent definition. What is patentable & not patentable? Invention And its Attributes, Inventors and Applications • Trademarks, definition, types of trademarks, infringement, and passing off. • Copy right definition and subject in which copyright exists, Originality, Meaning and Content, Authors and Owners, Rights, and Restrictions. • Plagiarism

5. Reference Books

	Business Law - II
	• *An introductory guide to Central Labour Legislation – W A Dawson* • *Industrial Law – P L Malik* • *Personnel Management and Industrial relations – Kapur S , Punia B – Gurgaon SK* • *Labour participation in Management – Mhetras V Manaklals* • *Law of Partnership, by J P Singhal (Author)* • *Partnership Act, 1932 with State Amendments* • *The Law Of Partnership, P.C. Markanda* • *Indian Partnership Act 1932* • *Limited Liability Partnership Act 2008*

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Core Course (CC)
6. Commerce (Business Environment) – I

1	Preamble of the syllabus
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2	Objectives of the course
•	To acquaint students with the concepts of business and its environment.
•	To understand the need towards society & business
•	To enhance thinking abilities towards entrepreneurship
•	To acquire knowledge of E-commerce in India
•	To understand various responsibilities of business towards various stakeholders

3	Course Outcomes
	The Students will be able to
•	Understand the concept of business environment and various tools of environmental analysis.
•	Aware of business ethics and Aware of various consumer laws in India.
•	Identify the factors of international business environment and positive and negative impact of environment on business.
•	Know CSR, Corporate Governance, and carbon credit and implementation of CSR activities by various companies.

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Commerce (Elements of Commerce)-I

(Course Code - UAF1BC1)

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Business and its Environment	14
2	Contemporary Issues	08
3	E commerce	08
4	Introduction to Entrepreneurship	10
5	Project Planning	10
6	Fundamentals of Retailing	10
	Total	**60**

4. Detailed syllabus

Sr. No.	Modules / Units
1	**Business and its Environment**
	• Business Objectives, Dynamics of Business and its Environment, Types of Business Environment • Environmental Analysis: Importance, Factors, PESTEL Analysis, SWOT Analysis • Constituents of Business Environment: Internal and External Environment, Educational Environment and its impact, International Environment – Current Trends in the World, International Trading Environment – WTO and Trading Blocs and their impact on Indian Business. • Strategies for going Global: MNCs and TNCs, WTO • Foreign Trade in India- Balance of Trade, FDI Investment Flows and its Implication for Indian Industries • Business Ethics: Nature and Scope of Ethics, Ethical Dilemmas, Corporate Culture and Ethical Climate
2	**Contemporary Issues**
	• Corporate Social Responsibility and Corporate Governance: Social Responsibility of Business, Ecology and Business, Carbon Credit • Social Audit: Evolution of Social Audit, Benefits of Social Audit, Social Audit v/s Commercial Audit
3	**E - Commerce**
	• **Introduction:** Meaning, Features, Functions and Scope of E-Commerce-Importance and Limitations of E-Commerce • **Types of E-Commerce:** Basic ideas and Major activities of B2C, B2B, C2C. Present status of E-Commerce in India: Transition to E-Commerce in India, E-Transition Challenges for Indian Corporates; on-line Marketing Research. M-Commerce
4	**Introduction to Entrepreneurship**
	• **Introduction:** Concept and importance of entrepreneurship, factors Contributing to Growth of Entrepreneurship, Entrepreneur and Manager, Entrepreneur and Entrepreneur • **The Entrepreneurs:** Types of Entrepreneurs, Competencies of an Entrepreneur, Entrepreneurship Training and Development centers in India. Incentives to Entrepreneurs in India. • **Women Entrepreneurs:** Problems and Promotion • **Development of Business Entrepreneurship**: Entrepreneurship and Economic Development, Micro, Small and Medium Enterprises Development (MSMED) Act. Entrepreneurship as a Career Option
5	**Project Planning**
	• **Introduction**: Business Planning Process; Concept and importance of Project Planning; Project Report; feasibility Study types and its importance

	• **Business Unit Promotion:** Concept and Stages of Business Unit Promotion, Location – Factors determining location, and Role of Government in Promotion. Statutory Requirements in Promoting Business Unit: Licensing and Registration procedure, Filling returns and other documents, Other important legal provisions
6	**Fundamentals of Retailing**
	• **Retailing Introduction:** Concept of organized and unorganized retailing , Trends in retailing, growth of organized retailing in India, Survival strategies for unorganized Retailers • **Retail Format:** Store format, Non – Store format, Store Planning, design and layout • **Retail Scenario:** Retail Scenario in India and Global context – Prospects and Challenges in India. Mall Management – Retail Franchising. FDI in Retailing, Careers in Retailing

5. Reference Books

Commerce (Business Environment) - Paper I

- *Business Environment Text and Cases by M.B. Shukla, Taxman Publications, New Delhi*
- *Global Economy and Business Environment by Francis Cherunilam, Himalaya Publication House, Mumbai*
- *Business Environment: Text and Cases by Francis Cherunilam, Himalaya Publication House, Mumbai*
- *Essentials of Business Environment by K. Aswathappa, Himalaya Publication House, Mumbai*
- *Business Environment by Justin Paul, Tata McGraw Hill Education Pvt. Ltd., New Delhi*
- *Entrepreneurial Development by S.S. Khanka, S. Chand and Company Pvt. Ltd., New Delhi*
- *Dynamics of Entrepreneurship by Vasanta Desai, Himalaya Publishing House, Mumbai*
- *Entrepreneurship and Small Development Business Management by C.B. Gupta and S.S. Khanka, Sultan Chand and Sons, New Delhi*
- *Entrepreneurship by David H. Holt, PHI Learning Pvt. Ltd., New Delhi*
- *The Complete E-Commerce Book: Design, Build & Maintain a Successful Web-based Business, by Janice Reynolds*
- *The International Business Environment by Leslie Hamilton, Philip Webster*
- *Retail Management, by Gibson*

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Core Course (CC)
Foundation Course –II

1	Preamble of the syllabus
	Foundation Course was introduced with an objective to acquaint the students with concepts of social awareness, appreciate the Unity in Diversity of Indian society and understand factors that have influenced the cultural, economic, environmental, and political factors of Indian society. Keeping in tune with the revised syllabi, the committee has introduced themes in lieu of issues of a rapidly changing Indian society. The revised syllabus is an attempt to make students conscious of their duties, responsibilities, and role in society. Students have the Knowledge of components of society and are aware of the problems in society. Under Credit Based Semester & Grading System (CBSGS) and continuous evaluation consisting of components of External Assessment & Internal Assessment. The external component of theory exams of 60 marks and an internal component of assignments/presentations for 40 marks of Foundational course for B.A./ B.Com./ B.Sc./ B.M.S./ B.Com. Accounting & Finance / Bio-Tech.

2	Objectives of the course
•	To acquaint the students with the concept of Liberalization, Privatization, Globalization, and Indian society.
•	To create awareness about Environment and its aspects
•	To impart the concepts of Stress Management and Conflict Management.
•	To develop Human Values and Personality.

3	Course Outcomes
	The Students will be able to
•	Summarize the concept of Liberalization, Privatization, Globalization, and Indian society.
•	Discuss concepts of Ecology & different causes of Environmental Degradation
•	Adapt the Stress Management and Conflict Management techniques.
•	List Civic Values, Types of Personality, and Agent of Socialisation.

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –II Syllabus
To be implemented from the Academic year 2022-2023

Foundation Course - II

(Course Code -)

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	**Liberalization, Privatization, Globalization and Indian Society**	15
2	**Ecology and Sustainable Development**	15
3	**Understanding and Managing Stress and Conflict**	15
4	**Personality Development**	15
	Total	**60**

4.Detailed syllabus

Sr. No.	Modules / Units
1	**Liberalization, Privatization, Globalization and Indian Society**
	A. Concepts and Impact of liberalization, privatization and globalization on Indian Society B. Concept causes and Effects of Poverty on Indian Society. C. Farmers' Suicides- Causes and Solutions
2	**Environment**
	A. Understanding concepts and the Importance of the Environment. B. Environmental Degradation - causes, impact and measures C. Concept, Importance and effective measures of water and soil conservation.
3	**Understanding and Managing Stress and Conflict**
	A. Concept, causes, types of stress B. Concept, causes, types of conflicts; **C.** Managing Stress and Conflicts.
4	**Personality Development**
	A. Civic Values and their impact on individual development B. Personality Development- Types and Factors affecting Personality C. Agents of Socialization

5.References.

Foundation Course II

- *K. Aswathappa, Essentials of Business Environment, Himalaya Publishing House, New Delhi*
- *Francis Cherunilam, Business Environment-Himalaya Publishing House, New Delhi*
- *Mishra and Puri, Indian Economy, Himalaya Publishing House, New Delhi*
- *Organisational behaviour, S.Robbins, Prentice Hall*
- *Organisational behaviour, John W.Newstrom and Keith Davis, Tata McGrawhill*
- *Organisational behaviour, Fred Luthans, McGrawhill,Newyork*
- *Organisational behaviour, K.Aswathappa, Himalaya Publishing House*
- *Environmental Studies – Dr. Vijay Kumar Tiwari , Himalayan Pub. (2010)*
- *Ecology and environment – Benu Singh, Vista International Pub. (2006)*
- *Universal Human Rights : In theory and practice, Jack Donnelly, (2014)*

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –II Syllabus
To be implemented from the Academic year 2022-2023

Core Course (CC)
Foundation Course in National Service Scheme - II

1	Preamble of the syllabus
	Foundation Course in National Service Scheme syllabus is prepared to give a sound knowledge and understanding of NSS to undergraduate students of first year of the F.Y.B.A./B.Com./B.Sc./B.M.S./B.A.F/BioTech. The goal of this syllabus is to make the study of N.S.S. stimulating, interesting and relevant as possible. The syllabus is prepared by keeping in mind the aim to make student capable of studying Foundation course in N.S.S and develop interest in them in relation to community based activities, further aiding the students to evolve in catering to the needs of the community, as and when required. The syllabus has an interdisciplinary tone facilitating the learners to develop an outlook of various aspects of the N.S.S. and its conceptual understanding, development of the organization and how it is helping to grasp and appreciate various facts of our society and societal based works. It will also acquaint students with the qualities like sharing, caring and shouldering the responsibilities which would be beneficial for aiding others in uplifting. Such knowledge is beneficial to assist the learners for overall development. The revised syllabus of National Service Scheme is aimed at rendering a selfless bond between the students and community that will ultimately lead to the nation building. In addition to that, it also reflects the essence of the democratic values that involves constant efforts of the students in building a better world. The syllabus is multifaceted embracing the aims and objectives which are initiated by the UGC since its inception. With the help of the revised syllabus the college strives for maintaining the relationship of the students to their community.

2	Objectives of the course
•	To make students to have an outlook to identify the problems and needs of the community getting the students involved in the problem solving process.
•	To develop the civic responsibility amongst the students.
•	To develop leadership qualities and democratic attitude.
•	To promote understanding of the community and environment in which they dwell.

3	Course Outcomes
	The Students will be able to
•	Demonstrate the leadership and better communication skills during the camps and any allied activities
•	Apply the knowledge about camping whilstcamping.
•	Utilize the information about the surveys whilstdesigning the survey
•	Illustrate the working of an NGO.

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –II Syllabus
To be implemented from the Academic year 2022-2023

Foundation Course in National Service Scheme - II

(Course Code -)

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	**Volunteerism and Planning**	12
2	**Special Camp Activity.**	09
3	**Conducting Survey and its agencies**	12
4	**Government Organization and Non-Government Organizations**	12
	Total	**45**

4. Detailed syllabus

Sr. No.	Modules / Units
1	**Volunteerism and Planning**
	• Volunteerism-Meaning and Training. • Leadership- Meaning and its attributes. • Communication Skills-Meaning, Types and Importance. • Planning-Importance and Limitations
2	**Special Camp Activity.**
	• Selection of camp site. • Identification of specific theme. • Co-ordination with local planning government and other agencies. • Ice-breaking and team building activities, songs.
3	**Conducting Survey and its agencies.**
	• Techniques of Data Collection: Questionnaire, Interview and Interview Schedule. • Data interpretation. • Report Writing. • NSO, NFHS, Census.
4	**Government Organization and Non-Government Organizations**
	• Meaning of GOs and NGOs. • NGOs-Functions and Registration. • International NGOs –UNICEF and WHO • NGOs in India- Help Age India and Goonj.

5. Reference Books

Foundation Course in National Service Scheme - II

- *National Service Scheme Manual (Revised) 2006, Government of India, Ministry of YouthAffairs and Sports, New Delhi.*
- *University of Mumbai National Service Scheme Manual 2009.*
- *Avhan Chancellor's Brigade – NSS Wing, Training camp on Disaster PreparednessGuidelines, March 2012*
- *Rashtriya Seva Yojana Sankalpana – Prof. Dr. Sankay Chakane, Dr. Pramod\ Pabrekar,Diamond Publication, Pune.*
- *National Service Scheme Manual for NSS District Coordinators, National Service SchemeCell, Dept. of Higher and Technical Education, Mantralaya,*
- *Annual report of National Service Scheme (NSS) published by Dept. of Higher and TechnicalEducation, Mantralaya.*
- *NSS Cell, Dept. of Higher and Technical Education, Mantralaya, UTKARSHA-Socio andcultural guidelines.*

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –II Syllabus
To be implemented from the Academic year 2022-2023

Core Course (CC)
Foundation Course In Physical Education - II

1	Preamble of the syllabus
	This Course is designed to introduce the students to elementary concepts in Foundation Course In Physical Education.The student should be able to use these concepts to understand the relevance of Foundation Course In Physical Education to the real world. The student should be able to build on these concepts in the future to develop deeper understanding of the Physical Education as well as the revised syllabus is framed to understand the Foundation Course In Physical Education theory, practical and its relevance indecision making.

2	Objectives of the course
•	To understand the basic concepts of Health, Physical Education and Physical Fitness.
•	To familiarize the learner with different types of fitness, its parameters and wellness.
•	To acquire the knowledge pertaining to game and sports of the choice of the learner.
•	To create awareness about own body functions through Physical Education and Exercise.

3	Course Outcomes
	The Students will be able to
•	
•	
•	
•	

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –II Syllabus
To be implemented from the Academic year 2022-2023

Foundation Course In Physical Education - II

(Course Code -)

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	**Development of Fitness**	10
2	**Health, Fitness and Diseases**	10
3	**Yoga Education**	10
4	**Daily Schedule of Achieving Quality of Life and Wellness**	10
5	**Introduction to Major Games (Volleyball, Handball, Ball badminton, Wrestling,)**	10
6	**Practical**	10
	Total	**60**

4. Detailed syllabus

Sr. No.	Modules / Units
1	**Development of Fitness**
	• Benefits of physical fitness and exercise and principles of physical fitness • Science Of Exercise and Benefits • Waist-hip ratio Target Heart Rate, BMI and types and principles of exercise(FITT) • Methods of training- continues, Internal, circuit, Fartlek and Plyometric
2	**Health, Fitness and Diseases**
	• Postures • Definition of obesity and its management. • Preventive and therapeutic aspects of communicable and non-communicable diseases • Factors responsible for communicable diseases
3	**Yoga Education**
	• Meaning and history of yoga. • Ashtanga yoga and types of yoga • Types of Suryanasmaskara and Technique of Pranayama • Benefits of Yoga
4	**Daily Schedule of Achieving Quality of Life and Wellness**
	• Daily schedule based upon one's attitude, gender, age & occupation • Basic-module:-Time split for rest, sleep, diet, activity & recreation • Principles to achieve quality of life:- positive attitude, daily regular exercise, control over food habits & healthy hygienic practices.
5	**Introduction to Major Games (Volleyball, Handball, Ball badminton, Wrestling,)**
	• Introduction • Fundamental & advance Skills of games. • Rules & Regulation • Ground Marking
6	**Practical**
	• Bridge-up Test. • Body Mass Index (BMI). • 12/9 min.Run & Walk Test. • Waist Hip Ratio.

5. Reference Books

Foundation Course In Physical Education

- *Adams, William's – Foundation of Physical Education Exercises and Sports Sciences, Lea and Febigor, Philadelphia, 1991.*
- *American College of Sports Medicine, ACSM's, Certification Review.(2006) 2nd Ed., Lippian Cott Williams and Wilkins 2006.*
- *American College of Sports Medicine, ACSM's, Guidelines for Exercise Testing and Priscription. (2013) Ninth Edition, Lippian Cott Williams and Wilkins.*
- *American College of Sports Medicine, ACSM's Resource Manual for Guidelines for Exercise Testing and Priscription. (2006) 5th Ed., Lippian Cott Williams and Wilkins, 2006.*
- *Beashel, P.,& Taylor, J. (1996). Advance Studies in Physical Education and Sports. U.K.: Thomas Nelson and Sons Ltd.*
- *Bucher, C.A. (1995). Foundation of Physical Education (12th Ed.) USA : St. Louis, C.V. Mosloy.*
- *Colfter, G.R., Hamilton, K.E., Magill R.A.,& Hamilton B.J. (1986). Contemporary Physical Education. USA : Wim C. Brown Publisher.*
- *Daryl S. (1994). Introduction to physical education, fitness and sports (2nd ed.). London: Mayfield publishing company.*
- *Dheer, S.D.(1991). Introduction to Health Education. New Delhi : Friends Publication.*
- *Dr. A.K.Uppal& Dr. G. P. Gautam (2004). Physical education and Health. Delhi: Friends publisher.*
- *Dr. Gharote M. L; Teaching Methods for Yogic Practices. – 2nd Ed., Kaivalyadham Samiti, Lonavala- 2001.*

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –II Syllabus
To be implemented from the Academic year 2022-2023

Core Course (CC)
Learning Mathematics and Statistics using Software's

1	Preamble of the syllabus
	Mathematical thinking is important for all members of a modern society as a habit of mind for its use in the workplace, business and finance and for personal decision making. Mathematics is fundamental to national prosperity in providing tools for understanding Science, Engineering, Technology and Economics. It is essential in public decision making and for participation in the knowledge economy. Mathematics is a creative discipline.

2	Objectives of the course
•	To introduce the basic concepts of Mathematics and Statistics.
•	To increase the learners appreciation of the basic role played by Mathematics in modern technology.
•	To prepare learners to face challenges of privatization and globalization by providing basic knowledge and skill of Mathematics and Statistics.
•	To bridge the gap between commerce and higher Mathematics

3	Course Outcomes
	The Students will be able to
•	This course will help students to learn about the basic concept relating Mathematics and Statistics , Calculus, Measures of central tendencies, Dispersion, sources of data, classification of data, Probability, etc. It will further help to apply the statistical tools and techniques for decision making and for research studies.

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –II Syllabus
To be implemented from the Academic year 2022-2023

Learning Mathematics and Statistics using Software's

(Course Code - USC2ECS)

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Introduction to Excel and Basic Commands, Pivot Tables, Graphs	
2	Correlation and Regression using Excel, Time series analysis, Probability Distribution	
3	Introduction to GeoGebra, Basic commands, Graphs of some basic mathematical functions	
4	Finding Maxima and Minima, Probability distribution using GeoGebra	
	Total	**30**

4. Detailed syllabus

Sr. No.	Modules / Units
1	Introduction to Excel and Basic Commands, Pivot Tables, Graphs
2	Correlation and Regression using Excel, Time series analysis, Probability Distribution
3	Introduction to GeoGebra, Basic commands, Graphs of some basic mathematical functions,
4	Finding Maxima and Minima, Probability distribution using GeoGebra

Choice Based Credit Grading and Semester System (CBCGS)
F.Y.B.Com. Accounting & Finance Semester –I & II Syllabus
To be implemented from the Academic year 2022-2023

Scheme of Evaluation

Scheme of examination for each semester

The performance of the learners shall be evaluated into two components. The learner's Performance shall be assessed by Internal Assessment with 40% marks in the first component. External assessment with 60% marks in the second component. The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below:-

A) Internal Assessment: 40 % 40 Marks

Sr. No.	Particular	Marks
01	One periodical class test / online examination to be conducted in the given semester	20 Marks
02	Any two tools out of these (10 Marks each) 1. Group/ Individual Project 2. Presentation and write up on the selected topics of the subjects. 3. Case studies /Test based on Tutorials 4. Open Book Test/Book Review 5. Quiz	20 Marks

(For Courses with Practical)

Sr. No.	Particular		Marks
01	**Practical Examination**		20 Marks
	Journal	05 Marks	
	Viva Voce	05 Marks	
	Laboratory Work	10 Marks	
02	Any two tools out of these (10 Marks each) 1. Group/ Individual Project 2. Presentation and write up on the selected topics of the subjects / Case studies. 3. Test on Practical Skills 4. Open Book Test		20 Marks

	5. Quiz	

Question Paper Pattern

(Periodical Class Test/ online examination for the Courses at Under Graduate Programmes)

- Maximum Marks: 20
- Duration: 30 Minutes

Particular	Marks
Match the Column / Fill in the Blanks / Multiple Choice Questions/ True/False/Answer in One or Two Lines (Concept based Questions) (1 Marks each)	20 Marks

B) Semester End Examination: 60 % **60 Marks**

Question Paper Pattern

Theory question paper pattern
1. There shall be four questions each of 15 marks (30 marks with internal options).
2. All questions shall be compulsory with internal options.
3. Question may be subdivided into sub-questions a, b, c… and the allocation of marks depends on the weightage of the unit/module.
4. Duration: The examination shall be of 2 hours duration.

Passing Standard

The learners to pass a course shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment and Semester End Examination. The learners shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 24 Out of 60) separately, to pass the course and minimum of Grade E to pass a particular semester A learner will be said to have passed the course if the learner passes the Internal Assessment and Semester End Examination together.

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Question Paper Pattern
(Practical Courses)

Maximum Marks: 60

Questions to be set: 04

Duration: 2 Hrs.

All Questions are Compulsory Carrying 15 Marks each.

Question No	Particular	Marks
Q-1	Full Length Practical Question ***OR*** Full Length Practical Question	15 Marks 15 Marks
Q-2 Q-2	Full Length Practical Question ***OR*** Full Length Practical Question	15 Marks 15 Marks
Q-3 Q-3	Full Length Practical Question ***OR*** Full Length Practical Question	15 Marks 15 Marks
Q-4 Q-4	Full Length Question ***OR*** Short Notes (Any three out of five)	15 Marks 15 Marks

Note:
Practical question of 15 marks may be divided into two sub questions of 7/8 and 10/5 Marks. If the topic demands, instead of practical questions, appropriate theory question may be asked.

Question Paper Pattern
(Theoretical Courses)

Maximum Marks: 60
Questions to be set: 04
Duration: 2 Hrs.
All Questions are Compulsory Carrying 15 Marks each.

Question No	Particular	Marks
Q-1	Full Length Question	15 Marks
	OR	
Q-1	Full Length Question	15 Marks
Q-2	Full Length Question	15 Marks
	OR	
Q-2	Full Length Question	15 Marks
Q-3	Full Length Question	15 Marks
	OR	
Q-3	Full Length Question	15 Marks
Q-4	Full Length Question	15 Marks
	OR	
Q-4	Short Notes (Any three out of five)	15 Marks

Note:
Theory question of 15 marks may be divided into two sub questions of 7/8 and 10/5 Marks.

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR
ARTS, COMMERCE & SCIENCE COLLEGE, NEW PANVEL
(AUTONOMOUS)

Re-accredited 'A+' Grade by NAAC
'College with Potential for Excellence' Status Awarded by UGC
'Best College Award' by University of Mumbai

Program: B.A.F. Subject Code- UAF1ECS

Revised Syllabus of F.Y.B.A.F. *Effective Communication Skills.*

Choice Based Credit System (60:40)
w.e.f. Academic Year 2022-23

Sr. No.	Heading	Particulars
1	Title of Course	***Effective Communication Skills***
2	Eligibility for Admission	12th Arts, Commerce and Science of all recognised Boards
3	Passing marks	40%
4	Ordinances/Regulations (if any)	
5	No. of Semesters	One
6	Level	U.G.
7	Pattern	Semester (60:40)
8	Status	Revised
9	To be implemented from Academic year	2022-23

Details of the Course

Preamble of the Course Syllabus

Communication is considered as an indispensable element of all the activities performed by the human beings. The success and failure of any activity is associated with application of communication. Effective communication Skills in English has become necessity in today's competitive and digital realm. The knowledge of English has become an inevitable facet of versatile personality development of the student. It is essential to enhance soft skills for accomplishment of personal as well as professional progress. Industry is also demanding an excellent balance of knowledge and skills in English pertaining to employees. Paradoxically, there is gap between demand of corporate world and skills developed by the curriculum. Therefore, it is crucial to upgrade communication skills of the learners. It is an initiative to contribute in the process of Skill India Campaign.

Effective communication skills in English is a pathway to achieve global identity in scientific and technology driven world. Hence, it is necessary to develop presentation, interview and leadership qualities in the personality of the students.

F.Y.B.A.F. Effective Communication Skills.

This innovative and creative two credit course aims at empowerment of effective communication skills in order to rise and shine in all the spheres of science and technology in 21st century.

Title: - ***Effective Communication Skills.***

Course Objectives:

- To define essentials of basic grammar for effective communication.
- To explain significance of employment communication and its application
- To examine communication theory and develop effective presentation and interview skills.

Course Outcomes:

After completion of the course the student will be able to

- CO1: To develop effective communication skills amongst the students for better employment opportunities.
- CO2: To distinguish between verbal and non- verbal methods of communication.
- CO3: To adapt soft skills for inculcation of effective communication amongst students.

Title of the Paper*: - Effective Communication Skills.*

For the subject of ***Effective Communication Skills*** there shall be two papers for 30 lectures each comprising of two units of 15 Lectures each.

Semester-I

1. Paper-I (Academic Skills) Unit-I will be on Academic Skills
2. Paper-I Unit-II will be on Soft Skills

Scheme of Examination for Each Semester:

Internal Evaluation: 40%

Sr.No.	Particular	Marks
01	**Any four** tools out of these (10 Marks each) 1. Mock interview and resume (10 M) 2. Power Point Presentation and write up on the selected topics of the subjects (10 M) 3. Case studies and its write up (10 M) 4. Role Play and its write up (10 M) 5. Public Speech and its write up (10 M)	40 Marks

Semester End Examination: 60 Marks will be as follows -:

I	**Theory:**	
	Each theory paper shall be of two and half hour duration.	
	All questions are compulsory and will have internal options. All questions carry equal marks	
	Q-1	From Unit – I Short Notes (With Internal Options) 15 Marks
	Q-2	From Unit – II (Essay having Internal Options.) 15 Marks
	Q-3	From Unit – I (Essay having Internal Options.) 15 Marks
	Q-4	From Unit – II (Short Notes any Two out of Four) 15 Marks

Choice Based Credit System (CBCS)
F. Y. B. A.F. Effective Communication Skills Syllabus
To be implemented from the Academic year 2022-2023
SEMESTER I

Course Code	Unit	Topics	Credits	Lectures
	Academic Skills	**1.1.Essentials of Grammar**: Parts of speech, Articles, Model Auxiliaries, Types of Sentences, Punctuation marks. **1.2.Employment Communication**: Introduction, Resume, Curriculum Vitae, Developing an Impressive Resume, Formats of Resume, Job Application Letter, Email Writing. **1.3. Professional Presentation**: Nature of Oral Presentation, planning a Presentation, Guidelines for Power Point Presentation, Preparing the	**02**	**15**

		Presentation, Delivering the Presentation **1.4.Job Interviews**: Introduction, Definition of Interview, Types of Interviews, preparations made by the interviewer and interviewee, Guidelines for Job Interviews, Frequently Asked Questions during Interviews. **1.5.Group Discussion**: Introduction, Seating Arrangement for Group Discussion, Importance of Group Discussions, Difference between Group Discussion, Panel Discussion and Debate, Traits, Types of Group Discussions, topic based and Case based Group Discussion. **1.6. Barriers to Communication**: Nature and Definition, Types- Physical, Psychological, Semantic Barriers.		
	2. Soft Skills	**2.1. Introduction to Soft Skills and Hard Skills**: Nature, Definition and Importance of Soft Skills and Hard Skills **2.2. Personality Development**: Knowing Your-self, Positive Thinking, Integrity, Honesty, Leadership, Decision Making, Critical Thinking and Physical Fitness.	**02**	**15**

		2.3. Etiquette and Mannerism: Introduction, Professional and Technology Etiquette **2**.4. **Communication Theory:** Nature and Definition**,** Process of Communication, Types of Communication, Verbal and Non- Verbal Communication. **2.5. Ethical Values**: Ethics and Society, Theories of Ethics, Correlation, between Values and behaviour, Nurturing Ethics, Importance of Work Ethics. **2**.6. **Leadership and Team Building**: Leader and Leadership, Leadership Traits, Culture and Leadership, Leadership Styles and Trends, Team Building, Types of Teams.		

Reference Books:

1. Bellare, Nirmala. *Reading Strategies*. Vols. 1 and 2. New Delhi. Oxford University Press, 1998.

2. Bhasker, W. W. S & Prabhu, N. S.: *English through Reading*, Vols. 1 and 2. Macmillan, 1975.

3. Blass, Laurie, Kathy Block and Hannah Friesan. *Creating Meaning*. Oxford: OUP, 2007.

4. Brown, Ralph: *Making Business Writing Happen: A Simple and Effective Guide to Writing Well*. Sydney: Allen and Unwin, 2004.

5. Buscemi, Santi and Charlotte Smith, *75 Readings Plus.* Second Edition New York: McGraw-Hill, 1994.

6. Doff, Adrian and Christopher Jones .*Language in Use (Intermediate and Upper Intermediate).* Cambridge: CUP, 2004.

7. Doughty, P. P., Thornton, J. G, *Language in Use.* London: Edward Arrold, 1973.

8. Freeman, Sarah: *Written Communication*. New Delhi: Orient Longman, 1977.

9. Glendinning, Eric H. and Beverley Holmstrom. Second edition. *Study Reading: A Course in Reading Skills for Academic Purposes*. Cambridge: CUP, 2004

10. Grellet, F. *Developing Reading Skills,* Cambridge: Cambridge University Press, 1981.

11. Hamp-Lyons, Liz and Ben Heasiey. Second edition. *Study Writing: A Course in Writing Skills for Academic Purposes*. Cambridge: CUP, 2006

12. Jakeman, Vanessa and Clare McDowell. *Cambridge Practice Test for IELTS 1.* Cambridge: CUP, 1996.

13. Maley, Alan and Alan Duff. Second Edition. *Drama Techniques in Language Learning.* Cambridge: CUP, 1983.

14. Mohan Krishna & Banerji, Meera: *Developing Communication Skills.* New Delhi: Macmillan India, 1990.

15. Mohan Krishna & Singh, N. P. *Speaking English Effectively.*New Delhi: Macmillan India, 1995.

16. Narayanaswami, V. R. *Organised Writing*, Book 2. New Delhi: Orient Longman.

17. *Reading & Thinking in English,* Four volumes, (vol. 1 for the lowest level, vol. 4 for the highest level). The British Council Oxford University Press, 1979-1981.

18. Sasikumar, V., Kiranmai Dutt and Geetha Rajeevan. *A Course in Listening and Speaking* I& II. New Delhi: Foundation Books, Cambridge House, 2006.

19. Savage, Alice, et al. *Effective Academic Writing*. Oxford: OUP, 2005.

20. Widdowson, H. G.*: English in Focus. English for Social Sciences.*

Choice Based Credit System (CBCS)
F. Y. B. Com Accounting and Finance (Business Communication)
Syllabus
To be implemented from the Academic year 2022-23
SEMESTER II

Course Code	Unit	Topics	Credits	Lectures
UAF1BC1	I Theory of Communication	**1.Concept of Communication** Meaning, Definition, Process, Need, Feedback Importance of Communication in Corporate world **2.Channels and Objectives of Communication: Channels-** Formal and Informal- Vertical, Horizontal and Grapevine. **3.Objectives of Communication** Information, Order, Persuasion, Motivation, Warning, and Boosting the Morale of Employees **4.Methods and Modes of Communication** Methods: Verbal and Non-verbal, Characteristics of Verbal and Non-verbal Communication, Business Etiquette, Technology Enabled Communication: Email, Fax, Video and Satellite Conferencing	03	15
	II	**1. Problems in Communication /Barriers to Communication** Physical/ Semantic/Language / Socio-Culture/ Psychological /		15

	Obstacles to Communication in Business World	Barriers, Ways to Overcome these Barriers. **2.Listening** • Importance of Listening Skills, • Types of Listeners, Cultivating good Listening Skills – 4 **3.Introduction to Business Ethics** • Concept and Interpretation, Importance of Business Ethics, Personal Integrity at the workplace, Business Ethics and media, Corporate Social Responsibility. • Teachers can adopt a case study approach and address issues such as the following so as to orient and sensitize the student community to actual business practices: • Surrogate Advertising, Patents and Intellectual Property Rights, Dumping of Medical/E-waste, • Human Rights Violations and Discrimination on the basis of gender, race, caste, religion, appearance and sexual orientation at the workplace • Piracy, Insurance, Child Labour.		
	III **Business Correspondence**	**1. Theory of Business Letter Writing** • Parts, Structure, Layouts—Full Block, Modified Block, Semi - Block Principles of Effective Letter Writing, **2. Personnel Correspondence** • Statement of Purpose, Job Application Letter and Resume, Letter of Acceptance of Job Offer, Letter of Resignation, Letter of Appointment, Promotion and Termination, Letter of Recommendation.		**15**

	IV **Language and Writing Skills**	**1.Commercial Terms used in Business Communication** • **Paragraph Writing:** • **Blog Writing:** • **Advertising:** **Activities** • Listening Comprehension • Remedial Teaching • Speaking Skills: Presenting a News Item, Dialogue and Speeches • Paragraph Writing: Preparation of the first draft, Revision and Self – Editing, Rules of spelling. • Reading Comprehension: Analysis of texts from the fields of Commerce and Management. **Practicals:** • English language laboratory.		**15**

Choice Based Credit System (CBCS)
S. Y. B.Com Accounting and Finance (Business Communication)
Syllabus
To be implemented from the Academic year 2022-23
SEMESTER III

Course Code	Unit	Topics	Credits	Lectures
UAF2BC2	**I** **Group Communication**	**Interviews:** • Group Discussion • Preparing for an • Interview, Types of • Interviews – Selection, Appraisal, Grievance, and Exit **Meetings:** • Need and Importance of Meetings, • Conduct of Meeting • Group Dynamics • Role of the Chairperson, • Role of the Participants, • Drafting of Notice, Agenda and Resolutions **Conference:** • Meaning and Importance of Conference • Organizing a Conference • Advantages and Disadvantages of Conference in Business World **Public Relations:** • Meaning, Functions of PR Department • External and Internal Measures of PR	**03**	**15**

	II **Presentation Skills**	**Presentations** • Principles of Effective Presentation • How to make a Power-Point Presentation • Public Speaking and its importance in corporate world		**15**
	III **Business Correspondence**	**Trade Letters:** • Letters of Inquiry, • Letters of Order, • Letters of Complaints, • Letters of Adjustments • Letters of Sales Letters, • Letter of RTI, • Promotional leaflets and fliers • Consumer Grievance Letters		**15**
	IV **Language and Writing Skills**	**Reports:** • Parts, Types, Feasibility Reports, • Investigative Reports. **Basics of Grammar:** • Parts of speech and Tense. **Practical's:** • English language laboratory: Presentations, Mock Interview, Group Discussion	**03**	**15**

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR ARTS, COMMERCE & SCIENCE COLLEGE, NEW PANVEL (AUTONOMOUS)

Re-accredited 'A+' Grade by NAAC
'College with Potential for Excellence' Status Awarded by UGC
'Best College Award' by University of Mumbai

Program: BMS

Revised Syllabus of F.Y.BMS Management Studies
Choice Based Credit System (CBCS) (60:40)
w. e. f. Academic Year 2022-23

Sr. No.	Heading	Particulars
1	Title of Course	Management Studies
2	Eligibility for Admission	12th Commerce, Science and Arts recognised Board
3	Passing marks criteria	40%
4	Ordinances/Regulations (if any)	
5	No. of Semesters	Two
6	Level	U.G.
7	Pattern	Semester (60:40)
8	Status	Revised
9	To be implemented from Academic year	2022-2023

Title Name of the Programme: Bachelor of Management Studies (B.M.S.)

Nature of the Programme: BMS is three year full time graduate degree programme

Preamble of the Programme: This course is being introduced by University of Mumbai .With the growing demand for professionally qualified management executives, the course has been especially designed to create operational cadre management personnel. It is a UGC approved three-year degree course under the faculty of Management, with six semesters. This is a specialty program with three specializations offered to learners i.e. Finance, Human Resource and Marketing.

The course is design to give basic understanding about management education which will develop the lateral thinking, communication skills and social responsibilities and strengthen the analytical, interpersonal organization and decision making skills through presentations and seminars. This will also provide an adequate exposure to operational environment in the field of management.

The course is designed to encourage and inculcate the use of modern technology to solve the practical problems in the real world and to prepare learners for future career success by encouraging them to develop necessary tools and skills, including written and oral communication skills, an ability to work with others, leadership qualities, and a capability to creatively solve problems.

List of Skill Enhancement Courses (SEC) for Semester I (Any One)		****List of Skill Enhancement Courses (SEC) for Semester II (Any One)***	
UMS1FC1	Foundation Course – I	UMS2FC2	Foundation Course - II
UMS1NS1	Foundation Course in NSS – I	UMS2NS2	Foundation Course in NSS - II
UMS1NC1	Foundation Course in NCC – I	UMS2NC2	Foundation Course in NCC - II
UMS1PE1	Foundation Course in Physical Education – I	UMS2PE2	Foundation Course in Physical Education - II
Note: Course selected in Semester I will continue in Semester II			

Bachelor of Management Studies (BMS) Programme

Under Choice Based Credit System

Course

FYBMS

(To be implemented from Academic Year- 2022-2023)

No. of Courses	Semester I	Credits	No. of Courses	Semester II	Credits
	Elective Courses (EC)			***Elective Courses (EC)***	
UMS1IFA	Introduction to Financial Accounts	**03**	UMS2ICA	Introduction to Cost Accounting	**03**
UMS1BLW	Business Law	**03**	UMS2ILW	Industrial Law	**03**
UMS1BST	Business Statistics	**03**	UMS2BMA	Business Mathematics	**03**
	Ability Enhancement Courses (AEC)			***Ability Enhancement Courses (AEC)***	
	Ability Enhancement Compulsory Course (AECC)			***Ability Enhancement Compulsory Course (AECC)***	
UMS1BC1	Business Communication - I	**03**	UMS2BC2	Business Communication -II	**03**
	****Skill Enhancement Courses (SEC)***			*****Skill Enhancement Courses (SEC)***	
	Any one course from the following list of courses	**02**		Any one course from the following list of the courses	**02**
UMS1PD1	Personality Development I	**02**	UMS2PD2	Personality Development II	**02**

	Core Courses (CC)			*Core Courses (CC)*	
UMS1FHS	Foundation of Human Skills	**03**	UMS2PMK	Principles of Marketing	**03**
UMS1BE1	Business Economics-I	**03**	UMS2PMG	Principles of Management	**03**
	Total Credits	**22**		**Total Credits**	**22**

Bachelor of Management Studies (BMS) Programme

Under Choice Based Credit System

Course Structure

(To be implemented from Academic Year- 2022-2023)

Semester I

**List of Skill Enhancement Courses (SEC) for Semester I (Any One)*	
UMS1FC1	Foundation Course – I
UMS1NS1	Foundation Course in NSS – I
UMS1NC1	Foundation Course in NCC – I
UMS1PE1	Foundation Course in Physical Education - I

Revised Syllabus of Courses of Bachelor of Management Studies (BMS) Programme at Semester I with Effect from the Academic Year 2022-2023

Elective Courses (EC)

Introduction to Financial Accounts
Course Code: UMS1IFA

Objectives

Sr. No	Objectives
01	To develop an understanding of the basic concept and principles of accounting and acquire the ability to apply the same in preparation of Financial Statement.

Modules at a Glance

Sr. No.	Module	No. of Lectures
1	Introduction	15
2	Accounting Transactions	15
3	Depreciation Accounting & Trial Balance	15
4	Final Accounts	15

Total	**60**

Sr. No.	Modules / Units
1	**Introduction**
	● **Meaning and Scope of Accounting:** Need and development, definition: Book-Keeping and accounting, Persons interested in accounting, Branches of accounting, Objectives of accounting ● **Accounting principles**: Introductions to Concepts and conventions ● **International Financial Reporting Standards (IFRS):** Introduction to IFRS ▪ **IAS-1:**Presenttion of Financial Statements (Introductory Knowledge) ▪ **IAS-2:**Inventories (Introductory Knowledge) ▪ **IAS-7**: Statement of Cash Flows ▪ **IAS-16**: Property Plant & Equipment ▪ **IAS-115**: Revenue Recognition ▪ **IAS-116**: Leases
2	**Accounting Transactions**
	● **Accounting transactions**: Accounting cycle, Journal, Journal proper, Opening and closing entries, Relationship between journal & ledger: Rules regarding posting: Trial balance: Subsidiary books (Purchase, Purchase Returns, Sales, Sales Returns & cash book –Triple Column), Bank Reconciliation Statement. ● **Expenditure**: Classification of Expenditure- Capital, revenue and Deferred Revenue expenditure Unusual expenses: Effects of error: Criteria test ● **Receipts:** Capital receipt, Revenue receipt, distinction between capital receipts and revenue receipts. ● **Profit or Loss:** Revenue profit or loss, capital profit or loss
3	**Depreciation Accounting & Trial Balance**
	□ **Depreciation accounting:** Practical problem based on depreciation using SLM and RBM methods. (Where Provision for depreciation Account not maintained). □ **Preparation of Trial Balance:** Introduction and Preparation of Trial Balance
4	**Final Accounts**

	• Introduction to Final Accounts of a Sole proprietor • Manufacturing Account, Trading Account, Profit and Loss Account and Balance Sheet. • Preparation and presentation of Final Accounts in horizontal format

Course Outcome

Sr.No	Course Outcome
01	Demonstrate basic knowledge of concepts, theories, principles and standards used in financial accounting.
02	Apply accounting concepts for transaction recording
03	Develop ability to prepare financial statement of the company
04	Interpret information in the financial statement of the organisation

Revised Syllabus of Courses of Bachelor of Management Studies (BMS) Programme at Semester I with Effect from the Academic Year 2022-2023
Elective Courses (EC)

Business Law
Course Code: UMS1BLW

OBJECTIVES

Sr. No	Objectives
01	To provide students with practical legal knowledge of legal issues.
02	To provide knowledge of basic concept, ideas, techniques and process in the field of law.

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Contract Act, 1872 & Sale of Goods Act, 1930	15
2	Negotiable Instrument Act, 1981 & Consumer Protection Act, 1986	12
3	Company Law	15
4	Intellectual Property Rights(IPR) & Indian Partnership Act, 1932	18
	Total	**60**

1	**Contract Act, 1872 & Sale of Goods Act, 1930**
	● **Contract Act, 1872:** Essential elements of Contract; Agreement and Contract – Capacity to Contract, free consent, consideration, lawful objects/ consideration, Breach of contract. Remedies for breach of Contract. ● **Sale of Goods Act,1930:**Scope of Act,Sale and Agreement sell,essential of a valid Sale Contract – Conditions and warranties – Implied Condition and warranties, Rights of an unpaid seller.
2	**Negotiable Instrument Act, 1981 & Consumer Protection Act, 1986**
	● **Negotiable Instrument Act, 1981:** Introduction of Negotiable Instruments – Characteristics of negotiable instruments, Promissory note, Bills of exchange, Cheque, Dishonour of Cheque. ● **Consumer Protection Act, 1986:** Objects of Consumer Protection- Introduction of Consumers, who is consumer? Meaning of the words "Goods and services" – Meaning of the words "Defects and Deficiencies of goods and services" Consumer disputes and Complaints.
3	**Company Law**
	● **Company Law:** What is company?–Incorporation of company–MOA,AOA, Prospectus, Meetings, Meaning of transfer and transmission of shares.
4	**Intellectual Property Rights(IPR) & Indian Partnership Act, 1932**
	● **Intellectual Property Rights(IPR)** ▪ IPR definition/ objectives ▪ Patent definition. What is patentable? What is not patentable? Invention And its Attributes, Inventors and Applications ▪ Trademarks, definition, types of trademarks, infringement and passing off. ▪ Copy right definition and subject in which copy right exists, Originality, Meaning and Content, Authors and Owners, Rights and Restrictions. ▪ Geographical indications (only short notes) ● **Indian Partnership Act, 1932:** Nature of partnership, Relation of Partners to One Another, Relation of Partner to Third Parties, Incoming & Outgoing Partners, Dissolution of Firms, Registration of Firms.

Course Outcome

Sr.No	Course Outcome
01	Learners will be able to apply basic legal knowledge to business transactions in their future and identify the fundamental legal principles behind contractual agreements.
02	Learners will be able to classify the negotiable instrument and legal environment of the business.
03	Learners will be able to determine the legal and fiscal structure of different forms of business organisations and their responsibility as an employer.
04	Learners will be able to interpret the various provisions related to Intellectual Property Rights, its applicability, duration & registration procedures also acquaint the incorporation and dissolution procedures of partnership firms.

Revised Syllabus of Courses of Bachelor of Management Studies (BMS) Programme at Semester I with Effect from the Academic Year 2022-2023

Elective Courses (EC)

Business Statistics

Course Code: UMS1BST

OBJECTIVES

Sr.No	Objectives
01	To familiarize learners with basic Statistical tools like central tendency, measures of dispersions, correlation and regression and time – series and their application.

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Introduction to Statistics	15
2	Measures of Central Tendency and Dispersion	15
3	Forecasting Techniques: Co-Relation and Linear Regression, Time Series and Index Number	15
4	Elementary Probability and Testing of Hypothesis	15
	Total	**60**

Sr. No.	Modules / Units
1	**Introduction to Statistics**
	● **Introduction:** Functions/Scope, Importance, Limitations ● **Data:** Relevance of Data(Current Scenario), Type of data(Primary & Secondary), Primary (Census vs Samples, Method of Collection (In Brief), Secondary(Merits, Limitations, Sources) (In Brief) ● **Presentation Of Data:** Classification – Frequency Distribution – Discrete & Continuous, Tabulation, Graph(Frequency, Bar Diagram, Pie Chart, Histogram, Ogives)
2	**Measures of Central Tendency and Dispersion**
	● **Measures Of Dispersion:** Range with C.R(Co-Efficient Of Range), Quartiles & Quartile deviation with CQ (Co-Efficient Of Quartile), Mean Deviation from mean with CMD (Co-Efficient Of Mean Deviation), Standard deviation with CV(Co-Efficient Of Variance). ● **Measures Of Central Tendency:** Mean(A.M, Weighted, Combined), Median(Calculation and graphical using Ogives), Mode(Calculation and Graphical using Histogram),Comparative analysis of all measures of Central Tendency
3	**Forecasting Techniques**
	● **Co-Relation and Linear Regression** - **Co-Relation:** Karl Pearson, Rank Co-Relation - **Linear Regression:** Least Square Method • **Time Series and Index Number** - **Time Series:** Least Square Method, Moving Average Method, Determination of Season - **Index Number:** Simple(un weighted) Aggregate Method, Weighted Aggregate Method, Simple Average of Price Relatives, Weighted Average of Price Relatives, Chain Base Index Numbers, Base Shifting, Splicing and Deflating, Cost of Living Index Number
4	**Elementary Probability and Testing of Hypothesis**
	• **Elementary Probability:** Concept of Sample space, Concept of Event, Definition of Probability, Addition & Multiplication laws of Probability, Conditional Probability • **Introduction to Testing of Hypothesis:** - **Sampling Distribution :** Sample Mean and sample proportion, Determination of sample size, Central limit theorem (statement only) - **Hypothesis :** Simple and Composite, null and alternatives, Two types of errors, level of significance (concepts only), Large sample test.

Course Outcomes

Sr.No	Course Outcome
01	Explain fundamentals of statistics and different types of data
02	Analyse information using numerical data and graphical charts
03	Interpret statistical analysis tools to make business decisions
04	Evaluate performance of the business or company and identify trends

Revised Syllabus of Courses of Bachelor of Management Studies (BMS) Programme at Semester I with Effect from the Academic Year 2022-2023

Ability Enhancement Courses (AEC)

Business Communication-I
Course Code: UMS1BC1

OBJECTIVES

Sr. No.	Objectives
01	To familiarize the students with process of communication and its applications
02	To acquaint the students with different types of communication
03	To demonstrate effective use of technology in communication
04	To inform the students about barriers to effective communication
05	To introduce the students with business correspondence
06	To develop effective listening skills amongst the students
07	To cultivate effective oral skills those can enable students to speak confidently, interpersonally as well as in business organization

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Theory of Communication	15
2	Obstacles to Communication in Business World	15
3	Business Correspondence	15
4	Language and Writing Skills	15
	Total	**60**

Sr. No.	Modules / Units
1	**Theory of Communication**
	Concept of Communication: Meaning, Definition, Process, Need, Feedback Emergence of Communication as a key concept in the Corporate and Global world Impact of technological advancements on Communication **Channels and Objectives of Communication**: **Channels-** Formal and Informal- Vertical, Horizontal, Diagonal, Grapevine **Objectives of Communication**: Information, Advice, Order and Instruction, Persuasion, Motivation, Education, Warning, and Boosting the Morale of Employees(A brief introduction to these objectives to be given) **Methods and Modes of Communication:** Methods: Verbal and Nonverbal, Characteristics of Verbal Communication Characteristics of Non-verbal Communication, Business Etiquette Modes: Telephone and SMS Communication 3 (General introduction to Telegram to be given) Facsimile Communication [Fax] Computers and E- communication Video and Satellite Conferencing
2	**Obstacles to Communication in Business World**
	Problems in Communication /Barriers to Communication: Physical/ Semantic/Language / Socio-Cultural / Psychological / Barriers, Ways to Overcome these Barriers **Listening:** Importance of Listening Skills, Cultivating good Listening Skills – 4 **Introduction to Business Ethics** ● Concept and Interpretation, Importance of Business Ethics, Personal Integrity at the workplace, Business Ethics and media, Computer Ethics, Corporate Social Responsibility. ● Teachers can adopt a case study approach and address issues such as the following so as to orient and sensitize the student community to actual business practices: ● Surrogate Advertising, Patents and Intellectual Property Rights, Dumping of Medical/E-waste, ● Human Rights Violations and Discrimination on the basis of gender, race, caste, religion, appearance and sexual orientation at the workplace ● Piracy, Insurance, Child Labour.
3	**Business Correspondence**
	Theory of Business Letter Writing: Parts, Structure, Layouts—Full Block, Modified Block, Semi - Block Principles of Effective Letter Writing, Principles of effective Email Writing, **Personnel Correspondence:** Statement of Purpose, Job Application Letter and Resume, Letter of Acceptance of Job Offer, Letter of Resignation Letter of Appointment, Promotion and Termination, Letter of Recommendation

Sr. No.	Modules / Units
4	**Language and Writing Skills**
	• Commercial Terms used in Business Communication • Articles writing • Meaning, objective and steps involved in articles writing • Paragraph Writing:- Paragraph Writing: Preparation of the first draft, Revision and Self – Editing, Rules of spelling. • Notes Making & Paraphrasing • Time & Stress Management Skills

Course Outcome

Sr.No	Course Outcome
01	Demonstrate the outline of theory of Business Communication
02	Apply formal and informal communication present in business organization
03	Examine the method of communication and identify different barriers to successful communication
04	Formulate various type of commercial letters effectively

Revised Syllabus of Courses of Bachelor of Management Studies (BMS) Programme at Semester I with Effect from the Academic Year 2022-2023

Skill Enhancement Courses (SEC)

Foundation Course –I
Course Code: UMS1FC1

OBJECTIVES

Sr. No	Objectives
01	To acquaint the students with concepts of the Social awareness.
02	To appreciate the Unity in Diversity of Indian society.
03	To acquaint the student with concepts of Globalization, Ecology and Environment
04	To create awareness about human right , and Managing Stress and Conflict in Contemporary Society

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Overview of Indian Society	15
2	Concept of Disparity	15
3	The Indian Constitution	08
4	Significant Aspects of Political Processes	07
	Total	**45**

Sr. No.	Modules / Units
1	**Overview of Indian Society**
	Understand the multi-cultural diversity of Indian society through its demographic composition: population distribution according to religion, caste, and gender; Appreciate the concept of linguistic diversity in relation to the Indian situation; Understand regional variations according to rural, urban and tribal characteristics; Understanding the concept of diversity as difference
2	**Concept of Disparity**
	Understand the concept of disparity as arising out of stratification and inequality; Explore the disparities arising out of gender with special reference to violence against women, female foeticide (declining sex ratio), and portrayal of women in media; Appreciate the inequalities faced by people with disabilities and understand the issues of people with physical and mental disabilities Examine inequalities manifested due to the caste system and inter-group conflicts arising thereof; Understand inter-group conflicts arising out of communalism; Examine the causes and effects of conflicts arising out of regionalism and linguistic Differences
3	**The Indian Constitution**
	Philosophy of the Constitution as set out in the Preamble; The structure of the Constitution-the Preamble, Main Body and Schedules; Fundamental Duties of the Indian Citizen; tolerance, peace and communal harmony as crucial values in strengthening the social fabric of Indian society; Basic features of the Constitution
4	**Significant Aspects of Political Processes**
	The party system in Indian politics; Local self-government in urban and rural areas; the 73rd and 74th Amendments and their implications for inclusive politics; Role and significance of women in politics

Topics for Project Guidance: Growing Social Problems in India:
● *Substance abuse- impact on youth & challenges for the future* ● *HIV/AIDS- awareness, prevention, treatment and services* ● *Problems of the elderly- causes, implications and response* ● *Issue of child labour- magnitude, causes, effects and response* ● *Child abuse- effects and ways to prevent* ● *Trafficking of women- causes, effects and response*

Course Outcome

Sr.No	Course Outcome
01	To know about duties & responsibilities towards society
02	To aware about the problems and issues of society.
03	To impart knowledge of Globalization and make students aware about the problems in society.

Revised Syllabus of Courses of Bachelor of Management Studies (BMS) Programme at Semester I with Effect from the Academic Year 2022-2023

Skill Enhancement Courses (SEC)

Foundation Course in NSS - I

Course Code: UMS1NS1

OBJECTIVES

Sr. No	Objectives
01	To make students identify the problems and needs of the community and get the students involved in the problem solving process.
02	To develop the civic responsibility amongst the students
03	To develop leadership qualities and democratic attitudes.
04	To nurture accountability regarding their duties in national building
05	To introduce the nature and structure of National Service Scheme.
06	To promote understanding of the community and environment in which they work through GOs and NGOs

Modules at a Glance

Modules	No. of Lectures
Introduction to National Service Scheme(NSS)	10
National Service Scheme regular Activities	15
Contemporary Social Issues in India	10
Indian constitution and social justice	10
Total	45

Sr. No.	Modules / Units
1	**Introduction to National Service Scheme(NSS)**
	Unit I: Emergence of NSS in India (Historical Background) and its development. ● Organizational Structure of National Service Scheme from National level to College level. ● Objectives of National Service Scheme(NSS) ● National Service Scheme (NSS) –Symbol and its meaning. **Unit II: Symbol of NSS and its meaning** ● Motto of National Service Scheme ● Various prayers, inspirational songs to be used in NSS programme
2	**National Service Scheme regular Activities**
	Unit I: Guidelines of Distributor of working hours or academic year. **Classification of regular activities in the society** ● Rural ● Urban ● Campus **Unit II: Theme Based Activities** ● Water Conservation ● Rain Water Harvesting: Issues and Policies ● Health Services provided by GOs and NGOs: Role of NSS Volunteers ● Social Media and Cyber Security: Definition, types, and its impact. ● Need for Cyber Security in contemporary scenario (Indian Cyber Act 2005, Role of NSS volunteers)
3	**Contemporary Social Issues in India**
	Unit I: Gender based issues ● Decline of Sex Ratio, #MeToo, Pinjara Todd, Right to bleed, Child Abuse ● Digital Media and Gender Issues **Unit II: Contemporary Beneficiaries Schemes** ● Sanitation,Housing, Health (Role of students in implementation and taking the schemes to the society)
4	**Indian constitution and social justice**
	Unit I:Indian Constitution ● Preamble ● Structure ● Features ● Fundamental Rights and Duties ● Review of Constitution Amendments towards community development. **Unit II:Social Justice** ● Social Justice – the Concept and its Features ● Contributions for Social Justice-ChhatrapatiShivajiMaharaj, Mahatma Jyotirao Phule, Shahu Maharaj, Dr. Babasaheb Ambedkar

Course Outcome

Sr. No.	Course Outcome
01	To make students to understand the Unity in diversity.
02	To make the students responsible in eradicating the social evils like class and caste conflicts, superstitions and gender inequality.
03	To promote students in bringing national integrity and communal harmony under the philosophical path of Phule, Shahu and Ambedkar.
04	To cultivate value system of Indian society.
05	To understand the different roles of students in national building.
06	To motivate the students in enhancing their standard of living with dignity.
07	To promote students in utilizing their knowledge in finding practical solution to individual and community problems.

Revised Syllabus of Courses of Bachelor of Management Studies (BMS) Programme at Semester I

with Effect from the Academic Year 2022-2023

Skill Enhancement Courses

(SEC) 5.Foundation Course in

NCC - I

Course Code: UMS1NC1

OBJECTIVES

Sr. No	Objectives
01	To create evolved youth, who will be equipped to contribute in the development of the nation
02	To train students so as to achieve their physical, mental, psychological and emotional development.
03	To make student aware of the protection and conservation of the environment.
04	To understand and develop life skills and soft skills and cultivate leadership qualities among the youth.
05	To impart basic military training, to develop awareness about the defence forces and expose learners to military ethos / values
06	To make the students apply the knowledge in specialised military subject/ social topics/ Cultural endeavours.

Modules at a Glance

Sr. No.	Modules	No. of Lectures

1	Introduction to NCC, National Integration & Awareness	12
2	Drill: Foot Drill	08
3	Environment Awareness and Conservation	05
4	Personality Development and Leadership	08
5	Specialized Subject: Army/ Navy/ Air	12
6	Project	15
	Total	**60**

Sr. No.	Modules / Units
1	**Introduction to NCC, National Integration & Awareness**

	Desired outcome: The students will display sense of patriotism, secular values and shall be transformed into motivated youth who will contribute towards nation building through national unity and social cohesion. ● Historical development of Military history in India ● Present scenario of NCC and its advantages in career building ● Genesis, Aims, Objectives of NCC & NCC Song ● Organization & Training ● Incentives & Benefits ● Religions, Culture, Traditions and Customs of India ● National integration, necessity
2	**Drill: Foot Drill**
	Desired outcome: The students will demonstrate the sense of discipline, improve bearing, smartness, turnout, develop the quality of immediate and implicit obedience of orders, with good reflexes. ● General and Words of Command ● Attention, Stand at Ease and Stand Easy, Turning and Inclining at the Halt ● Sizing, Forming Up in Three Ranks and Numbering, Open and Close Order March and Dressing ● Saluting at the Halt, Getting On Parade, Dismissing and Falling Out ● Marching, Length of Pace and Time of Marching in Quick Time and Halt, Slow March and Halt ● Turning on the March and Wheeling. ● Saluting on the March. ● Formation of squad and Squad Drill.
3	**Environment Awareness and Conservation**
	Desired outcome: The student will be aware of the conservation of natural resources and protection of environment. ● Natural Resources – Conservation and Management ● Water Conservation and Rainwater Harvesting

Sr. No.	Modules / Units
4	**Personality Development and Leadership**

	Desired outcome: The student will develop an all-round personality with adequate leadership traits to deal / contribute effectively in life. ● Introduction to Personality Development ● Factors Influencing /Shaping Personality: Physical, Social, Physiological, Philosophical and Psychological ● Self-Awareness Know yourself/ Insight ● Change Your Mind Set ● Communication Skills: Group Discussion / Public Speaking ● Leadership Traits ● Types of Leadership
5	**Specialized Subject: Army Or Navy Or Air**
	<u>Army</u> **Desired outcome:** The training shall instill patriotism, commitment and passion to serve the nation motivating the youth to join the defence forces. It will also acquaint, expose & provide basic knowledge about armed, naval and air-force subjects **A. Armed Force** ● Basic organization of Armed Forces ● Organization of Army ● Badges and Ranks **B. Introduction to Infantry and weapons and equipments** ● Characteristics of 7.62mm SLR Rifle, Ammunition, Fire power, Stripping, Assembling and Cleaning **C. Military history** ● Biographies of renowned Generals (Carriapa / Sam Manekshaw) ● Indian Army War Heroes-PVCs **D. Communication** ● Types of Communications ● Characteristics of Wireless Technologies (Mobile, Wi-Fi etc.) ***OR*** **<u>Navy</u>** **A. Naval orientation and service subjects** ● History of the Indian Navy-Pre and Post Independence, Gallantry award winners ● Organization of Navy- NHQ, Commands, Fleets, Ships and shore establishments ● Types of Warships and their role ● Organization of Army and Air Force- Operational and Training commands ● Ranks of Officers and Sailors, Equivalent Ranks in the Three Services **B. Ship and Boat Modelling** ● Principles of Ship Modelling ● Maintenance and Care of tools

Sr. No.	Modules / Units
	C. Search and Rescue ● SAR Organization in the Indian ocean **D. Swimming** Floating for three minutes and Free style swimming for 50 meters ***OR*** **<u>AIR</u>** **A. General Service Knowledge** □ Development of Aviation □ History of IAF **B. Principles of Flight** □ Introduction □ Laws of Motion □ Glossary of Terms. **C. Airmanship** □ Introduction □ Airfield Layout □ Rules of the Air □ Circuit Procedure □ ATC/RT Procedures □ Aviation Medicine **D. Aero-Engines** □ Introduction to Aero-engines
06	**Project**
	Projects based on social Activities

Course Outcome

Sr. No.	Course Outcome

01	Trained and disciplined citizens will be developed.
02	Physical fitness and overall personality of the youth will be enhanced.
03	Students will be trained to develop their carrer in defence / paramilitary/ police forces & civil services

Revised Syllabus of Courses of Bachelor of Management Studies (BMS) Programme at Semester I with Effect from the Academic Year 2022-2023

Skill Enhancement Courses (SEC)

Foundation Course in Physical Education -I
Course Code: UMS1PE1

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Introduction to Basic Relevant concepts in Physical Education	10
2	Components of Physical Fitness	15
3	Testing Physical Fitness	10
4	Effect of Exercise on various Body System	10
	Total	**45**

Sr. No.	Modules / Units
1	**Introduction to Basic Relevant concepts in Physical Education**
	● Dimensions and determinants of Health, Fitness &Wellness ● Concept of Physical Education and its importance ● Concept of Physical Fitness and its types ● Concept of Physical Activity, exercise and its types &benefits
2	**Components of Physical Fitness**
	● Concept of components of Physical Fitness ● Concept and components of HRPF ● Concept and components of SRPF ● ImportanceofPhysicalEducationindevelopingphysicalfitnesscomponents.
3	**Testing Physical Fitness**
	● Tests for measuring Cardiovascular Endurance ● Tests for measuring Muscular Strength &Endurance ● Tests for measuring Flexibility ● Tests for measuring Body Composition
4	**Effect of Exercise on various Body System**
	● Effect of exercises on Musculoskeletal system ● Effect of exercises on Circulatory System ● Effect of exercises on Respiratory System ● Effect of exercises on Glandular System

Revised Syllabus of Courses of Bachelor of Management Studies (BMS) Programme at Semester I

with Effect from the Academic Year 2022-2023

Skill Enhancement Courses

(SEC) 5. Personality

Development - I

Course Code: UMS1PD1

OBJECTIVES

Sr. No	Objectives
01	To learn about the essential factors for personality development and bringing them into practice.
02	To help the learners to know themselves better and identify their own potentials and accept their limitations.
03	To develop and exhibit an accurate sense of individuality.
04	To involve students in adapting the techniques of personality development.

Modules at a Glance

Sr. No.	Modules	No. of Hours
1	Introduction to Personality Development	7
2	Self-esteem	8
	Total	**15**

Sr. No.	Modules / Units
1	**Introduction to Personality Development**
	● The concept of personality - Dimensions of personality – Theories of Freud & Erickson-Significance of personality development. The concept of success and failure: What is success? - Hurdles in achieving success ● Overcoming hurdles - Factors responsible for success – What is failure - Causes of failure. SWOT analysis ● Self Confidence, Positive Attitude, Conversation English, Pronunciations, Story narrations.
2	**Self-esteem**
	● Term self-esteem - Symptoms - Advantages - Do's and Don'ts to develop positive self-esteem – Low self-esteem- Symptoms - Personality having low self-esteem - Positive and negative self-esteem. ● Interpersonal Relationships – Defining the difference between aggressive, submissive and assertive behaviours – Lateral thinking.

Course Outcomes

Sr. No	Objectives
01	Learners will be able to describe how personality develops
02	Learners will be able to define stages of personality development and basic personality trait's.
03	Learners will be able to describe how morals are developed
04	Learners will be able to describe personality theories about development

Revised Syllabus of Courses of Bachelor of Management Studies (BMS) Programme at Semester I
With Effect from the Academic Year 2022-2023

Core Courses (CC)

Foundation of Human Skills
Course Code: UMS1FHS

Objectives

Sr.No	Objectives
01	To provide basis of understanding to the learners with reference to human behaviour, human skills and introduction to group behaviour, organizational culture and motivation.

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Understanding of Human Nature	15
2	Introduction to Group Behaviour	15
3	Organizational Culture and Motivation at workplace	15
4	Organizational Change, Creativity and Development and Work Stress	15
	Total	**60**

Sr. No.	Modules / Units
1	**Understanding of Human Nature**
	● **Individual Behaviour:** Concept of a man, individual differences, factors affecting individual differences, Influence of environment ● **Personality and attitude:** Determinants of personality, Personality traits theory, Big five model, Personality traits important for organizational behaviour like authoritarianism, locus of control, Machiavellianism, introversion-extroversion achievement orientation , self – esteem, risk taking, self-monitoring and type A and B personalities, Concept of understanding self through JOHARI WINDOWS, Nature and components of attitude, Functions of attitude, Ways of changing attitude, Reading emotions ● **Thinking, learning and perceptions:** Thinking skills, thinking styles and thinking hat, Managerial skills and development, Learning characteristics, theories of learning (classical conditioning, operant conditioning and social learning approaches), Intelligence, type (IQ, EQ, SQ, at work place), Perception features and factor influencing individual perception, Effects of perceptual error in managerial decision making at work place.(Errors such as Halo effect, stereotyping, prejudice attributional).
2	**Introduction to Group Behaviour**
	● **Introduction to Group Behaviour** ▪ **Group Dynamics:** Nature, types, group behavior model (roles, norms, status, process, structures) ▪ **Team effectiveness:** nature, types of teams, ways of forming an effective team. ▪ Setting goals. OB History and Development; Importance of OB to the field of management. Basic behavioral Process: Cognitive functions intelligence, Creativity, Problem solving, Learning and its process - implications, OB History and Development; Importance of OB to the field of management. Basic behavioral Process: Cognitive functions - intelligence, Creativity, Problem solving, Learning and its process - implications, OB History and Development; Importance of OB to the field of management. Basic behavioral Process: Cognitive functions - intelligence, Creativity, Problem solving, Learning and its process - implications, ● **Organizational Behavior & Development** ▪ Organizational behavior -concept and significance;

	▪ OB & Management ▪ Relationship between management and organizational behaviour; ▪ Importance of OB to the field of management, ▪ Basic Behavioral Process, Cognitive functions ● **Organizational processes and system.** ▪ **Power and politics:** nature, bases of power, politics nature, types, causes of organizational politics, political games. ▪ **Organizational conflicts and resolution**: Conflict features, types, causes Leading to organizational conflicts, levels of conflicts, ways to resolve conflicts through five conflicts resolution strategies with outcomes.
3	**Organizational Culture and Motivation at workplace**
	● **Organizational Culture:** ▪ Characteristics of organizational culture. ▪ Types, functions and barriers of organizational culture ▪ Ways of creating and maintaining effective organization culture ● **Motivation at workplace**: Concept of motivation Theories of motivation in an organizational setup. ▪ A. Maslow Need Heirachy ▪ F.Hertzberg DualFactor ▪ Mc.Gregor theory X and theory Y. Ways of motivating through carrot (positive reinforcement) and stick (negative reinforcement) at workplace.
4	**Organizational Change, Creativity and Development and Work Stress**
	● **Organizational change and creativity:** Concepts of organizational change, Factors leading/influencing organizational change, Kurt Lewins model of organizational change and development, Creativity and qualities of a creative person, Ways of enhancing creativity for effective decision making, Creative problem solving. ● **Organizational Development and work stress:** Need for organizational development, OD Techniques, Stress, types of stress, Causes and consequences of job stress, Ways for coping up with job stress

Course Outcome

Sr.No	Course Outcome
01	Develop and nurture a deep understanding of personal motivation
02	Evaluate and improve upon personal leadership strengths and weaknesses
03	Explain the importance of social responsibility & social ethics
04	Elaborate ,lead and also guided by the values of self-awareness, equity, social justice, inclusiveness, empowerment, collaboration, citizenship.

Revised Syllabus of Courses of Bachelor of Management Studies (BMS) Programme at Semester I with Effect from the Academic Year 2022-2023

Core Courses (CC)

Business Economics –I

Course Code: UMS1BE1

Objectives

Sr. No	Objectives
01	To help the students to understand the basic concepts of Business Economics
02	To study the nature and scope of Business Economics
03	To study importance and applications of Business Economics in practical market.
04	Students will be able to identify key economic problems in business firms

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Introduction	15
2	Demand Analysis	15
3	Supply and Production Decisions and Cost of Production	15
4	Market structure: Perfect competition and Monopoly and Pricing and Output Decisions under Imperfect Competition	15
	Total	**60**

Sr. No.	Modules / Units
1	**Introduction**
	Scope and Importance of Business Economics - basic tools- Opportunity Cost principle, Basic economic relations – functional relations: equations-Total, Average and Marginal relations-use of Marginal analysis in decision making. Introduction to Survey: Meaning, Features- Survey based project (Industry related)
2	**Demand Analysis**
	Law of Demand, Demand Function Meaning, significance, types and measurement of elasticity of demand (Price, income cross and promotional) The basics of Market Demand & Supply and Equilibrium Price – shifts in the demand and supply curves and equilibrium Indifference curve: Meaning Properties Iso-Cost Line Consumer equilibrium **Demand Estimation and forecasting:** Meaning and significance-methods of demand estimation: survey and statistical methods (Numerical illustrations on trend analysis and simple linear regression)
3	**Production function**
	Short run analysis with Law of Variable proportion-isoquants, ridgelines, and least cost combination of inputs-Long run production function and Law of return to Scale-Expansion path Cost Concepts: Accounting cost and economic cost, implicit and explicit cost, fixed and variable cost- total, average and marginal cost, cost output relationship in the short run and long run (hypothetical numerical problems to be discussed) Break even analysis (with business applications)
4	**Market Structure**
	Perfect competition and monopoly and pricing and output decisions under imperfect competition:-Short run and long run equilibrium of a competitive firm and of industry-Monopoly- Short run and long run equilibrium of a firm under monopoly. Monopolistic Competition: Equilibrium of a firm under monopolistic competition. Oligopolistic markets: Key attributes of oligopoly –price rigidity

Course Outcome

Sr.No	Course Outcome
01	Define the concepts related to business economics and its applications.
02	Illustrate the fundamentals of demand and supply.
03	Make use of various production techniques to understand the functioning of productive units in the economy.
04	Interpret different types of market structures in the economy

Bachelor of Management Studies (BMS) Programme

Under Choice Based Credit System

Course Structure

(To be implemented from Academic Year- 2022-2023

Semester II

No. of Courses	Semester II	Credits
1	***Elective Courses (EC)***	
UMS2ICA	Introduction to Cost Accounting	**03**
UMS2ILW	Industrial Law	**03**
UMS2BMA	Business Mathematics	**03**
	Ability Enhancement Courses (AEC)	
	Ability Enhancement Compulsory Course (AECC)	
UMS2BC2	Business Communication – II	**03**
	*****Skill Enhancement Courses (SEC)***	
	Any one course from the following list of the courses	**02**
UMS2PD2	Personality Development I	**02**
	Core Courses (CC)	
UMS2PMK	Principles of Marketing	**03**
UMS2PMG	Principles of Management	**03**
	Total Credits	**22**

*****List of Skill Enhancement Courses (SEC) for Semester II (Any One)***	
UMS2FC2	Foundation Course – II
UMS2NS2	Foundation Course in NSS – II
UMS2NC2	Foundation Course in NCC – II
UMS2PE2	Foundation Course in Physical Education – II

Revised Syllabus of Courses of Bachelor of Management Studies (BMS) Programme at Semester II with Effect from the Academic Year 2022-2023

Elective Courses (EC)

Introduction to Cost Accounting
Course Code: UMS2ICA

OBJECTIVES

Sr.No	Objectives
01	The primary objective of the course is to familiarize the students with the basic cost concepts, allocation and control of various costs and methods of costing.
02	To enable the students to understand the principles and procedure of cost accounting and to apply them to different practical situations.

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Introduction	15
2	Elements of Cost	20
3	Cost Projection	15
4	Emerging Cost Concepts	10
	Total	**60**

Sr. No.	Modules / Units
1	**Introduction to Cost Accounting**
	● Meaning, Nature and scope, Objective of Cost Accounting, Relationship of Financial Accounting and Cost Accounting, Advantages and disadvantages of Cost Accounting, Cost classification (concept only), Types of costing- Job, process, batch and contract (concept only), Installation of Cost Accounting System.
2	**Elements of Cost**
	● **Material Costing**- Introduction, motives of holding stock, Stock valuation (FIFO & weighted average method) (Practical Problems), maintenance of stock levels, EOQ, EOQ with discounts, Calculation of Stock levels (Practical Problems) ● **Labour Costing** – Introduction, System of Wage Payment and incentives (Time rate & Price rate), labour turnover (Practical Problems) ● **Overhead Costing-** Introduction, classification of overheads, Distribution/Apportionment of overheads (Primary and Secondary Distribution)
3	**Cost Projection**
	● Cost Sheet (Current and Estimated) (Practical Problems) ● Reconciliation of Financial Accounts and Cost Accounting (Practical Problems)
4	**Emerging Cost Concepts**
	● Uniform Costing and Inter-firm Comparison, Emerging Concepts – Targeting Costing, Benchmarking, JIT, The Balanced Scorecard; Strategic Based Control; Concept, Process and Implementation of Balanced Scorecard, Challenges in Implementation of Balanced Scorecard

Course Outcome

Sr.No	Course Outcome
01	Learners will be able to differentiate between Financial and Cost Accounting.
02	Learners will be able to understand concepts and theories of Cost Accounting.
03	Learners will be able to explain Cost elements.
04	Learners will be able to interpret various emerging concepts of Costing

Elective Courses (EC)

Industrial Law
Course Code: UMS2ILW

OBJECTIVES

Sr.No	Objectives
01	To emphasize on the practical aspects and uses of industrial law by the organization since the students will be joining the industry.
02	To familiarize them with the current industrial practices.

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Laws Related to Industrial Relations and Industrial Disputes and Shop Establishment	18
2	Laws Related to Health, Safety and Welfare	15
3	Social Legislation	15
4	Laws Related to Compensation Management	12
	Total	**60**

Sr. No.	Modules / Units
1	**Laws Related to Industrial Relations and Industrial Disputes and Shop Establishment**
	● Industrial Disputes Act, 1947: Definition, Authorities, Awards, Settlements, Strikes Lockouts, Lay Offs, Retrenchment and Closure ● The Trade Union Act,1926 ● **Maharashtra Shops and Establishment Act, 2017:** Introduction, Definition, Application of Act to Other Establishments and Workers, Suspension of all or any of provisions of this act, Registration of Establishment, Cancellation of Registration, Change to be Communicated to Facilitator, Closing of Establishment to be communicated to Facilitator, Opening & Closing Hours, Hours of Work, Interval for Rest, Spread Over, Wages for overtime and weekly off, Employer to furnish identity card to worker, Enforcement and Inspection, Offences and Penalties
2	**Laws Related to Health, Safety and Welfare**
	● The Factory Act 1948: (Provisions related to Health, Safety and Welfare) ● The Workmen's Compensation Act, 1923Provisions: ▪ Introduction: The doctrine of assumed risk, The doctrine of Common Employment, The doctrine of Contributory Negligence ▪ Definitions ▪ Employers liability for compensation (S-3 to13) ▪ Rules as to Compensation (Sec 4 to Sec 9) (14 A &17)
3	**Social Legislation**
	● Employee State Insurance Act 1948: Definition and Employees Provident Fund ● Miscellaneous Provision Act 1948: Schemes, Administration and determination of dues
4	**Laws Related To Compensation Management**
	● The payment of Wages Act 1948: Objectives, Definition, Authorized Deductions ● Payment of Bonus Act,1965 ● The Payment Of Gratuity Act,1972

Course Outcome

Sr.No	Course Outcome
01	Learners will be able to summarize the concept of Industrial relations and industrial disputes, also will be able to illustrate the role of trade union in the industrial setup and acquaint knowledge related to shop establishment in Maharashtra.
02	Learners will be able to explain the law related to health, safety and welfare measures in industry and provisions related to employee's compensation.
03	Learners will be able to distinguish various provisions in the industry for the employee benefits.
04	Learners will be able to identify numerous laws related to compensation and make use of it at the work place.

Elective Courses (EC)

Business Mathematics
Course Code: UMS2BMA

Objectives

Sr.No	Objectives
01	To develop an understanding of the basic mathematics like interest and annuity, matrices, derivatives and numerical analysis and their application.

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Elementary Financial Mathematics	15
2	Matrices and Determinants	15
3	Derivatives and Applications of Derivatives	15
4	Integral Calculus and its Application	15
	Total	**60**

Sr. No.	Modules / Units
1	**Elementary Financial Mathematics**
	● **Simple and Compound Interest**: Interest compounded once a year, more than once a year, continuous, nominal and effective rate of interest ● Annuity-Present and future value-sinking funds ● **Depreciation of Assets:** Equated Monthly Installments (EMI)-using flat interest rate and reducing balance method. ● **Functions:** Algebraic functions and the functions used in business and economics, Break Even and Equilibrium point.
2	**Matrices and Determinants**
	● **Matrices:** Some important definitions and some important results. Matrix operation (Addition, scalar multiplication , matrix multiplication, transpose of a matrix) ● **Determinants of a matrix of order two or three**: properties and results of Determinants ● Solving a system of linear equations using Cramer's rule ● Inverse of a Matrix (up to order three) using ad-joint of a matrix and matrix inversion method ● Input Output Analysis
3	**Derivatives and Applications of Derivatives**
	● **Introduction and Concept:** Derivatives of constant function, logarithmic functions, polynomial and exponential function ● **Rules of derivatives:** addition, multiplication, quotient ● Second order derivatives ● **Application of Derivatives:** Maxima, Minima, Average Cost and Marginal Cost. Total revenue, Marginal revenue, Average revenue. Average and Marginal profit. Introduction to Partial derivatives of first order, Price elasticity of demand
4	**Integral Calculus and it's Application**
	● **Integral Calculus:** Introduction, Integration, Integration as inverse of differentiation, Standard Formulae (integration of constant function, x^n, e^x, a^x, log x) (Simple Problems), definite integrals (Simple problems) (No Properties) **Application of Integral Calculus:** Cost function; Revenue function; Consumer's & Producer's Surplus

Course Outcome

Sr.No	Course Outcome
01	Explain basic mathematical concepts
02	Make use of basics of mathematics for financial calculations like simple interest, compound interest, annuity, depreciation, etc
03	concepts of mathematical and economical functions
04	Predict risk and take decisions accordingly

Ability Enhancement Courses (AEC)

Business Communication –II
Course Code: UMS2BC2

Objectives

Sr.No	Objectives
01	To develop ability to prepare and effectively deliver an oral presentation utilizing electronic software.
02	To learn organization of team activities that lead to development of collaborative work skills.
03	To draft effective business correspondence with brevity and clarity.

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Presentation Skills	15
2	Group Communication	15
3	Business Correspondence	15
4	Language and Writing Skills	15
	Total	**60**

Sr. No.	Modules / Units
1	**Presentation Skills**
	Presentations ● Principles of Effective Presentation **Public Speaking** ● Principles of Effective Public Speaking
2	**Group Communication**
	Interviews: ● Group Discussion Preparing for an Interview, Types of Interviews – Selection, Appraisal, Grievance, Exit **Meetings:** Need and Importance of Meetings, Conduct of Meeting and Group Dynamics Role of the Chairperson, Role of the Participants, Drafting of Notice, Agenda and Resolutions **Conference:** Meaning and Importance of Conference Organizing a Conference Modern Methods: Video and Tele – Conferencing **Public Relations:** Meaning, Functions of PR Department, External and Internal Measures of PR
3	**Business Correspondence**
	Trade Letters: Order, Credit and Status Enquiry, Collection Letters of Inquiry, Letters of Complaints, Claims, Adjustments Sales Letters, promotional leaflets and fliers Consumer Grievance Letters, Letters under Right to Information (RTI) Act
4	**Language and Writing Skills**
	Reports: Parts, Types, Feasibility Reports, Investigative Reports. **Book review** **Mock interview**

Course Outcome

Sr.No	Course Outcome
01	Interpret different type of interview organized in commercial world.
02	Develop effective presentation necessary in corporate world
03	Apply mechanism of meeting,conference and its application in business world
04	Construct business letters effectively

Revised Syllabus of Courses of Bachelor of Management Studies (BMS) Programme at Semester II with Effect from the Academic Year 2022-2023

Skill Enhancement Courses (SEC)

Foundation Course –II
Course Code: UMS2FC2

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Globalization and Indian Society	08
2	Human Rights	07
3	Ecology and Sustainable Development	15
4	Understanding and Managing Stress and Conflict	15
	Total	**45**

Sr. No	Modules /Units
1	**Globalization and Indian Society**
	Understanding the concepts of liberalization, privatization and globalization; Growth of information technology and communication and its impact manifested in everyday life; Impact of globalization on industry: changes in employment and increasing migration; Changes in agrarian sector due to globalization; rise in corporate farming and increase in farmers' suicides.
2	**Human Rights**
	Concept of Human Rights; origin and evolution of the concept; The Universal Declaration of Human Rights; Human Rights constituents with special reference to Fundamental Rights stated in the Constitution
3	**Ecology and Sustainable Development**
	Importance of Environment Studies in the current developmental context; Understanding concepts of Environment, Ecology and their interconnectedness; Environment as natural capital and connection to quality of human life; Environmental Degradation- causes and impact on human life; Sustainable development- concept and components; poverty and environment
4	**Understanding and Managing Stress and Conflict**
	Understanding Stress and Conflict: Causes of stress and conflict in individuals and society; Agents of socialization and the role played by them in developing the individual; Significance of values, ethics and prejudices in developing the individual; Stereotyping and prejudice as significant factors in causing conflicts in society. Aggression and violence as the public expression of conflict. **Managing Stress and Conflict in Contemporary Society** Types of conflicts and use of coping mechanisms for managing individual stress; Maslow's theory of self-actualization;Different methods of responding to conflicts in society; Conflict-resolution and efforts towards building peace and harmony in society.

Topics for Project Guidance: Growing Social Problems in India:
• Increasing urbanization, problems of housing, health and sanitation. • Changing lifestyles and impact on culture. • Farmer's suicide and agrarian distress. • Debate regarding Genetically Modified Crops. • Development projects and Human Rights violations. • Increasing crime/ suicides among youth.

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Skill Enhancement Courses (SEC)

Course Code: UMS2NS2

5. Foundation Course in NSS - II

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Volunteerism & Communication Skills	10
2	Socio-Economic Survey of village / Slum Adoption	15
3	Special Camping Activity	10
4	Government Organizations /Non-Government Organizations	10
	Total	**45**

Sr. No.	Modules / Units
1	**Volunteerism & Communication Skills**
	Unit I: Concept of Volunteerism Meaning &Features ● Need of Training for Volunteerism. ● Role Models of Volunteerism in India. ● Leadership –Meaning & Attributes. ● Communication Skills-Meaning, Types & Importance **Unit II: Programme Planning** ● Requirement of Successful implementation of Programmes ● Importance of Planning and Limitation of Planning. ● Flow chart and Scheduling of the programme.
2	**Socio-Economic Survey of village / Slum Adoption**
	Unit I: Meaning & Needs of Socio Economic Survey ● Process of Socio-Economic Survey 1. Design of Questionnaire (Population, Literacy, Family) 2. Design of Interview, Education, Income. 3. Data Analysis (Introduction of Different Tools). 4. Report Writing. **Unit II: Village development plan and creation of durable assets** 1. Short term, Medium term, Long terms plans (14th Finance Commission) 2. Roles of NSSO, NFHS, Census towards plan formation and implementation.
3	**Special Camping Activity**
	Unit I: Nature & Objectives of Activities ● Selection of camp Site ● Identification of specific Theme ● Co-ordination with Local Planning Government and other Agencies. ● Ice breaking & team building activities. **Unit II: Feedback and Evaluation** ● Post camping Activities
4	**Government Organizations /Non-Government Organizations**
	Unit I: Structure of Government organisations and Non-Government Organisations ● Meaning of GOs, VOs/NGOS. ● Rise of NGOs in India (Company Act 2013, Organisation and Registration Act) ● Global Agencies working in India (UNICEF & WHO) ● NGOs: Regulation and Functions. **Unit II: Social Justice** ● Association of NGOs with NSS activities.

Skill Enhancement Courses (SEC)

5. Foundation Course in NCC – II
Course Code: UMS2NC2

Objectives

Sr.No	Objectives
01	To empower and train youth to be responsible citizens and assist civil administration in performance of selective duties during disaster.
02	To teach the values and skills involved in providing voluntary social service.
03	To inculcate spirit of adventure, undertake adventure activities, to hone leadership qualities and risk taking abilities.
04	To instill respect and responsibility towards personal health and hygiene.
05	To train students so as to achieve their physical, mental, psychological and emotional development.
06	To impart elementary knowledge about riffles and firing.
07	To impart basic military training, to develop awareness about the defence forces and expose learners to military ethos / values.
08	To make the students apply the knowledge in specialised military subject/ social topics/ cultural endeavors

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Disaster Management, Social Awareness and Community Development	07
2	Adventure Training and Health and Hygiene	08
3	Drill with Arms	08
4	Weapon Training	10
5	Specialized Subject: Army Or Navy Or Air	12
6	Project	15
	Total	**60**

Sr. No.	Modules / Units
1	**Disaster Management, Social Awareness and Community Development**
	Disaster Management: **Desired outcome:** The student shall gain basic information about civil defence organization / NDMA & shall provide assistance to civil administration in various types of emergencies during natural / manmade disasters ● Civil Defence Organization and Its Duties/NDMA ● Types of Emergencies/ Natural Disaster ● Assistance during Natural / Other Calamities: Flood / Cyclone/ Earth Quake/ Accident etc. ● 'Avan' model of NCC **Social Awareness and Community Development:** **Desired outcome:** The student shall have an understanding about social service and its need, about NGOs and shall participate in community action programmes for betterment of the community. ● Basics of Social Service, Weaker Sections of Our Society and Their Needs ● Social/ Rural Development Project: MNREGA, SGSY, NSAP etc. ● Contribution of Youth towards Social Welfare ● Civic Responsibilities
2	**Adventure Training and Health and Hygiene**
	Desired outcome : The students will overcome fear & inculcate within them the sense of adventure , sportsmanship , espirit-d-corp and develop confidence, courage , determination, diligence and quest for excellence. ● Any Two such as – Obstacle course, Slithering, Trekking, Cycling, Rock Climbing, Para Sailing, Sailing, Scuba Diving etc **Desired outcome:** The student shall be fully aware about personal health and hygiene lead a healthy life style and foster habits of restraint and self awareness. ● Hygiene and Sanitation (Personal and Food Hygiene) ● Infectious & Contagious Diseases & Their Prevention
3	**Drill with Arms**
	Desired outcome: The students will demonstrate the sense of discipline, improve bearing, smartness, turnout, develop the quality of immediate and implicit obedience of orders, with good reflexes. ● Attention, Stand at Ease and Stand Easy ● Getting on Parade with Rifle and Dressing at the Order ● Dismissing and Falling Out ● Ground / Take Up Arms ● Present From the Order and Vice-versa ● General Salute, Salami Shastra
4	**Weapon Training**
	Desired outcome: The student shall have basic knowledge of weapons and their use and handling. ● Characteristics of a Rifle / Rifle Ammunition and its Fire Power

	● Stripping, Assembling, Care and Cleaning and Sight Setting of .22rifle ● Stripping, Assembling, Care and Cleaning of 7.62mm SLR ● Loading, Cocking and Unloading ● The lying position, Holding and Aiming-I ● Trigger control and firing a shot ● Range procedure and safety precautions Short range firing, Aiming- II -Alteration of sight
5	**Specialized Subject: Army Or Navy Or Air**
	Army **Desired outcome:** The training shall instill patriotism, commitment and passion to serve the nation motivating the youth to join the defence forces. It will also acquaint, expose & provide basic knowledge about armed, naval and air-force subjects **A. Map reading** ● Introduction to types of Maps and Conventional signs ● Scales and Grid system ● Topographical forms and technical terms ● Relief, contours and Gradients ● Cardinal points and Types of North ● Types of bearings and use of Service Protractor ● Prismatic compass and its use and GPS **B. Field Craft and Battle Craft** ● Introduction ● Judging distance ● Description of ground ● Recognition, Description and Indication of landmarks and targets ***OR*** **Navy** **A. `Naval Communication** □ Introduction to Naval Modern Communication, Purpose and Principles ▪ Introduction of Naval communication ▪ Duties of various communication sub-departments □ Semaphore ▪ Introduction of position of letters and prosigns ▪ Reading of messages ▪ Transmission of messages **B. Seamanship** □ **Anchor work** ▪ Parts of Anchor and Cable, their identification □ **Rigging** ▪ Types of ropes and breaking strength- stowing, maintenance and securing of ropes ▪ Practical Bends and Hitches: Reef Knot, Half hitch, Clove Hitch,

	Rolling Hitch, Timber Hitch, Bow Line, Round Turn and Two half hitch and Bow line on the Bight and its basic elements and uses. ▪ Introduction to Shackles, Hooks, Blocks and Derricks, Coiling Down and Splicing of rope **C. Boat work** □ Parts of Boat and Parts of an Oar □ Instruction on boat Pulling- Pulling orders □ Steering of boat under oars, Practical instruction on Boat Pulling, Precautions while pulling

Sr. No.	Modules / Units
	OR **Air** **A. Airframes** ● Aircraft Controls ● Landing Gear **B. Instruments** ● Basic Flight Instruments **C. Aircraft Particulars** ● Aircraft Particulars (Type specific) **D. Aero modelling** ● History of Aero modelling ● Materials used in Aero modelling ● Type of Aero models ● Flying/ Building of Aero models
6	**Project**
	Project on Social Activities

Course Outcome

Sr. No.	Course Outcome
01	Trained and disciplined citizens will be developed.
02	Physical fitness and overall personality of the youth will be enhanced.
03	Students will be trained to develop their carrer in defence / paramilitary/ police forces & civil services

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Skill Enhancement Courses (SEC)

Foundation Course in Physical Education –II
Course Code: UMS2PE2

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Development of Fitness	10
2	Health, Fitness and Diseases	15
3	Yoga Education	10
4	Daily Schedule of Achieving Quality of Life and Wellness	10
	Total	**45**

Sr. No.	Modules / Units
1	**Development of Fitness**
	● Benefits of physical fitness and exercise and principles of physical fitness ● Calculation of fitness index level1-4 ● Waist-hip ratio Target Heart Rate, BMI and types and principles of exercise (FITT) ● Methods of training – continues, Interval, circuit, Fartlek and Plyometric
2	**Health, Fitness and Diseases**
	● Definition of obesity and its management ● Communicable diseases, their preventive and therapeutic aspects ● Factors responsible for communicable diseases ● Preventive and therapeutic aspect of Communicable and non- communicable diseases
3	**Yoga Education**
	● Meaning and history of yoga ● Ashtang yoga and types of yoga ● Types of Suryanamaskar and Technique of Pranayam ● Benefits of Yoga
4	**Daily Schedule of Achieving Quality of Life and Wellness**
	● Daily schedule based upon one's attitude, gender, age & occupation. ● Basic – module: - Time split for rest, sleep, diet, activity &recreation. ● Principles to achieve quality of life:- positive attitude, daily regular exercise, control over food habits & healthy hygienic practices.

Revised Syllabus of Courses of Bachelor of Management Studies (BMS) Programme at Semester II

with Effect from the Academic Year 2022-2023

Skill Enhancement Courses

(SEC) 5. Personality

Development - II

Course Code: UMS2PD2

OBJECTIVES

Sr. No	Objectives
01	To develop talent, facilitate employability enabling the learners to excel and sustain in highly competitive world of business
02	To make learners know about self - awareness, life skills and need for personal development
03	To bring about personality development with regard to different behavioral dimensions in the direction of organizational effectiveness
04	To increase awareness of personality development, mutual understanding and importance of supportive learning environment.

Modules at a Glance

Sr. No.	Modules	No. of Hours
1	Important Aspects of Personality Development and Self Grooming	7
2	Personality Makeover	8
	Total	**15**

Sr. No.	Modules / Units
1	**Important Aspects of Personality Development and Self Grooming**
	• Body language - Problem-solving - Conflict and Stress Management - Decision-making skills - Leadership and qualities of a successful leader – Character building - Team-work – Time management - Work ethics –Good manners and etiquette, Assertiveness,. • Self Image and Self Concept, Dressing Sense, Table Mannerism, Diet Exercise and Mental
2	**Personality Makeover**
	• Speech fluency, Self Motivation, Confidence Building, Role Plays, Reporting, Speaking habits, Powerful Presentation Techniques, Time management, Voice modulation, Stress Management, Building a positive attitude – creative thinking, Executive Corporate Attire / Formal Dressing, Personality Branding

Course Outcomes

Sr. No	Course Outcomes
01	Learners will be able to develop the basic idea of significance and reasons for personality development and self-grooming
02	Learners will be able to build confidence and overcome the problems associated with personality
03	Learners will be able to understand and demonstrate knowledge of personal beliefs and values
04	Learners will be able to improve their personality and language related difficulties.

Revised Syllabus of Courses of Bachelor of Management Studies (BMS)
Programme at Semester II
with Effect from the Academic Year 2022-2023

Core Courses (CC)

1. Principles of Marketing
Course Code: UMS2PMK

OBJECTIVES

Sr.No	Objectives
01	To introduce the marketing concept and how we identify, understand and satisfy the needs of customers in the market.
02	To introduce marketing strategies and current policies.

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Introduction to Marketing	15
2	Marketing Environment, Research and Consumer Behaviour	15
3	Marketing Mix	15
4	Segmentation, Targeting and Positioning and Trends In Marketing	15
	Total	**60**

Sr. No.	Modules / Units
1	**Introduction to Marketing**
	● **Introduction to Marketing:** Definition, features, advantages and scope of marketing. The 4P's and 4C's of marketing. Marketing v/s Selling. Marketing as an activity and function ● **Concepts of Marketing:** Needs, wants and demands, transactions, transfer and exchanges. ● **Orientations of a firm:** Production concept; Product concept; selling concept and marketing concept, social relationship, Holistic marketing.
2	**Marketing Environment, Research and Consumer Behaviour**
	● **The micro environment of business:** Management structure; Marketing Channels; Markets in which a firm operates; competitors and stakeholders. ● **Macro environment:** Political Factors; Economic Factors; Socio Cultural Factors , Technological Factors (PEST Analysis) ● **Marketing research:** Meaning, features, Importance of marketing research. Types of marketing research: Product research; Sales research; consumer/customer research; production research ● **MIS:** Meaning, features and Importance ● **Consumer Behaviour:** Meaning, feature, importance, factors affecting Consumer Behaviour
3	**Marketing Mix**
	● **Marketing mix:** Meaning –elements of Marketing Mix. ● Product-product mix-product line lifecycle-product planning – New product development- failure of new product-levels of product. ● Branding –Packing and packaging – role and importance ● Pricing – objectives- factors influencing pricing policy and Pricing strategy. ● Physical distribution – meaning – factor affecting channel selection-types of marketing channels ● Promotion – meaning and significance of promotion. Promotion ● tools(brief)
4	**Service Marketing Segmentation, Targeting and Positioning and Trends In Marketing**
	● Service Marketing – Concept. Meaning, Definition of Service Marketing, 7Ps of Service Marketing, Implementation of 7Ps of Service Marketing. ● Types of Business – Meaning and Concept of B2B, B2C, C2B and C2C. ● Segmentation – meaning , importance ,basis ● Targeting – meaning , types ● Positioning – meaning –strategies ● New trends in marketing – E-marketing , Internet marketing and marketing

	using Social network ● Social marketing/ Relationship marketing

Course Outcome

Sr.No	Course Outcome
01	Learners will be able to explain the concept of marketing and define the basic parts of Marketing.
02	Learners will be able to illustrate the marketing environment consisting of micro and macro factors of marketing and consumer behavior.
03	Learners will be able to summarize marketing mix in detail.
04	Learners will be able to describe Service Marketing, Types of Business, Segmentation, Targeting and Positioning also current trends in the marketing field.

Core Courses (CC)

7. Principles of Management
Course Code: UMS2PMG

Objectives

Sr.No	Objectives
01	To provide a basis of understanding to the learners with reference to working of business organization through the process of management.
02	To inculcate managerial skills of planning, organising and controlling and to teach how it can be executed in a variety of circumstances.
03	To apply concepts of strategic and tactical organizational planning

Modules at a Glance

Sr. No.	Modules	No. of Lectures
1	Nature of Management	15
2	Planning and Decision Making	15
3	Organizing	15
4	Directing, Leadership, Co-ordination and Controlling	15
	Total	**60**

Sr. No.	Modules / Units
1	**Nature of Management**
	● **Management:** Concept, Significance, Role & Skills, Levels of Management, Concepts of PODSCORB, Managerial Grid. ● Evolution of Management thoughts, Contribution of F.W Taylor, Henri Fayol And Contingency Approach. ● Organization culture and Environment – Current trends and issues in Management. ● Integrative Managerial Issues: Managing in a Global Environment;
2	**Planning and Decision Making**
	● **Planning:** Meaning, Importance, Elements, Process, Limitations and MBO. ● **Decision Making**: Meaning, Importance, Process, Techniques of Decision Making.
3	**Organizing**
	● **Organizing:** Concepts, Structure (Formal & Informal, Line &Staff and Matrix), Meaning, Advantages and Limitations ● **Departmentation:** Meaning, Basis and Significance ● **Span of Control:** Meaning, Graicunas Theory, Factors affecting span of Control Centralization vs Decentralization ● **Delegation:** Authority & Responsibility relationship
4	**Directing, Leadership, Co-ordination and Controlling**
	● **Directing:** Meaning and Process ● **Leadership:** Meaning, Styles and Qualities of Good Leader ● **Co-ordination** as an Essence of Management ● **Controlling:** Meaning, Process and Techniques ● **Recent Trends:** Green Management &CSR ● New Perspectives in Management - Strategic alliances - Core competence ● Managing Innovation & Change

Course Outcome

Sr.No	Course Outcome
01	explain the functions and responsibilities of managers & tools and techniques to be used in the performance of the managerial job.
02	analyze and understand the environment of the organization
03	build the leadership capacity and teamwork skills for business decision making.
	elaborate the knowledge of current theory and techniques of major business discipline.

Revised Syllabus of Courses of Bachelor of Management Studies (BMS) Programme at Semester I with effect from the Academic Year 2022-2023

Reference Books

Reference Books
Introduction to Financial Accounts
• *Financial Accounts (a managerial emphasis): By Ashok Banerjee – Excelbooks* • *Fundamental of Accounting and Financial Analysis : By Anil Choudhary (Pearsoneducation)* • *Indian Accounting Standards and IFRS for non-financial executives : By T.P. Ghosh–Taxman* • *Financial Accounting for Business Managers: By Ashish K.Bhattacharya.* • *Introduction to Accountancy by T.S. Grewal, S. Chand and Company (P) Ltd., NewDelhi* • *Advance Accounts by Shukla and Grewal, S. Chand and Company (P) Ltd., NewDelhi* • *Advanced Accountancy by R.L Gupta and M. Radhaswamy, S. Chand and Company (P) Ltd., NewDelhi* • *Modern Accountancy by Mukherjee and Hanif, Tata Mc. Grow Hill and Co. Ltd.,Mumbai* • *Financial Accounting by LesileChandwichk, Pentice Hall of India AdinBakley (P) Ltd., NewDelhi* • *Financial Accounting for Management by Dr. Dinesh Harsalekar, Multi-Tech. Publishing Co. Ltd., Mumbai* • *Financial Accounting by P.C. Tulsian, Pearson Publications, NewDelhi* • *Accounting Principles by R.N. Anthony and J.S. Reece, Richard Irwin,Inc* • *Financial Accounting by Monga, J.R. Ahuja, GirishAhuja and Ashok Shehgal, Mayur Paper Back,Noida* • *Compendium of Statement and Standard of Accounting,ICAI* • *Indian Accounting Standards, Ashish Bhattacharya, Tata Mc. Grow Hill and Co. Ltd.,Mumbai* • *Financial Accounting by Williams, Tata Mc. Grow Hill and Co. Ltd.,Mumbai* • *Company Accounting Standards by ShrinivasanAnand, Taxman, NewDelhi* • *Financial Accounting by V. Rajasekaran, Pearson Publications, NewDelhi* • *Introduction to Financial Accounting by Horngren, Pearson Publications, NewDelhi* • *Financial Accounting by M. Mukherjee and M. Hanif, Tata McGraw Hill Education Pvt. Ltd., NewDelhi* • *Financial Accounting a Managerial Perspective, Varadraj B. Bapat, MehulRaithatha, Tata McGraw Hill Education Pvt. Ltd., NewDelhi*
Business Law
Elements of mercantile Law –N.D.Kapoor *Business Law – P.C.Tulsian* *Business Law – SSGulshan* *Company Law – Dr.AvtarSingh* *Indian contract Act – Dr.AvtarSingh* *Law of IntellectualProperty-V.K-Taraporevala*
Business Statistics
Statistics of Management , Richard Levin &David S. Rubin,Printice Hall of India , NewDelhi. *Statistics for Business & Economics, David R Anderson, Dennis J Sweney, ThopmsonPublication.* *Fundamental of Statistics, S C Gupta, Himalya PublicationHouse.* *Business Statistics , Bharadwaj , Excel Books,Delhi* *Business Mathematics, S.K Singh & J.K Singh, Brijwasi Book Distributor &Publisher.*

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Business Communication - Paper I

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- *Ashley,A(1992) A Handbook Of Commercial Correspondence, Oxford UniversityPress.*
- *Aswalthapa, K (1991)Organisational Behaviour, Himalayan Publication,Mumbai.*
- *Atreya N and Guha (1994) Effective Credit Management, MMC School of Management,Mumbai.*
- *Bahl,J.C. and Nagamia,S.M. (1974) Modern Business Correspondence and MinuteWriting.*
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- *Banerjee, Bani P (2005) Foundation of Ethics in Mangement Excel Books 10.Businessworld Special Collector's Issue: Ethics and theManager*
- *Barkar, Alan(1993) Making Meetings Work, Sterling Publications Pvt. Ltd., NewDelhi.*
- *Basu,C.R.(1998) Business Organisation and Management, T.M.H.NewDelhi.*
- *Benjamin, James (1993) Business and Professional Communication Concepts and Practices, Harper Collins College Publishers, NewYork.*
- *Bhargava and Bhargava91971) Company Notices, Meetings andRegulations*
- *Black, Sam (1972) Practical Public Relations, E.L.B.S.London.*
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- *Gupta, Anand Das (2010) Ethics, Business and Society: Managing Responsibly Response Books 32.Gupta, Dipankar (2006) Ethics Incorporated: Top Priority and Bottom Line ResponseBooks*
- *Krevolin, Nathan (1983) Communication Systems and Procedures for Modern Office, Prentice Hall, New Jersey.*
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Foundation Course – I

- Indian Political System: A Critical Study of the Constitutional Structure and the Emerging Trends of Indian Politics, J C Johari, Anmol Publications, 1996
- Understanding Social Inequality, Tim Butler, Paul Watt, Sage Publications (2006)
- Social and Economic Problems in India, Naseem Azad, R Gupta Pub (2011)
- Indian Society and Culture, Vinita Padey, Rawat Pub(2016)
- Social Problems in India, Ram Ahuja, Rawat Pub(2014)
- Faces of Feminine in Ancient , medivial and Modern India, Mandakranta Bose Oxford UniversityPress
- National Humana rights commission- disabilityManual
- Rural, Urban Migration : Trends, challenges & Strategies, S Rajagopalan, ICFAI-2012
- Regional Inequilities in India Bhat L SSSRD- NewDelhi
- Urbanisation in India: Challenges, Opportunities & the way forward, I J Ahluwalia, Ravi Kanbur, P K Mohanty, SAGE Pub (2014)
- The Constitution of India, P M Bakshi2011
- The Problems of Linguistic States in India,KrishnaKodesia SterlingPub
- Politics in India: structure, Process and Policy SubrataMitra, RouutlegePub
- Politics in India, Rajani Kothari, OrientBlackswan
- Problems of Communilism in india,RavindraKumar MittalPub
- Combating communalism in India: Key to National Integration, KawalKishorBhardwaj, Mittal Pub

Foundation Course in NSS

- *National Service Scheme Manual (Revised) 2006, Government of India, Ministry of Youth Affairs and Sports, New Delhi.*
- *University of Mumbai National Service Scheme Manual2009.*
- *Avhan Chancellor's Brigade - NSS Wing, Training camp on Disaster Preparedness Guidelines, March 2012*
- *RashtriyaSevaYojanaSankalpana - Prof.Dr.SankayChakane, Dr.Pramod\Pabrekar, Diamond Publication,Pune*
- *National Service Scheme Manual for NSS District Coordinators, National Service Scheme Cell, Dept. of Higher and Technical Education,Mantralaya,*
- *Annual report of National Service Scheme (NSS) published by Dept. of Higher and Technical Education, Mantralaya,*
- *NSS Cell, Dept. of Higher and Technical Education, Mantralaya, UTKARSHA- Socio and cultural guidelines*
- *Case material as a Training Aid for Field Workers, GurmeetHans.*
- *Social service opportunities in hospitals, Kapil K. Krishnan,TISS*
- *New Trends in NSS, Research papers published by University ofPune*
- *ANOOGUNJ Research Journal, published by NSS Unit C. K. Thakurcollege*

Reference Books
• *Training Manual for Field Work published by RGNIYD,Chreeperumbudur* • *Prof.Ghatole R.N. Rural Social Science and CommunityDevelopment.* • *PurushottamSheth, Dr.Shailaja Mane, National ServiceScheme* • *Joint programme of National Service Scheme, University of Mumbai & DISHA - DEEPSHIKHA Projects, Nair Hospital,2011-12* • *National Service Scheme in India: A Case study of Karnataka, M. B. Dishad, Trust Publications,2001* • *http://www.thebetterindia.com/140/national-service-scheme-nss/* • *http://en.wikipedia.org/wiki/national-service-scheme19=http://nss.nic.in/adminstruct* • *http://nss.nic.in/propexpan* • *http://nss.nic.in* • *http://socialworknss.org/about.html*
Foundation Course in NCC

- *Cadet's Hand book – Common subject..all wings, BY DG NCC, NewDelhi.*
- *Cadet's Hand book – Specialised Subjects, Army, Navy, Air-force, BY DG NCC, NewDelhi.*
- *NCC OTA Precise, BY DG NCC, NewDelhi.*
- *"AVAN" Model of Disaster Mang.,VinayakDalvie, Proceedings of Int. Conf. on Urban Plan. andEnvStrat& Challenges, Elphinstone College, Jan2007.*
- *Humanistic Tradition of India,N.L.Gupta, Mohit Publication, NewDelhi*
- *Social psychology, Baron & Byrne, Pearson Publication, 12th Edition self awareness know yourself / insight (110) Group & Individuals (374) Groupdiscussion*
- *Chanakya's 7 Secrets of Leadership, RadhakrishananPillai and D.Shivnandhan,Jaico*
- *Social Psychology: Understanding Human Interaction, Baron, Robert A., (302/BAR/BYR),7thEdition*
- *Seven Habits of Highly Effective People., Covey ,Stephen*
- *The Habit of Winning., Iyer , Prakash, Penguin , India ;2011*
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- *India 1996- A Reference Annual Govt. ofIndia*
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- *National Cadet Corps: 100 Years of Distinction, National Cadet Corps (Singapore),NCC*
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- *Grooming Tomorrow's Leaders: National Cadet Corps, 1917-2006, R.S. Chhettri, Lancer Publishers, 2006*
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- *Discovery of India, JawaharlalNehru*
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Organisational behaviour, S.Robbins, PrenticeHall *Organisational behaviour, John W.Newstrom and Keith Davis, TataMcGrawhill* *Organisational behaviour, Fred Luthans,McGrawhill,Newyork* *Organisational behaviour, K.Aswathappa, Himalaya PublishingHouse* *Essentials of management, Koontz,Harold, TataMcGrawhill*
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Revised Syllabus of Courses of Bachelor of Management Studies (BMS) Programme at Semester II with effect from the Academic Year 2022-2023

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Industrial Law
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Scheme of

❖ **Scheme of Examination**

The performance of the learners shall be evaluated into two components. The learner's Performance shall be assessed by Internal Assessment with 40% marks in the first component by conducting the Semester End Examinations with 60% marks in the second component. The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below:-

A) Internal Assessment: 40 **%** **40 Marks**

(For Courses without Practical)

Sr. No.	Particular		Marks
01	One periodical class test / online examination to be conducted in the given semester		20 Marks
02	One case study/ project with presentation based on curriculum to be assessed by the teacher concerned		15 Marks
	Presentation	10 Marks	
	Written Document	05 Marks	
03	Active participation in routine class instructional deliveries and overall conduct as a responsible learner, mannerism and articulation and exhibit of leadership qualities in organizing related academic activities		05 Marks

(For Courses with Practical)

Sr. No.	Particular		Marks
01	**Practical Examination**		20 Marks
	Journal	05 Marks	
	Viva Voce	05 Marks	
	Laboratory Work	10 Marks	
02	**One case study /project with presentation to be assessed by teacher concerned (15 Marks)**		
	Presentation		10 Marks
	Written Document		05 Marks

03	Active participation in routine class instructional deliveries and Overall conduct as a responsible learner, mannerism and articulation and exhibit of leadership qualities in organizing related academic activities	05 Marks

Question Paper Pattern

(Periodical Class Test for the Courses at Under Graduate Programmes)

Maximum Marks: 20
Questions to be set: 02
Duration: 40 Minutes
All Questions are Compulsory

Question No	Particular	Marks
Q-1	Match the Column / Fill in the Blanks / Multiple Choice Questions/ Answer in One or Two Lines (Concept based Questions) (1 Marks / 2 Marks each)	10 Marks
Q-2	Answer in Brief (Attempt any Two of the Three) (5 Marks each)	10 Marks

B) Semester End Examination: 60 % 60 Marks

- Duration: The examination shall be of 2 hours duration.

Question Paper Pattern

Theory question paper pattern
1. There shall be four questions each of 15 marks. 2. All questions shall be compulsory with internal options. 3. Question may be subdivided into sub-questions a, b, c… and the allocation of marks depends on the weightage of the unit.

❖ **Passing Standard**

The learners to pass a course shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment and Semester End Examination. The learners shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 24 Out of 60) separately, to pass the course and minimum of Grade D, wherever applicable, to pass a particular semester. A learner will be said to have passed the course if the learner passes the Internal Assessment and Semester End Examination together.

❖ Guidelines and Evaluation pattern for project work (100 Marks)

Introduction

Inclusion of project work in the course curriculum of the B.Com. (Accounting & Finance) and B.M.S. programme is one of the ambitious aspects in the programme structure. The main objective of inclusion of project work is to inculcate the element of research analyse and scientific temperament challenging the potential of learner as regards to his/ her eager to enquire and ability to interpret particular aspect of the study. It is expected that the guiding teacher should undertake the counselling sessions and make the awareness among the learners about the methodology of formulation, preparation and evaluation pattern of the project work.

- There are two modes of preparation of project work
  1. Project work based on research methodology in the study area
  2. Project work based on internship in the study area

Guidelines for preparation of Project Work

1. General guidelines for preparation of project work based on Research Methodology

- The project topic may be undertaken in any area of Elective Courses.
- Each of the learner has to undertake a Project individually under the supervision of a teacher-guide.
- The learner shall decide the topic and title which should be specific, clear and with definite scope in consultation with the teacher-guide concerned.
- University/college shall allot a guiding teacher for guidance to the students based on her / his specialization.
- The project report shall be prepared as per the broad guidelines given below:
  - Font type: Times New Roman
  - Font size: 12-For content, 14-for Title
  - Line Space : 1.5-for content and 1-for in table work
  - Paper Size: A4
  - Margin : in Left-1.5, Up-Down-Right-1
  - The Project Report shall be bounded.
  - The project report should be 80 to 100 pages

Format

1st page (Main Page)

Title of the problem of the Project

A Project Submitted to

University of Mumbai for partial completion of the degree of

Bachelor in Commerce (Accounting and Finance)/B.M.S.

Under the Faculty of Commerce

By

Name of the Learner

Under the Guidance of

Name of the Guiding Teacher

Name and address of the College

Month and Year

2nd Page
This page to be repeated on 2nd page (i.e. inside after main page)

On separate page

Index

List of tables, if any, with page numbers.

List of Graphs, if any, with page numbers.

List of Appendix, if any, with page numbers.

Abbreviations used:

Structure to be followed to maintain the uniformity in formulation and presentation of Project Work

(Model Structure of the Project Work)

- **Chapter No. 1: Introduction**
  In this chapter Selection and relevance of the problem, historical background of the problem, brief profile of the study area, definition/s of related aspects, characteristics, different concepts pertaining to the problem etc can be incorporated by the learner.

- **Chapter No. 2: Research Methodology**
  This chapter will include Objectives, Hypothesis, Scope of the study, limitations of the study, significance of the study, Selection of the problem, Sample size, Data collection, Tabulation of data, Techniques and tools to be used, etc can be incorporated by the learner.

- **Chapter No. 3: Literature Review**
  This chapter will provide information about studies done on the respective issue. This would specify how the study undertaken is relevant and contribute for value addition in information/ knowledge/ application of study area which ultimately helps the learner to undertake further study on same issue.

- **Chapter No. 4: Data Analysis, Interpretation and Presentation**
  This chapter is the core part of the study. The analysis pertaining to collected data will be done by the learner. The application of selected tools or techniques will be used to arrive at findings. In this, table of information's, presentation of graphs etc. can be provided with interpretation by the learner.

- **Chapter No. 5: Conclusions and Suggestions**
  In this chapter of project work, findings of work will be covered and suggestion will be enlisted to validate the objectives and hypotheses.

Note: If required more chapters of data analysis can be added.

- **Bibliography**
- **Appendix**

On separate page
Name and address of the college

Certificate

This is to certify that Ms/Mr _____has worked and duly completed her/his Project Work for the degree of Bachelor in Commerce (Accounting & Finance)/B.M.S. under the Faculty of Commerce in the subject of _____ and her/his project is entitled, "_____*Title of the Project*_____" under my supervision.

I further certify that the entire work has been done by the learner under my guidance and that no part of it has been submitted previously for any Degree or Diploma of any University.

It is her/ his own work and facts reported by her/his personal findings and investigations.

Seal of the College

Name and Signature of
Guiding Teacher

Date of submission:

On separate page

Declaration by learner

I the undersigned Miss / Mr._____here by, declare that the work embodied in this project work titled "_____ _____", forms my own contribution to the research work carried out under the guidance of _____ is a result of my own research work and has not been previously submitted to any other University for any other Degree/ Diploma to this or any other University.

Name of the learner

Title of the Project

Name of the guiding teacher

Wherever reference has been made to previous works of others, it has been clearly indicated as such and included in the bibliography.

I, here by further declare that all information of this document has been obtained and presented in accordance with academic rules and ethical conduct.

Name and Signature of the learner

Certified by
Name and signature of the Guiding Teacher

On separate page

Acknowledgment

(Model structure of the acknowledgement)

To list who all have helped me is difficult because they are so numerous and the depth is so enormous. I would like to acknowledge the following as being idealistic channels and fresh dimensions in the completion of this project.

I take this opportunity to thank the **University of Mumbai** for giving me chance to do this project.

I would like to thank my **Principal, _____**for providing the necessary facilities required for completion of this project.

I take this opportunity to thank our **Coordinator_____**, for her moral support and guidance.

I would also like to express my sincere gratitude towards my project guide _____ whose guidance and care made the project successful.

I would like to thank my **College Library**, for having provided various reference books and magazines related to my project.

Lastly, I would like to thank each and every person who directly or indirectly helped me in the completion of the project especially **myParents and Peers** who supported me throughout my project.

2. Guidelines for Internship based project work

- Minimum 20 days/ 100 hours of Internship with an Organisation/ NGO/ Charitable Organisation/ Private firm.
- The theme of the internship should be based on any study area of the elective courses
- Experience Certificate is Mandatory
- A project report has to be brief in content and must include the following aspects:
  - **Executive Summary:**

    A bird's eye view of your entire presentation has to be precisely offered under this category.
  - **Introduction on the Company:**

    A Concise representation of company/ organization defining its scope, products/ services and its SWOT analysis.
  - **Statement and Objectives:**

    The mission and vision of the organization need to be stated enshrining its broad strategies.
  - **Your Role in the Organisation during the internship:**

    The key aspects handled, the department under which you were deployed and brief summary report duly acknowledged by the reporting head.
  - **Challenges:**

    The challenges confronted while churning out theoretical knowledge into practical world.
  - **Conclusion:**

    A brief overview of your experience and suggestions to bridge the gap between theory and practice.
- The project report based on internship shall be prepared as per the broad guidelines given below:
  - Font type: Times New Roman
  - Font size: 12-For content, 14-for Title
  - Line Space : 1.5-for content and 1-for in table work
  - Paper Size: A4
  - Margin : in Left-1.5, Up-Down-Right-1
  - The Project Report shall be bounded.
  - The project report should be of minimum 50 pages

Evaluation pattern of the project work

The Project Report shall be evaluated in two stages viz.	
● **Evaluation of Project Report (Bound Copy)**	**60 Marks**
▪ Introduction and other areas covered	20 Marks
▪ Research Methodology, Presentation, Analysis and interpretation of data	30 Marks
▪ Conclusion& Recommendations	10 Marks
● **Conduct of Viva-voce**	**40 Marks**
▪ In the course of Viva-voce, the questions may be asked such as importance / relevance of the study, objective of the study, methodology of the study/ mode of Enquiry (question responses)	10 Marks
▪ Ability to explain the analysis, findings, concluding observations, recommendation, limitations of the Study	20 Marks
▪ Overall Impression (including Communication Skill)	10 Marks

Note:

- ***The guiding teacher along with the external evaluator appointed by the University/ College for the evaluation of project shall conduct the viva-voce examination as per the evaluation pattern***
- ***The plagiarism should be maintained as per the UGC guidelines.***

Passing Standard

- Minimum of Grade D in the project component
- In case of failing in the project work, the same project can be revised for ATKT examination.
- Absence of student for viva voce: If any student fails to appear for the viva voce on the date and time fixed by the department such student shall appear for the viva voce on the date and time fixed by the Department, such student shall appear for the viva voce only along with students of the next batch.

Note: 1) It is noted that the concerned regulation of the university is amended and implemented to all Semesters i.e. Semester I to Semester VI to all undergraduate programmes, simultaneously, under faculty of Arts, Commerce and Science with effect from the academic year 2019 - 2020.

2) This scheme of evaluation is discussed in detail, finalised and accepted.

Choice Based Credit System (CBCS)
F.Y. B.M.S. (Business Communication) Syllabus
To be implemented from the Academic year 2022-23
SEMESTER I

Course Code	Unit	Topics	Credits	Lectures
UCM1BC	I Theory of Communication	**1.Concept of Communication** Meaning, Definition, Process, Need, Feedback Importance of Communication in Corporate world **2.Channels and Objectives of Communication: Channels-** Formal and Informal- Vertical, Horizontal and Grapevine. **3.Objectives of Communication** Information, Order, Persuasion, Motivation, Warning, and Boosting the Morale of Employees **4.Methods and Modes of Communication** Methods: Verbal and Non-verbal, Characteristics of Verbal and Non-verbal Communication, Business Etiquette Technology Enabled Communication: Email, Fax, Video and Satellite Conferencing	03	15
	II Obstacles to Communication in Business World	**1.Problems in Communication /Barriers to Communication** Physical/ Semantic/Language / Socio-Culture/ Psychological / Barriers, Ways to Overcome these Barriers. **2.Listening** • Importance of Listening Skills, • Types of Listeners, Cultivating good Listening Skills – 4 **3.Introduction to Business Ethics** • Concept and Interpretation, Importance of Business Ethics, Personal Integrity at the workplace, Business Ethics and media, Corporate Social Responsibility.		15

		• Teachers can adopt a case study approach and address issues such as the following so as to orient and sensitize the student community to actual business practices: • Surrogate Advertising, Patents and Intellectual Property Rights, Dumping of Medical/E-waste, • Human Rights Violations and Discrimination on the basis of gender, race, caste, religion, appearance and sexual orientation at the workplace • Piracy, Insurance, Child Labour.		
	III Business Correspondence	**1. Theory of Business Letter Writing** • Parts, Structure, Layouts—Full Block, Modified Block, Semi - Block Principles of Effective Letter Writing, **2.Personnel Correspondence** • Statement of Purpose, Job Application Letter and Resume, Letter of Acceptance of Job Offer, Letter of Resignation, Letter of Appointment, Promotion and Termination, Letter of Recommendation.		**15**
	IV Language and Writing Skills	**1.Commercial Terms used in Business Communication** • **Paragraph Writing:** • **Blog Writing:** • **Advertising:** • **Activities** • Listening Comprehension • Remedial Teaching • Speaking Skills: Presenting a News Item, Dialogue and Speeches • Paragraph Writing: Preparation of the first draft, Revision and Self – Editing, Rules of spelling. • Reading Comprehension: Analysis of texts from the fields of Commerce and Management.		**15**

		Particles: • English language laboratory.		

Choice Based Credit System (CBCS)
F. Y. B.M.S (Business Communication) Syllabus
To be implemented from the Academic year 2022-23
SEMESTER II

Course Code	Unit	Topics	Credits	Lectures
UCM2BC	**I** **Group Communication**	**Interviews:** • Group Discussion Preparing for an Interview, Types of Interviews – Selection, Appraisal, Grievance, Exit **Meetings:** Need and Importance of Meetings, Conduct of Meeting and Group Dynamics Role of the Chairperson, Role of the Participants, Drafting of Notice, Agenda and Resolutions **Conference:** Meaning and Importance of Conference Organizing a Conference Advantages and Disadvantages of Conference in Business World **Public Relations:** Meaning, Functions of PR Department, External and Internal Measures of PR	**03**	**15**

	II Presentation Skills	**Presentations** • Principles of Effective Presentation • How to make a Power-Point Presentation • Public Speaking and its importance in corporate world		**15**
	III Business Correspondence	**Trade Letters:** Letters of Inquiry, Letters of Order, Letters of Complaints, Letters of Adjustments Letters of Sales Letters, Letter of RTI, Promotional leaflets and fliers Consumer Grievance Letters		**15**
	IV Language and Writing Skills	**Reports:** Parts, Types, Feasibility Reports, Investigative Reports. **Basics of Grammar:** Parts of speech and Tense. **Particles:** English language laboratory: Presentations, Mock Interview, Group Discussion	**03**	**15**

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29. Graves, Harold F. (1965) Report Writing, Prentice Hall, New Jersey.

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II ववववव ववववव ववववव II

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR ARTS, COMMERCE & SCIENCE COLLEGE, NEW PANVEL (AUTONOMOUS)

Re-accredited 'A+' Grade by NAAC
'College with Potential for Excellence' Status Awarded by UGC
'Best College Award' by University of Mumbai

Program: Bachelor's in Science (B. Sc.)

Credits: 132

SYLLABUS

(Approved in the Academic council meeting held on-26/07/2022)

F. Y. B. Sc. Chemistry

Revised as per
Choice Based Credit System (60:40)
w. e. f. Academic Year 2022-23

BACHELOR'S IN SCIENCE (B. Sc.)

Programme Outcomes

S. N.	After completion of B.Sc. program students will acquire	Graduate Attribute
PO1	The knowledge of the disciplines and in-depth and extensive knowledge, understanding and skills in a specific field of interest.	Disciplinary knowledge
PO2	An ability to develop and conduct experiments, analyze, and interpret data and use scientific judgment to draw conclusions	Scientific reasoning
PO3	An ability to use current technology, and modern tools necessary for creation, analysis, dissemination of information.	Digital literacy
PO4	Innovative, professional, and entrepreneurial skills needed in various disciplines of science.	Life-long learning
PO5	An ability to achieve high order communication skills.	Communication skills
PO6	An ability to collect, analyze and evaluate information and ideas and apply them in problem solving using conventional as well as modern approaches	Problem solving
PO7	A sense of social responsibility; intellectual and practical skills and demonstration of ability to apply it in real-world settings.	Reflective thinking
PO8	An ability to engage in independent and life-long learning through openness, curiosity, and a desire to meet new challenges.	Life-long learning
PO9	A capacity to relate, collaborate, and lead others, and to exchange views and ideas to work in a team to achieve desired outcomes	Teamwork
PO10	An ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	Leadership
PO11	An ability to understanding values, ethics, and morality in a multidisciplinary context.	Moral and ethical awareness

Preamble:

Bachelor of Science (B.Sc.) in Chemistry is an undergraduate course of Department of Chemistry, Changu Kana Thakur Arts, Commerce & Science College, New Panvel (Autonomous). The Choice Based Credit System to be implemented through this curriculum would allow students to develop a strong footing in the fundamentals and specialize in the disciplines of his/her liking and abilities.

This syllabus is prepared to give the sound knowledge and understanding of chemistry to undergraduate students at first year of the B.Sc. degree course. The goal of the syllabus is to make the study of Chemistry as stimulating, interesting and relevant as possible. The syllabus is prepared by keeping in mind the aim to make students capable of studying Chemistry in academic and industrial courses. Also to expose the students and to develop interest in them in various fields of Chemistry.

The new and updated syllabus is based on disciplinary approach with vigour and depth taking care of the syllabus is not heavy at the same time it is comparable to the syllabi of other universities at the same level. The students pursuing this course would have to develop understanding of various aspects of the chemistry. The conceptual understanding, development of experimental skills, developing the aptitude for academic and professional skills, obtaining basic ideas and understanding of hyphenated techniques, understanding the fundamental chemical processes and rationale towards application of knowledge are among such important aspects.

Semester - I
[Under CBCS Scheme]

Course	Course Type	Course code	Hrs/ week	Internal assessment	Semester-end examination	Total	Credits
Chemistry 1	Core	USC1CH1	3	40	60	100	2
Chemistry 2	Core	USC1CH2	3	40	60	100	2
Chemistry Practical	Core	USC1CHP	6	--	100	100	2
Environmental Science	Ability enhancement	USC1EVS	2	40	60	100	2

Semester - II
[Under CBCS Scheme]

Course	Course Type	Course code	Hrs/ week	Internal assessment	Semester-end examination	Total	Credits
Chemistry 1	Core	USC2CH1	3	40	60	100	2
Chemistry 2	Core	USC2CH2	3	40	60	100	2
Chemistry Practical	Core	USC2CHP	6	--	100	100	2
Communication Skill	Ability enhancement	USC2ECS	2	40	60	100	2

Examination Scheme

Choice Based Credit System (CBCS)

The performance of the learners shall be evaluated into two components. The learner's Performance shall be assessed by Internal Assessment with 40% marks in the first component and by conducting the Semester End Examinations with 60% marks in the second component. The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below –

A) Internal Assessment: 40 % 40 Marks
B) Semester End Examination: 60 % 60 Marks

A) Internal Assessment: 40 % 40 Marks

01	One periodical class test / online examination to be conducted in the given semester	20 Marks
02	Any two tools out of these (10 Marks each) 1. Group/ Individual Project 2. Presentation and write up on the selected topics of the subjects / Case studies. 3. Test on Practical Skills 4. Open Book Test 5. Quiz	20 arks

Question Paper Pattern for Periodical Class Test/ online examination--

- Maximum marks : 20
- Duration : 30 Minutes

Particular	Marks
Match the Column / Fill in the Blanks / Multiple Choice Questions/ True/False/Answer in One or Two Lines (Concept based Questions) (1 Marks each)	20 Marks

Question Paper Pattern for Semester End Examination

Semester End Examination: 60 % 60 Marks

- **Undergraduate Programmes of F. Y. B.Sc. (Sem. I & II)**
- Duration: The examination shall be of 2 hours duration.

Theory question paper pattern
1. There shall be four questions of 15 marks each (30 marks with internal options). 2. On each unit there will be one question and fourth question will be based on entire syllabus. 3. All questions shall be compulsory with internal options. 4. Question may be subdivided into sub-questions a, b, c… and the allocation of marks depends on the weightage of the unit.

Question Paper Pattern for Continuous Assessment
(Total Marks 20 to be converted in 10 marks)

Marks	Group Project*/ Individual Project	Presentation and write-up	Practical Skills	Open book test	Quiz
5	Hypothesis/Topic of the project	Presentation skill	Demonstration of skill	High order thinking questions (HOTS)	Quiz on application of subject in real life
5	Actual laboratory work/Field work	Knowledge	Viva		
5	Result/output	Quality of ppt	Report		
5	Dissertation/Report	Writing skill	Problem solving ability		

Note

Group Project*

1) Define number of students

2) Every student will get equal marks if the same contribution

3) if any student without any kind of involvement in the project, guide will take the decision on his share

Question Paper Pattern for Practical Examination

Semester End Practical Examination (100 Marks)

- Laboratory Work (70 Marks)
- Journal (10 Marks)
- Viva (20 Marks)

The practical examination will be held for 3.0 hrs.
The candidates will be examined practically and orally.

Course Discription	
Semester	**I**
Course Name	**Chemistry**
Course Code	**Paper-I - USC1CH1**
Eligibility for the Course	**12th Science of all recognizedBoard**
Credit	**2**
Hours	**45**

Course Objectives

- To construct and apply knowledge of chemistry, and appreciate therelationship between Chemistry and other disciplines.
- To promote understanding of basic facts and concepts in Chemistry while retaining the excitement of Chemistry.
- To enable students to understand Chemistry and its Industrial and Social Context.

Course Outcomes

COs. No.	After completing the course, students will be able to:	Bloom Taxonomy Level (BTL)
CO 1	Recall thermodynamics terms, the first law of thermodynamics and terms like normality, molarity.	Remember
CO 2	Solve the Numerical problems based on the Concentration of solutions	Apply
CO 3	Classify the elements according to electronic configuration and explain details of periodic trends and atomic structure.	Understand
CO 4	Explain the name, bonding and structure of organic compounds, bond fission, types of organic reactions and various electronic effects	Understand

Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
1	**1.1 Chemical Thermodynamics: (10L)** Thermodynamic terms: System, surrounding, boundaries, open, closed and isolated system, intensive and extensive properties, state functions and path functions, zeroth law of thermodynamics First law of thermodynamics: concept of heat (q), work (w), internal energy (U), statement of first law, enthalpy, relation between heat capacities, calculations of heat (q), work (w), internal energy (U) and enthalpy (H) (Numericals expected) Second law of thermodynamics and its different statements. Carnot's cycle, its efficiency and Carnot's Theorem (Heat engine) Concepts of entropy and free energy, spontaneity and physical significance of free energy. **1.2 Chemical Calculations: (5L)** Expressing concentration of solutions: Normality, molality, molarity, formality, mole fractions, weight ratio, volume ratio, weight to volume ratio, ppm, ppb, millimoles, milliequivalents (Numericals expected)	15h	2	2	1
2	**2.1 Atomic structure: (10L)** (Qualitative treatment only; it is expected that the learner knows the mathematical statements and understands their physical significance after completing this topic. No derivations of the mathematical equations required) a) Historical perspectives of the atomic structure; Rutherford's Atomic Model, Bohr's theory, its limitations And atomic spectrum of hydrogen atom. Structure of hydrogen atom. b) Hydrogenic atoms: Simple principles of quantum mechanics; 2. Atomic orbitals i) Hydrogenic energy levels ii) Shells, subshells and orbitals iii) Electron spin iv) Radial shapes of orbitals v) Radial distribution function vi) Angular shapes of orbitals 3. Many Electron Atoms	15h	3	1	4

	i) Penetration and shielding ii) Effective nuclear charge 4. Electrons filling rules in various orbitals: a) Aufbau principle b) Hund's rule of maximum multiplicity c) Pauli's exclusion principle **2.2 Periodic Table and Periodicity (5L)** Long form of Periodic Table; Classification for elements as main group, transition and inner transition elements; Periodicity in the following properties: Atomic and ionic size; electron gain enthalpy; ionization enthalpy, effective nuclear charge (Slater's rule); electronegativity; Pauling, Mulliken and Alred Rochow electronegativities (Numerical problems expected, wherever applicable.)				
3	**Basics of Organic Chemistry** **3.1** Introduction, General properties and applications of organic compounds in every days life **(1L)** **3.2 Classification and Nomenclature of organic compounds: (4L)** Review of basic rules of IUPAC nomenclature. Nomenclature of mono and bi-functional aliphatic compounds on the basis of priority order of the following classes of compounds: alkanes, alkenes, alkynes, haloalkanes, alcohols, ethers, aldehydes, ketones, carboxylic acids, carboxylic acid derivatives (acid halides, esters, anhydrides, amides), nitro compounds, nitriles and amines; including their cyclic analogues **3.3 Bonding and Structure of Organic compounds(4L)** Hybridization: sp^3, sp^2, sp hybridization of carbon and nitrogen; sp^3 and sp^2 hybridizations of oxygen in Organic compounds (alcohol, ether, aldehyde, ketone, carboxylic acid, ester, cyanide, amine and amide) Shapes of molecules; Influence of hybridization on bond properties (as applicable to ethane, ethene, ethyne) Bond dissociation energy, steric effect, Concept of tautomerism, Concept of hydrogen bonding **3.4 Fundamentals of organic reaction mechanism: (4L)** **Electronic Effects:** Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications; Dipole moment. Bond fission: Homolytic and Heterolytic fission with suitable examples. Electrophiles and Nucleophiles; Nucleophilicity and basicity. **Types (primary, secondary, tertiary, allyl, benzyl),**	15h	2	3	7

	shape and their relative stability of reactive intermediates: Carbocations, Carbanions and Free radicals. **3.5 Introduction to polymer chemistry: (2L)** Introduction, Basic concept, Classification of polymers, Properties of polymers, applications of polymers.				

Course Description	
Semester	**I**
Course Name	**Chemistry**
Course Code	**Paper-II- USC1CH2**
Eligibility for the Course	**12th Science of all recognizedBoard**
Credit	**2**
Hours	**45**

Course Objectives

- To expose the students to various emerging new areas of Chemistry and apprise them with their prevalent in their future studies and their applications in variousspheres of chemical sciences.
- To familiar students with chemistry of main group elements.
- To do the comparative study of carbides, nitrides, oxides and hydrides of group 1 and group 2 elements and some important compounds.
- To aware the students with important class of organic compounds with applications.

Course Outcomes

COs. No.	**After completing the course, students will be able to:**	**Bloom Taxonomy Level (BTL)**
CO 1	Explain the rules of integration , derivatives.	Apply
CO 2	Outline the metallic and non-metallic nature, oxidation states, electronegativity, Anomalous behaviour and allotropy of main group elements.	Understand
CO 3	Explain the reactivity of group 1 and group 2 elements and the effects of Oxides of carbon, sulfur and nitrogen on the environment.	Understand
CO 4	Define surface tension, Viscosity, Refractive index of Liquid, Order of reaction.	Remember

Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
1	**1.1 Chemical Kinetics: (7L)** Rate of reaction, rate constant, measurement of reaction rates, order and molecularity of reaction, integrated rate equation of first and second order reactions (with equal initial concentration of reactants) (Numericals expected) Determination of order of reaction by (a) Integration method (b) Graphical method (c) Ostwald's isolation method (d) Half time method (Numericals expected) **1.2 Mathematical Concept in Chemistry: (8L)** Graphical representation of equations: Rules for drawing graph co-ordinates etc., Equation of straight line, slope and intercept, plotting the graph from the data of chemical properties and problems. Derivative: Rules of differentiation (without proof), Algebraic, Logarithmic and exponential functions and numerical. Integration: rules of integration (without proof), Integration with limit, Algebraic, Logarithmic and exponential functions and numerical. Numerical related to Chemistry	15h	4	1	5,8
2	**2.1 Comparative chemistry of Main Group Elements: (15L)** Metallic and non-metallic nature, oxidation states, electronegativity, anomalous behaviour of second period elements, allotropy, catenation, diagonal relationship. Comparative chemistry of carbides, nitrides, oxides and hydroxides of group I and group II elements. Some important compounds- $NaHCO_3$, Na_2CO_3, NaCl, NaOH, CaO, $CaCO_3$ **2.2 Chemistry of Noble Gases** 1 Physical properties 2 Chemical properties 3 Clathrate compounds	15h	1	2	9
3	**Stereochemistry: (15)** Classification of isomer, IUPAC nomenclature of stereoisomers. Fischer Projection, Newman and Sawhorse Projection formulae (of erythro, threo isomers of tartaric acid and 2,3 dichlorobutane) and their interconversions; Geometrical isomerism in alkene and cycloalkanes:cis–trans and syn-anti isomerism E/Z notations with C.I.P. rules.	15h	2	1	8

	Optical Isomerism: Optical Activity, Specific Rotation, Chirality/Asymmetry, Enantiomers, Molecules with two similar and dissimilar chiral-centres, Distereoisomers, meso structures, racemic mixture and resolution (methods of resolution not expected). Relative and absolute configuration: D/L and R/S designations. Conformation analysis of alkanes (ethane, propane and n-butane); Relative stability with energy diagrams.				

Course Discription	
Semester	**I**
Course Name	**Chemistry**
Course Code	**Practical- USC1CHP**
Eligibility for the Course	**12th Science of all recognizedBoard**
Credit	**2**
Hours	**45**

Course Objectives

- To develop the practical skills in the students regarding the preparation of chemical solutions.
- To build the knowledge of important reagents, practical techniques in the students.
- To develop the knowledge of handlings chemical instruments used in the laboratory.

Course Outcomes

COs. No.	**After completing the course, students will be able to:**	**Bloom Taxonomy Level (BTL)**
CO 1	Find exact concentration of the solutions and enthalpy of dissolution.	Remember
CO 2	Apply chemical kinetics law to calculate the rate constant of the reaction.	Apply
CO 3	Find the normality of acids and bases and purity of samples gravimetrically.	Remember
CO 4	Apply Thin Layer Chromatographic (TLC), Distillation, Recrystallization, Sublimation methods for separation of a mixture.	Apply

Course Description		Hrs	CO No.	PSO No.	PO No.
	Physical chemistry 1. Standardization of solutions of two different concentration of KOH by using 0.1 N oxalic acid solution. 2 To determine the rate constant for the hydrolysis of ester using HCl as catalyst 3 To determine enthalpy of dissolution of salt (like KNO3) 4 Preparation of different normal and molar solutions (at least two). **Inorganic chemistry** **1.** Commercial analysis of a) Mineral acid–Sulphuric acid b) Organic acid **2.** Titration using double indicator: analysis of solution of Na2CO3 and NaHCO3. **3.** To determine the percent purity of sample of BaSO4 containing NH4Cl by gravimetrically. 4) To determine the percentage purity of given sample of ascorbic acid . **Organic Chemistry** Purification of Organic Compound compounds by 1. Recrystallization (02) (Benzoic acid, Acetanilide) 2. Sublimation (01) Phthalic anhydride to Phthalic acid 3. Distillation. (01) (Recording of M.P. & B.P.) Learners are expected to report a) Solvent for recrystallization. b) Mass and the M.P. & B.P. of purified compound. Learners should calibrate thermometer before determining melting point 2. Chromatography-- Separation of a mixture of o-and p-nitrophenols by thin layer chromatography (TLC)	6 hr	3	2	3,7

Course Discription	
Semester	**II**
Course Name	**Chemistry**
Course Code	**Paper-I – USC2CH1**
Eligibility for the Course	**12th Science of all recognised Board**
Credit	**02**
Hours	**45**

Course Objectives

- To develop problem solving skills in students.
- To make students capable of studying Chemistry in academic and Industrialcourses.
- To develop analytical skills and critical thinking through application of theoryknowledge into practical course
- To acquaint students with the fundamental Organic, Inorganic, Physical &Analytical Chemistry.

Course Outcomes

COs. No.	After completing the course, students will be able to:	Bloom Taxonomy Level (BTL)
CO 1	Explain deviations from ideal gas laws , Joule-Thomson effect and nanotechnology with the experimental setup.	Understand
CO 2	Define the equilibrium constant, Le-Chatelier Principle and the second law of thermodynamics.	Remember
CO 3	Discuss basic terms of co-ordination chemistry, qualitative analysis and acid-base theories	Understand
CO 4	Identify the products of reactions of alkanes, alkenes and alkynes	Apply

Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
1	**1.1 Gaseous State: (8L)** Ideal gas laws, kinetic theory of gases, Maxwell-Boltzmann's distribution of velocities (qualitative discussion), ideal gases, real gases, compressibility factor, Boyle's temperature (Numericals expected) Deviation from ideal gas laws, reasons for deviation from ideal gas laws, Van der Waals equation of state, Joule-Thomson effect: qualitative discussion and experimentation, inversion temperature. (Numericals expected) **1.2 Chemical Equilibria: (4L)** Reversible and irreversible reactions, law of mass action, dynamic equilibria, equilibrium constant, (Kc and Kp), relationship between Kc and Kp, Le Chatelier's principle, factors affecting chemical equilibrium (Numericals expected (4 L) **1.3 Nanochemistry: (3L)** Introduction, Definition of Nanochemistry, nanoparticles, Basic concept explanation., all types of nanoparticles.	15h	2	1	3
2	**2.1 Concept of Qualitative Analysis: (4L)** Precipitation equilibria, effect of common ions, uncommon ions, oxidation states, buffer action, complexing agents on precipitation of ionic compounds. (Balanced chemical equations and numerical problems expected.) **2.2 Coordination chemistry: (3L)** 1. Introduction to coordination compound 2. Terminology in coordination compound 3. Types of ligands **2.3 Acid Base Theories: (5L)** Arrhenius, Lowry- Bronsted, Lewis, Lux-Flood acid –base concept, Usanovich acid –base concept, Solvent – Solute concept of acids and bases, Hard and Soft acids and bases, Applications of HSAB **2.4 Chemistry of 3d series elements: (3L)** Introduction Characteristics of d-block elements with special reference to i) Electronic structure ii) Oxidation states iii) Magnetic character iv) Colored ions v) Complex formation.	15h	3	2	7,9
3	**Chemistry of Aliphatic Hydrocarbons** **3.1** Physical and chemical properties of alkane, alkene and alkynes : (1L) **3.2 Carbon-Carbon sigma bonds: (3L)**	15h	2	1	10

	Chemistry of alkanes: Formation of alkanes by Corey-House reaction, Sabatier-Sanderens reaction, and Reaction of alkanes- , Chlorination, Iodination, Nitration,Sulphonation, Combustion. **3.3 Carbon-Carbon pi bonds: (11L)** Formation of alkenes and alkynes by elimination reactions: Mechanism of E1, E2, E1cb, Saytzeff and Hofmann eliminations **Reactions of alkenes:** Electrophilic additions ,their mechanisms (Markownikoff/ Anti Markownikoff addition), Mechanism of oxymercuration-demercuration, hydroboration-oxidation, ozonolysis, Reduction (catalytic and chemical), syn and anti-hydroxylation (oxidation). 1, 2-and 1, 4- addition reactions in conjugated dienes and, Diels-Alder reaction; Allylic and benzylic bromination using N-bromosuccinimide and mechanism, e.g. propene, 1-butene, toluene, ethylbenzene. **Reactions of alkynes:** Acidity, Electrophilic and Nucleophilic additions. Alkylation of terminal alkynes.				

Course Discription	
Semester	**II**
Course Name	**Chemistry**
Course Code	**Paper-II-USC2CH2**
Eligibility for the Course	**12th Science of all recognised Board**
Credit	**02**
Hours	**45**

Course Objectives

- To construct the problem solving approach in the students.
- To build the skills in the students to apply their theory and practical knowledge in real life.
- to produce knowledge of various chemical reagents and their reactivity in industrial fields.

Course Outcomes

COs. No.	After completing the course, students will be able to:	Bloom Taxonomy Level (BTL)
CO 1	Classify between aromatic, anti-aromatic, and non-aromatic compounds.	Understand
CO 2	Write the mechanism of the Electrophilic aromatic substitution reaction.	Apply
CO 3	Identify the shapes of molecules with and without lone pair of electrons and the oxidation number of elements to balance the redox equations.	Apply
CO 4	Explain Law of crystallography, Different types of interaction of electromagnetic radiation with matter, Degree of ionization and Henderson equation for acidic and basic buffers.	Understand

Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
1	**1.1 Ionic Equilibria : (7L)** Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water, ionization of weak acids and bases, pH scale, common ion effect, dissociation constants of mono-, di- and triprotic acid (exact treatment for monoprotic acid) **Buffers:** Introduction, types of buffers, derivation of Henderson equation for acidic and basic buffers, buffer action, buffer capacity (Numericals expected) **1.2 Liquid State: (4L)** Surface tension: Introduction, methods of determination of surface tension by drop number method (Numericals expected) Viscosity: Introduction, coefficient of viscosity, relative viscosity, specific viscosity, reduced viscosity, determination of viscosity by Ostwald viscometer (Numericals expected) Refractive index: Introduction, molar refraction and polarizability, determination of refractive index by Abbe's refractometer (Numerical expected) **1.3 Solid State Chemistry (4L)** Types of solids, crystal lattice, lattice points, unit cell, space lattice and lattice plane, laws of crystallography: Law of constancy of interfacial angle, law of symmetry and law of rational indices	15h	4	3	6,9

	(Numericals expected)				
2	**2.1 Chemical Bond and Reactivity: (7L)** Types of chemical bond, comparison between ionic and covalent bonds, polarizability (Fajan's Rule), shapes of molecules, Lewis dot structure, Sidgwick Powell Theory, basic VSEPR theory for ABn type molecules with and without lone pair of electrons, isoelectronic principles, applications and limitations of VSEPR theory. **2.2 Oxidation Reduction Chemistry: (3L)** a) Reduction potentials b) Redox potentials: half reactions; balancing redox equations. c) Applications of redox chemistry: Metallurgy **2.3 General Principles of Metallurgy: (5L)** **i)** Introduction, occurrence of metals, ores and minerals, types of ores. **ii)** operations involved in metallurgy:- crushing, methods of concentration such as hand picking, gravity separation, Froth floatation, Calcinations, Roasting etc. **iii)** Reduction:- Auto reduction, Aluminothermic process and electrolytic reduction. **iv)** Refining of metals:- poling, liquation, electrolytic and vapour phase refining. i) Extraction of elements: (example: isolation of copper by auto reduction)	15h	2	1	3,7
3	**Aromatic Hydrocarbons: (15L)** Aromaticity: Hückel's rule anti-aromaticity, aromatic character of arenes, cyclic carbocations/carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft alkylation/acylation with their mechanism. Hammond's postulate, directing effects of the groups. Disadvantages of F&C acylation and alkylation reaction. Name reaction Involving Electrophilic aromatic substitution. Activating and deactivating groups Mono and Disubstituted compounds and their orienting effects the groups. Disadvantages of F&C acylation and alkylation reaction. Name reaction Involving Electrophilic aromatic substitution. Activating and deactivating groups Mono and Disubstituted compounds and their orienting effects.	15h	2	3	10

Course Discription	
Semester	**II**
Course Name	**Chemistry**
Course Code	**Practical - USC2CHP**
Eligibility for the Course	**12th Science of all recognised Board**
Credit	**02**
Hours	**45**

Course Objectives

- To develop practical skills of identification of organic compounds.
- To identify the compounds by performing chemical tests.
- To develop the skills of titrations in the students.

Course Outcomes

COs. No.	After completing the course, students will be able to:	Bloom Taxonomy Level (BTL)
CO 1	Apply chemical kinetics law to calculate the rate constant of reaction.	Apply
CO 2	Make use of colorimeter and pH meter.	Apply
CO 3	Identify cations and anions from the given mixture of compounds and percentage of metal present in the sample by titration.	Apply
CO 4	Identify organic compound containing C,H (O) N, S, X elements.	Apply

	Course Description	Hrs	CO No.	PSO No.	PO No.
	Physical Chemistry 1. Determination of viscosity of given liquid by viscometer. 2. To determine dissociation constant of weak acid (Ka) using Henderson's equation and the method of incomplete titration pH metrically. 3. To verify Beer-Lambert's law, using $KMnO_4$	6 h	2,4	2	3,8

	solution by colorimetric method. 4. To standardize commercial sample of HCl using borax and to write material safety data of the chemicals involved. **Inorganic Chemistry** **1. Qualitative analysis: (at least 3 mixtures to be analyzed)** Semi-micro inorganic qualitative analysis of a sample containing two cations and two anions. Cations (from amongst): Ba^{2+}, Ca^{2+}, Sr^{2+}, Cu^{2+}, Cd^{2+}, Fe^{2+}, Ni^{2+}, Mn^{2+}, Mg^{2+}, Al^{3+}, Cr^{3+}, K^{+},$NH4^{+}$ Anions (From amongst): $CO^{3\ 2-}$, S^{2-}, $SO^{3\ 2-}$, NO2 -, NO3 -, Cl^{-}, Br^{-}, I^{-}, $SO^{-4\ 2-}$, $PO^{-4\ 3-}$. (Scheme of analysis should avoid use of sulphide ion in any form for Precipitation / separation of cations.) **2. Redox Titration:** 1 . To determine the percentage of copper(II) present in a given sample by titration against a standard aqueous solution of sodium thiosulfate (iodometry titration) 2 Estimation of available chlorine in bleaching powder iodometrically. **Organic Chemistry** Characterization of monofunctional organic compound (solid, liquid) containing C, H, (O), N, S, X elements. (minimum 6 compounds) **Characteristic Reactions of following Test** 1. Test for unsaturation (KMnO4 and bromine water) 2. Test for acid 3) Test for phenol 4) Test for base 5) Test for nitrogen 6) Test for sulphur 7) Test for halogens 8. Functional groups test A) Alcohols B) Aldehyde and ketone C) Esters D) Primary aromatic amines E) Nitro/Dinitro F) Phenol G) Amide .				

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Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR ARTS, COMMERCE & SCIENCE COLLEGE, NEW PANVEL

(AUTONOMOUS)

Re-accredited 'A^{+}' Grade by NAAC

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'Best College Award' by University of Mumbai

Program: B. Sc.

Revised Syllabus of F.Y.B.Sc. Microbiology

Choice Based Credit, Grading and Semester System

w.e.f. Academic Year 2022-2023

PREAMBLE OF THE SYLLABUS

With the introduction of Academic autonomy by the esteemed Changu Kana Thakur Arts ,Commerce and Science College, New Panvel from the academic year 2019-2020, the existing syllabus of F.Y.B.Sc. Microbiology is restructured and revised according to the CBCGS pattern for its implementation from 2022-2023. This syllabus is prepared to make students more knowledge oriented in Microbiology subject. The new and updated syllabus is based on interdisciplinary approach with vigour and depth taking care of the syllabus which is not heavy for the F.Y.B.Sc. students. The contents have been drawn to accommodate the widening horizons of the Microbiology discipline. It reflects the changing needs of the students, pertaining to the fields of Bio-Chemistry, Bacterial taxonomy and Molecular Biology. The well-organized curriculum including basic as well as advanced concepts progressively from first year to the third year and shall inspire the students for pursuing higher studies in Microbiology and for becoming an entrepreneur and also enable students to get employed in the Microbiology subject based industries.

OBJECTIVES TO BE ACHIEVED:-

- To enrich students' knowledge and train them in the subject of Microbiology.
- To introduce the concepts of application and research in Microbiology.
- To inculcate sense of scientific, social responsibilities and environment awareness.
- To help students build-up a progressive and successful career.

F.Y.B.Sc Microbiology Syllabus (General Outline) Revised
for Choice Based Credit System
To be implemented from the Academic year 2022-23

	SEMESTER I	
Course Code	**Title**	**Credits**
USC1MI 1 Theory	**FUNDAMENTALS OF MICROBIOLOGY.**	**2 Credits (45 lectures)**
Unit-I	History, Introduction & Scope Of Microbiology, Biosafety In Microbiology	15 lectures.
Unit-II	Cell Organization of Prokaryotic and Eukaryotic Cell	15 lectures.
Unit-III	Macromolecules	15 lectures.
USC1MI 2 Theory	**BASIC TECHNIQUES IN MICROBIOLOGY.**	**2 Credits (45 lectures)**
Unit-I	Microscopy & Staining	15 lectures.
Unit-II	Bacterial Systematics ,Cultivation, Isolation & Preservation	15 lectures.
Unit-III	Control Of Microorganisms	15 lectures.
USC1MI P	**PRACTICALS**	**2 Credits**
	SECTION-1 FUNDAMENTALS OF MICROBIOLOGY. (Practical's Based On Unit-I,II & III Of USCMI 1	**1 Credit (45 lectures)**
	SECTION-2 BASIC TECHNIQUES IN MICROBIOLOGY. (Practical's Based On Unit-I,II & III Of USCMI 2	**1 Credit (45 Lectures)**
	SEMESTER II	
USC2MI-1 Theory	**BASICS OF MICROBIOLOGY.**	**2 Credits (45 Lectures)**
Unit-I	Study Of Different Groups Of Microbes-I	15 lectures.
Unit-II	Study Of Different Groups Of Microbes-II	15 lectures.
Unit-III	Microbial Growth	15 lectures.
USC2MI-2 Theory	**EXPLORING MICROBIOLOGY.**	**2 Credits (45 Lectures)**
Unit-I	Microbial Interactions	15 lectures.
Unit-II	Microbes & Human Health	15 lectures.
Unit-III	Advance Techniques In Microbiology & Instrumentation	15 lectures.
USC2MIP	**PRACTICALS**	**2 Credits**
	SECTION-1 BASICS OF MICROBIOLOGY. (Practical's Based On Unit-I,II & III Of USCMI 1	**1 Credit (45 Lectures)**
	SECTION-2 EXPLORING MICROBIOLOGY. (Practical's Based On Unit-I,II & III Of USCMI 2	**1 Credit (45Lectures)**

F.Y.B.Sc Microbiology: Detail Syllabus Revised for Credit Based Semester & Grading System to be implemented from the academic year 2022-23

Bachelor of Science in Microbiology Duration: Six Semesters			
	SEMESTER I		
Course Code	**Title**	**Credits**	Notional Periods
USC1MI-1 Theory	**FUNDAMENTALS OF MICROBIOLOGY.**	**2 Credits (45 lectures)**	Self Study (45)
Unit-I	**<u>History, Introduction & Scope Of Microbiology, Biosafety in Microbiology</u>** **1.1 History,Introduction & Scope Of Microbiology:** a. Discovery of microorganisms b. Conflict over spontaneous generation c. Golden Age Of Microbiology-Koch Postulate, Medical Microbiology, Immunology d. Development of industrial microbiology and microbial ecology e. Scope and relevance of microbiology f. Future of microbiology **1.2 Biosafety In Microbiology:.** a. Means of laboratory infection b. Potentially hazardous procedures c. Responsibility d. Risk Assessment e. Restricted access f. Safety equipments g. Immunization and medical records h. Training of personnel i. Laboratory procedures j. Levels of Containment	(10 Lectures) (05 Lectures)	**15**

Unit-II	**<u>Cell Organization of Prokaryotic and Eukaryotic Cell</u>** **2.1 Prokaryotic Cell Organization:** a. Cell size, shape and arrangement, glycocalyx, capsule, flagella, endoflagella, fimbriae and pili. b. Cell-wall: Composition and detailed structure of Gram-positive and Gram-negative cell walls, Archaebacterial cell wall, Gram and acid fast staining mechanisms, lipopolysaccharide (LPS), sphaeroplasts, protoplasts, and L-forms. Effect of antibiotics and enzymes on the cell wall. c. Cell Membrane: Structure, function and chemical composition of bacterial and archaeal cell membranes. d. Cytoplasm: Ribosomes, Mesosomes, Inclusion bodies, Nucleoid, Chromosome and Plasmids Endospore: Structure, formation, stages of sporulation. **2.2 Eukaryotic Cell Organization:** a. Overview of Eukaryotic cell structure b. The plasma membrane and membrane structure c. Mitochondria d. Chloroplasts e. Nucleus –Nuclear Structure f. External Cell Coverings: Cilia And Flagella g. Comparison Of Prokaryotic And Eukaryotic Cells	(12 Lectures) (03 Lectures)	**15**
Unit-III	**<u>Macromolecules</u>** **3.1Chemical foundations**: a. Biomolecules as compounds of carbon with a variety of functional groups. b. Universal set of small molecules. c. Macromolecules as the major constituents of cells. d. Configuration and Conformation with definitions and suitable examples only. e. Types of Stereoisomers and importance of stereoisomerism in biology. f. Types of bonds and their importance: Electrovalence, covalent, ester, phosphodiester, thioester, peptide, glycosidic **3.2 Water- Structure, properties in brief.** **3.3Carbohydrates**: Definition, Classification, Biological role. Monosaccharides, oligosaccharides (maltose, cellobiose, sucrose, lactose) and polysaccharide (starch, glycogen, peptidogycan, cellulose) **3.4 Lipids:**	(05 Lectures)	**15**

	Fatty acids as basic component of lipids and their classification (Lehninger), nomenclature, storage lipids and structural lipids.Types of lipids with general structure of each and mention examples. **3.5 Amino acids& proteins:** General structure and features of amino acids (emphasis on amphoteric nature) Classification by R-group, Uncommon amino acids and their functions Peptides and proteins- Definition and general features and examples with biological role. Primary, secondary, tertiary, quaternary structures of proteins- Brief outline. **3.6 Nucleic acids**: Nitrogenous bases- Purines , Pyrimidines Pentoses-Ribose, Deoxyribose, Nomenclature of Nucleosides and nucleotides, N-β-glycosidic bond, polynucleotide chain to show bonding between nucleotides (Phosphodiester bonds). Basic structure of RNA and DNA.	(10 Lectures)	
USC1MI-2 Theory	**BASIC TECHNIQUES IN MICROBIOLOGY.**	**2 Credits (45 lectures)**	Self Study (45)
Unit-I	**<u>Microscopy & Staining</u>** **1.1 Microscopy:** History of microscopy, Optical spectrum, Lenses and mirrors: Simple and compound light microscope, Dark field Microscopy, Phase contrast **1.2 Staining procedures** a. Dyes and stains: Types, Physicochemical basis Fixatives, Mordants, Decolorizers b. Simple and differential staining c. Special staining (Cell wall, Capsule, Lipid granules ,Spores, Metachromatic granules & Flagella)	(08 Lectures) (07 Lectures)	**15**

Unit-II	**<u>Bacterial Systematics, Cultivation, Isolation& Preservation</u>** **2.1 Bacterial Systematics** **No. of Hours: 8** Aim and principles of classification, systematics and taxonomy, concept of species, taxa, strain; conventional, molecular and recent approaches to polyphasic bacterial taxonomy, evolutionary chronometers, rRNA oligonucleotide sequencing, signature sequences, and protein sequences. Differences between eubacteria and archaebacteria **2.2** Isolation of microorganisms and pure culture Techniques **2.3** Preservation of microorganisms **2.4** Culture Collection Centers	(12 Lectures) (03 Lectures)	**15**

Unit-III	**<u>Control Of Microorganisms</u>** **2.1 Definition** of frequently used terms & Rate of microbial death,Factors affecting the effectiveness of antimicrobial agents & Properties of an ideal disinfectant **2.2 Evaluation of disinfectant** –Tube dilution & Agar plate techniques, Phenol coefficient , Tissue toxicity index **2.3 Physical methods of microbial control** a. Dry & moist heat – mechanisms, instruments used and their operations b. Electromagnetic radiations – Ionizing radiations, mechanisms –advantages & disadvantages c. Bacteria proof filters d. Low temperature e. Osmotic pressure f. Desiccation **2.4 Chemical methods of microbial control** - mechanism & advantages & disadvantages (if any) applications. a. Phenolics b. Alcohols c. Heavy metals and their compounds d. Halogens e. Quaternary ammonium compounds f. Halogens g. Dyes h. Surfaces active agents/Detergents i. Aldehydesp j. Peroxygens **k.** Sterilizing gases	(08 Lectures) (07 Lectures)	**15**

	2.5 Chemotherapeutic agents - List types of agents active against various groups & mention the site of action(Detailed mode of action not to be done)		
USC1MIP	**PRACTICALS**	**2 Credits**	Notional Periods
	SECTION-1 FUNDAMENTALS OF MICROBIOLOGY.	**1 Credit (45 lectures)**	Self Study (45)
Unit-I	1. Assignment : Contribution of Scientists in the field of Microbiology **2.** Special staining: Cell wall, capsule, endospore, flagella, lipid, metachromatic granules.		
Unit-II	3. Handling corrosive chemical using rubber teat method for pipetting. Prevention of mouth pipetting and use of auto-pipettes. 4. Discard of highly infectious pathogenic samples like T.B, sputum etc. 5. Explain safety inoculation hood for infection inoculations and laminar air flow. 6. On accidental spillage of/ breakage of culture containers-precautions to be taken. 7. Demonstration of microbes in air, cough, on table surface, finger tips. 8. Permanent slides of Eukaryotes & its organelles:		
Unit-III	9. Qualitative detection : 10. Carbohydrates- Benedicts, Molisch's test. 11. Proteins, amino acids- Biuret, Ninhydrin.		
	SECTION-2 BASIC TECHNIQUES IN MICROBIOLOGY.	**1 Credit (45 lectures)**	Self Study (45)
Unit-I	1. Parts of a microscope. 2. Monochrome and differential staining procedures, Gram staining& Negative Staining.		

Unit-II	3. Introduction to Laboratory equipments, disinfection & discarding techniques in laboratory 4. Methods of preparation of glassware for Sterilization 5. (Pipettes, Petri Plates, Plastic wares, Flasks, Micropipettes, microtitre plates) & Control of microorganisms using moist heat & dry heat sterilization (Sterilization of Dry powders, Rubber gloves, Bandages, Screw capped tubes, Sterilizable plasticwares) 6. Effect of UV Light, Heavy metals(Oligodynamic action) 7. Effect of dyes, phenolic compounds and chemotherapeutic agents(disc inhibition method) 8. Evaluation of Disinfectant by Coupon Method 9. Case study on identification of microbial species by using Bergey's Manual.		
Unit-III	10. Preparation of Culture Media: a. Liquid medium(Nutrient Broth) b. Solid Media(Nutrient agar,Sabourauds agar) c. Preparation of slant ,butts & plates 11. Inoculation techniques and Study of Growth: a. Inoculation of Liquid Medium b. Inoculation of Solid Media(Slants, Butts and Plates) c. Study of Colony Characteristics of pigment & non- pigment producing bacteria. d. Study of Motility (Hanging Drop Preparation) 12. Use of Differential & Selective Media: (MacConkey , Salt Mannitol Agar & Cetrimide agar) 13. Determination of Optimum growth conditions: a)Temperature, b) pH		

	SEMESTER II		
Course Code	**Title**	**Credits**	**Notional Periods**
USC2MI-1 Theory	**BASICS OF MICROBIOLOGY.**	**2 Credits (45 lectures)**	Self Study (45)
Unit-I	**<u>Study Of Different Groups Of Microbes-I:</u>** **1.1 Nature and Properties of Viruses** **No. of Hours: 12** Introduction: Discovery of viruses, nature and definition of viruses, general properties, conceptof viroids, virusoids, satellite viruses and Prions. Theories of viral origin Structure of Viruses: Capsid symmetry, enveloped and non-enveloped viruses Isolation, purification and cultivation of viruses Viral taxonomy: Classification and nomenclature of different groups of viruses **1.2 Ricketssia, Coxiella, Chlamydia,Mycoplasma:** general features, medical significance **1.3 Actinomycetes**: General features of *Nocardia* species and *Streptomyces* species Importance: ecological, commercial and medical	(12 Lectures) (03 Lectures)	**15**
Unit-II	**<u>Study Of Different Groups Of Microbes-II:</u>** Classification, Morphological characteristics, cultivation, reproduction and significance **2.1 Protozoa-** Major Categories of Protozoa Based on motility, reproduction. Medically important Protozoa Life cycle of Entamoeba **2.2 Algae -** Characteristicsof algae: morphology, Pigments, reproduction Cultivation of algae. Major groups of Algae –an overview.Biological,Medical and economic importance of Algae. Differences between Algae and Cyanobacteria **2.3 Fungi and Yeast-**Characteristics: structure, Reproduction.Cultivation of fungi and yeasts. Major fungal divisions- overview. Life cycle of yeast,Biological and economical importance **2.4 Slime molds and Myxomycetes**	(12 Lectures) (03 Lectures)	**15**

Unit-III	**Microbial Growth:** **3.1** Nutritional requirements – Carbon, Oxygen, Hydrogen, Nitrogen, Phosphorus, Sulfur and growth factors. **3.2** Nutritional types of microorganisms **3.3** Definition of growth, Mathematical Expression, Growth curve a. Measurement of growth b. Direct microscopic count – Breed's count, Petroff – Hausser Counting chamber- Haemocytometer. c. Viable count – Spread plate and Pour plate technique d. Measurements of cell constituents. e. Turbidity measurements – Nephelometer and spectrophotometer techniques f. Synchronous growth, Continuous growth (Chemostat and Turbidostat) g. Influence of environmental factors on growth. h. Microbial growth in natural environment. i. Counting viable non-culturable organisms-Quorum sensing techniques	. (03 Lectures) (12 Lectures)	**15**
USC2MI-2 Theory	**EXPLORING MICROBIOLOGY.**	**2 Credits (45 lectures)**	Self Study (45)
Unit-I	**Important archaeal and eubacterial groups** (*Nanoarchaeum*), Crenarchaeota (*Sulfolobus*, *Thermoproteus*) and Euryarchaeota [Methanogens (*Methanobacterium*, *Methanocaldococcus*), thermophiles (*Thermococcus*, *Pyrococcus*, *Thermoplasma*), and Halophiles (*Halobacterium, Halococcus*)] **Eubacteria:** Morphology, metabolism, ecological significance and economic importance of following groups: ***Gram Negative:*** Non proteobacteria: General characteristics with suitable examples Alpha proteobacteria: General characteristics with suitable examples Beta proteobacteria: General characteristics with suitable examples Gamma proteobacteria: General characteristics with suitable examples Delta proteobacteria: General characteristics with suitable examples	. (08 Lectures) (07 Lectures)	**15**

	Epsilon proteobacteria: General characteristics with suitable examples Zeta proteobacteria: General characteristics with suitable examples ***Gram Positive:*** Low G+ C (Firmicutes): General characteristics with suitable examples High G+C (Actinobacteria): General characteristics with suitable examples ***Cyanobacteria*:** An Introduction		
Unit-II	**Microbes & Human Health:** **2.1 Difference between infection & disease.** Important terminology: Primary infection, secondary infection.Contagious infection, occupational disorder, clinical infection,subclinical infection, Zoonoses,genetic disorder, vector borneinfection,virulence,pathogen & herd immunity. **2.2 Factors affecting infection:** Microbial factors: adherence, invasion, role of virulence factors in invasion,microbial enzymes & toxins, bacterial colonization & its effects. Host factors: natural resistance, species resistance, racial resistance. **2.3 Individual resistance**: Factors influencing individual resistance: Age, nutrition, personal hygiene, stress, hormones, Addiction to drugs/ alcohol. Interaction between Microbes & host is dynamic. **2.4 Host defense against infection: Overview** i) First line of Defence: for skin, respiratory tract, gastrointestinal tract, genitourinary tract, eyes. ii) Second line of defence: Biological barriers: Phagocytosis,Inflammation **iii)** Third line of defence: Brief introduction to antibody mediated & cell mediated immunity.	. (07 Lectures) (08 Lectures)	**15**
Unit-III	**Advance Techniques In Microbiology & Instrumentation:** **3.1** Electron Microscope:TEM,SEM, **3.2** Contrast enhancement for electron microscope **3.3**Fluorescent Microscope, Confocal Microscope **3.4**pH meter ,pH meter Validation and calibration **3.5**Colorimeter **3.6**Validation and calibration of Autoclave & Hot air Oven **3.7**Concepts :Laminar air flow systems, Biosafety cabinets , Walk in Incubators, Industrial autoclaves,Cold Room.	(08 Lectures) (07 Lectures)	**15**

USC2MIP	**PRACTICALS**	**2 Credits**	
	SECTION-1 **BASICS OFMICROBIOLOGY.**	**1 Credit (45 lectures)**	Self-Study (45)
Unit-I	1. Spot assay and plaque assay of Bacteriophage (Demonstration) 2. Slide Culture technique (Actinomycetes & Fungal Culture)		
Unit-II	3.Isolation of yeast, cultivation of other fungi Cultivation on Sabourauds agar		
	4. Static & Shaker Cultures. *5.* Fungal Wet mounts & Study of Morphological Characteristics: Mucor,Rhizopus,Aspergillus*,* *Penicillium.* 6. Permanent slides of Algae, Protozoa		
Unit-III	7. Growth curve (Demonstration) only in complex media. 8.Breed's Count 9.Haemocytometer 10. Viable count: Spread plate and pour plate 11.Brown's opacity 12.Effect of pH and temperature on growth 13.Measurement of cell dimensions-Micrometry		
	SECTION-2 EXPLORING MICROBIOLOGY.	**1 Credit (45 lectures)**	Self Study (45)
Unit-I	1. Normal flora of the Skin & Saliva 2. Isolation of Thermophiles and Halophiles. 3. Bacteroid Staining & Isolation of *Rhizobium* 4. *Azotobacter* isolation & staining		
Unit-II	6.Study of virulence factors – Enzyme Coagulase 7.Study of virulence factors – Enzyme Hemolysin 8.Study of virulence factors – Enzyme Lecithinase		

Unit-III	9. Use of standard buffers for calibration and determination of pH of a given solution 10. Determination of λR_{max} & Verification of Beer Lambert's law 11. Determination & efficiency of Autoclave, Hot air oven , LAF 12. Writing of SOP's for Instruments 13. Visit to a Central Instrumentatin laboratory of college.		

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2. A.J.Salle, Fundamental Principles of Bacteriology,McGraw Hill Book Company Inc.1984
3. Cruikshank, Medical Microbiology , Vol -II
4. Prescott ,Hurley.Klein-Microbiology, 5th & 6th edition, International edition 2002 & 2006, McGraw Hill.
5. Michael T.Madigan & J.M.Martin,Brock ,Biology of Microorganisms 11th Ed. International edition ,2006, Pearson Prentice Hall.

6. Ananthanarayan And Paniker, Textbook Of Microbiology,10th edition ,2013,University Press Hyderabad.

MODALITY OF ASSESSMENT:-

Theory Examination Pattern

Choice Based Credit System (CBCS)

Revised Scheme of Examination

The performance of the learners shall be evaluated into two components. The learner's Performance shall be assessed by Internal Assessment with 40% marks in the first component by conducting the Semester End Examinations with 60% marks in the second component. The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below:-

A) Internal Assessment: 40 **%** **40 Marks**

Sr. No.	Particular	Marks
01	One periodical class test / online examination to be conducted in the given semester	20 Marks
02	Any two tools out of these (10 Marks each) 1. Group/ Individual Project 2. Presentation and write up on the selected topics of the subjects / Case studies. 3. Test on Practical Skills 4. Open Book Test 5. Quiz	20 Marks

Question Paper Pattern

(Periodical Class Test/ online examination for the Courses at Under Graduate Programmes)

- Maximum Marks: 20
- Duration: 30 Minutes

Particular	Marks
Match the Column / Fill in the Blanks / Multiple Choice Questions/ True/False/Answer in One or Two Lines (Concept based Questions) (1 Marks each)	20 Marks

B) Semester End Examination: 60 % **60 Marks**

- **Undergraduate Programmes of F. Y. B.Sc. (Sem. I & II)**

Duration: The examination shall be of 2 hours duration.

Question Paper Pattern

Theory question paper pattern
1. There shall be Four questions of 15 Marks each (30 marks with internal options). 2. On each unit there will be one question and fourth question will be based on entire syllabus. 3. All questions shall be compulsory with internal options. 4. Question may be subdivided into sub-questions a, b, c… and the allocation of marks depends on the weightage of the unit.

Passing Standard

The learners to pass a course shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment and Semester End Examination. The learners shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 24 Out of 60) separately, to pass the course and minimum of Grade D, wherever applicable, to pass a particular semester. A learner will be said to have passed the course if the learner passes the Internal Assessment and Semester End Examination together.

PRACTICAL EXAMINATION PATTERN

Sr.No.	Particulars	Marks		Total
1.	Laboratory work (Section-I + Section-II)	35 + 35	=	70
2.	Journal	05 + 05	=	10

3.	**Viva**	**05 + 05 = 10**
4.	**Assignment/Visit report/Case study/SOP writing/Quiz**	**05 + 05 = 10**

PRACTICAL BOOK/JOURNAL

Semester I

The students are required to present a duly certified journal for appearing at the practical examination, failing which they will not be allowed to appear for the examination.
In case of loss of Journal and/ or Report, a Lost Certificate should be obtained from Head/ Co-Ordinator / Incharge of the department; failing which the student will not be allowed to appear for the practical examination.

Semester II

The students are required to present a duly certified journal for appearing at the practical examination, failing which they will not be allowed to appear for the examination.

In case of loss of Journal and/ or Report, a Lost Certificate should be obtained from Head/ Co-ordinator / Incharge of the department; failing which the student will not be allowed to appear for the practical examination.

Overall Examination and Marks Distribution Pattern

Semester I

Course	USC1MI-1	USC1MI-2	Grand Total
Theory	100 02 Credits	100 02 Credits	200 04 Credits
Practical's	50 02 Credits	50 02 Credits	100 04 Credits
Total Marks	150	150	300
Total Credits	04 Credits	04 Credits	08 Credits

Semester II

Course	USC2MI-1	USC2MI-2	Grand Total
Theory	100 02 Credits	100 02 Credits	200 04 Credits

Practical's	**50** **02 Credits**	**50** **02 Credits**	**100** **04 Credits**
Total Marks	**150**	**150**	**300**
Total Credits	**04 Credits**	**04 Credits**	**08 Credits**

II विद्या विनयेन शोभते II

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR
ARTS, COMMERCE & SCIENCE COLLEGE, NEW PANVEL
(AUTONOMOUS)

Re-accredited 'A+' Grade by NAAC
'College with Potential for Excellence' Status Awarded by UGC
'Best College Award' by University of Mumbai

Program: Bachelor's in Science (B. Sc.)

Credits: 132

SYLLABUS

(Approved in the Academic council meeting held on 12th April 2022)

F. Y. B. Sc. ZOOLOGY

Revised as per
Choice Based Credit System (60:40)
w. e. f. Academic Year 2022-23

BACHELOR'S IN SCIENCE (B. Sc.)

Programme Outcomes

S. N.	After completion of B.Sc. program students will acquire	Graduate Attribute
PO1	The knowledge of the disciplines and in-depth and extensive knowledge, understanding and skills in a specific field of interest.	Disciplinary knowledge
PO2	An ability to develop and conduct experiments, analyze, and interpret data and use scientific judgment to draw conclusions	Scientific reasoning
PO3	An ability to use current technology, and modern tools necessary for creation, analysis, dissemination of information.	Digital literacy
PO4	Innovative, professional, and entrepreneurial skills needed in various disciplines of science.	Life-long learning
PO5	An ability to achieve high order communication skills.	Communication skills
PO6	An ability to collect, analyze and evaluate information and ideas and apply them in problem solving using conventional as well as modern approaches	Problem solving
PO7	A sense of social responsibility; intellectual and practical skills and demonstration of ability to apply it in real-world settings.	Reflective thinking
PO8	An ability to engage in independent and life-long learning through openness, curiosity, and a desire to meet new challenges.	Life-long learning
PO9	A capacity to relate, collaborate, and lead others, and to exchange views and ideas to work in a team to achieve desired outcomes	Teamwork
PO10	An ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	Leadership
PO11	An ability to understanding values, ethics, and morality in a multidisciplinary context.	Moral and ethical awareness

PREAMBLE OF THE SYLLABUS:

The ongoing B.Sc. (CBCGS) Zoology course was introduced by the Faculty of Sciences from the academic year 2022-2023. The new course of F.Y.B.Sc. Zoology that will be effective from the academic year 2019- 2020, will follow the Semester mode. It has been prepared keeping in view the unique requirements of B.Sc. (CBCGS) Zoology students. The syllabus has been drawn up to introduction of the classical zoology with accommodation of widening horizons of the discipline of Biological Sciences. The Board of Studies examined the existing syllabus and after analysing with respective subjects in term of content relevance, quality and pattern of teaching along with examination in present scenario. With the holistic approach the syllabus including basic as well as advanced concepts in Zoology from first year to third year shall inspire the students for pursuing higher studies in Zoology and for becoming an entrepreneur and also enable students to get employed in the biological research Institutes, Industries, Educational Institutes and in the various concerning departments of State and Central Government based on subject Zoology.

Semester - I

[Under CBCS Scheme]

Course	Course Type	Course code	Hrs/ week	Internal assessment	Semester-end examination	Total	Credits
Chemistry 1	Core		3	40	60	100	2
Chemistry 2	Core		3	40	60	100	2
Physics1	Core		3	40	60	100	2
Physics 2	Core		3	40	60	100	2
Mathematics1	Core		3	40	60	100	2
Mathematics 2	Core		3	40	60	100	2
Microbiology 1	Core		3	40	60	100	2
Microbiology 2	Core		3	40	60	100	2
Zoology 1	Core		3	40	60	100	2
Zoology 2	Core		3	40	60	100	2
Botany 1	Core		3	40	60	100	2
Botany 2	Core		3	40	60	100	2
Foundation Course/ Foundation course in PE/NSS/ NCC	Skill enhancement		3	40	60	100	2
Environmental Science	Ability enhancement		2	40	60	100	2
Chemistry Practical	Core		6	--	100	100	2
Physics Practical	Core		6	--	100	100	2
Mathematics Practical	Core		3	--	100	100	2
Microbiology Practical	Core		6	--	100	100	2
Zoology Practical	Core		6	--	100	100	2
Botany Practical	Core		6	--	100	100	2

Semester - II

[Under CBCS Scheme]

Course	Course Type	Course code	Hrs/ week	Internal assessment	Semester-end examination	Total	Credits
Chemistry 1	Core		3	40	60	100	2
Chemistry 2	Core		3	40	60	100	2
Physics1	Core		3	40	60	100	2
Physics 2	Core		3	40	60	100	2
Mathematics1	Core		3	40	60	100	2
Mathematics 2	Core		3	40	60	100	2
Microbiology 1	Core		3	40	60	100	2
Microbiology 2	Core		3	40	60	100	2
Zoology 1	Core		3	40	60	100	2
Zoology 2	Core		3	40	60	100	2
Botany 1	Core		3	40	60	100	2
Botany 2	Core		3	40	60	100	2
Foundation Course/ Foundation course in PE/NSS/ NCC	Skill enhancement		3	40	60	100	2
Communication Skill	Ability enhancement		2	40	60	100	2
Chemistry Practical	Core		6	--	100	100	2
Physics Practical	Core		6	--	100	100	2
Mathematics Practical	Core		6	--	100	100	2
Microbiology Practical	Core		6	--	100	100	2
Zoology Practical	Core		6	--	100	100	2
Botany Practical	Core		6	--	100	100	2

Course Description	
Semester	**I & II**
Course Name	**Zoology**
Course Code	**USCZ1P/ USCZ2P**
Eligibility for the Course	**12th Science passed**
Credit	**6**
Hours	**90 Hrs**

Scheme of Examination
Faculty of Science
(Undergraduate Programmes)

Choice Based Credit System (CBCS)

- **Revised Scheme of Examination**

The performance of the learners shall be evaluated into two components. The learner's Performance shall be assessed by Internal Assessment with 40% marks in the first component by conducting the Semester End Examinations with 60% marks in the second component. The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below: -

A) Internal Assessment: 40 **%** **40 Marks**

Sr. No.	Particular	Marks
01	One periodical class test / online examination to be conducted in the given semester	20 Marks
02	Any two tools out of these (10 Marks each) 1. Group/ Individual Project 2. Presentation and write up on the selected topics of the subjects / Case studies. 3. Test on Practical Skills 4. Quiz	20 Marks

Question Paper Pattern
(Periodical Class Test/ online examination for the Courses at Under Graduate Programmes)

- Maximum Marks: 20
- Duration: 30 Minutes

Particular	Marks
Match the Column / Fill in the Blanks / Multiple Choice Questions/ True/False/Answer in One or Two Lines (Concept based Questions) (1 Marks each)	20 Marks

B) Semester End Examination: 60 % **60 Marks**

- **Undergraduate Programmes of F. Y. B.Sc. (Sem. I & II) and S. Y. B.Sc. (Sem. III & IV)**
  - Duration: The examination shall be of 2 hours duration.

Question Paper Pattern

Theory question paper pattern
1. There shall be four questions of 15 marks each (30 marks with internal options). 2. On each unit there will be one question and fourth question will be based on entire syllabus. 3. All questions shall be compulsory with internal options. 4. Question may be subdivided into sub-questions a, b, c… and the allocation of marks depends on the weightage of the unit.

- **Undergraduate Programmes of T. Y. B.Sc. (Sem. V & VI)**
  - Duration: The examination shall be of 2 hours duration.

Question Paper Pattern

Theory question paper pattern
1. There shall be five questions each of 12 marks (24 marks with internal options). 2. On each unit there will be one question and fifth question will be based on entire syllabus. 3. All questions shall be compulsory with internal options. 4. Question may be subdivided into sub-questions a, b, c… and the allocation of marks depends on the weightage of the unit.

- **Passing Standard**

The learners to pass a course shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment and Semester End Examination. The learners shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 24 Out of 60) separately, to pass the course and minimum of Grade D, wherever applicable, to pass a particular semester. A learner will be said to have passed the course if the learner passes the Internal Assessment and Semester End Examination together.

- **Evaluation pattern of the project work (50 Marks)**
  Student would undertake a project for 1-2 months during the semester.

Sr. No.	Particular		Marks
01	Project		50 Marks
	Documentation	25 Marks	
	Presentation	15 Marks	
	Viva	10 Marks	

- ***The plagiarism should be maintained as per the UGC guidelines.***

Note: As per previous ordinance there will not be any internal examination for practical.

Note: 1) It is noted that the concerned regulation of the College is amended and implemented to all Semesters i.e. Semester I to Semester VI to all undergraduate programmes, under faculty of Arts, Commerce and Science with effect from the academic year 2022 - 2023.

2) This revised scheme of evaluation is discussed in detail, finalised and accepted

Question Paper Pattern for Semester End Examination

I	**Theory: 60 Marks**	
	Each theory paper shall be of two-hour duration.	
	All questions are compulsory and will have internal options.	
	Q-1	From Unit – I (having internal options.) 15 M
	Q-2	From Unit – II (having internal options.) 15 M
	Q-3	From Unit – III (having internal options.) 15M
	Q-4	Questions from all the THREE Units with equal weightage of marks Allotted to each Unit. 15 M

Question Paper Pattern for Continuous Assessment (Total Marks 20 to be converted in 10 marks)

Marks	**Group Project*/ Individual Project**	**Presentation and write-up**	**Practical Skills**	**Open book test**	**Quiz**
5	Hypothesis/Topic of the project	Presentation skill	Demonstration of skill	**High order thinking questions (HOTS)**	**Quiz on application of subject in real life**
5	Actual laboratory work/Field work	Knowledge	Viva		
5	Result/output	Quality of ppt	Report		
5	Dissertation/Report	Writing skill	Problem solving ability		

Note

Group Project*

1) Define number of students

2) Every student will get equal marks if the same contribution

3) if any student without any kind of involvement in the project, guide will take the decision on his share

Question Paper Pattern for Practical Examination

II	Practical	The External examination per practical course will be conducted as per the Following scheme.
Sr. No.	**Particulars of External Practical Examination**	**Marks**
1.	Laboratory Work	35+35 = 70
2.	Field visit and report	05+05= 10
3.	Journal	05+05 = 10
4.	Viva	05+05 = 10
	TOTAL	**100**

Choice Based Credit Grading and Semester System (CBCGS)

F.Y.B. Sc. Course – ZOOLOGY

To be implemented from the Academic year 2022-2023

SEMESTER I

COURSE CODE	UNIT	TOPICS	CREDITS	LECTURES/WEEK
USC1ZO1	I	Diversity in Non-chordates	2	1
	II	Animal Diversity- Non chordates		1
	III	Type study- Earthworm		1
USC1ZO2	I	Introduction of Cell	2	1
	II	Structure and function of cell		1
	III	Tools and Techniques in cell biology		1
USC1ZOP	Practical based on both courses		2	6

SEMESTER II

COURSE CODE	UNIT	TOPICS	CREDITS	LECTURES/WEEK
USZO201	I	Animal Diversity in chordates	2	1
	II	Group Eurochordata		1
	III	Type study- Shark		1
USZO202	I	Mendelian Inheritance	2	1
	II	Sex determination and Sex linkage		1
	III	Basics of linkage and crossing over		1
USZOP2	Practical based on both courses		2	6

SYLLABUS F.Y.B.Sc. ZOOLOGY
UNIT WISE DISTRIBUTION

Semester I		**Semester II**	
Core Course 1	**Core Course 2**	**Core Course 3**	**Core Course 4**
Unit 1 Diversity of animal Kingdom I	**Unit 1** Introduction of Cell	**Unit 1** Animal Diversity in chordates	**Unit 1** Mendelian Inheritance
Unit 2 Animal Diversity- Non chordates	**Unit 2** Structure and function of cell	**Unit 2** Group Eurochordata	**Unit 2** Sex determination and Sex linkage
Unit 3 Type study- Earthworm	**Unit 3** Tools and Techniques in cell biology	**Unit 3** Tools and Techniques in cell biology	**Unit 3** Basics of linkage and crossing over
Practical (USC1ZOP)	**Practical** (USC1ZOP)	**Practical** (USC2ZOP)	**Practical** (USC2ZOP)

Syllabus for F.Y.B.Sc.

Program: B.Sc.

Course: ZOOLOGY

Semester I

Paper I and Practical I

F.Y.B.Sc. ZOOLOGY (THEORY)

SEMESTER I

Course Code: USCZ1P01

Course I: Diversity in Non-chordates **Credit 2**

Course Objectives:

- To nurture interest in the students for the subject of Zoology.
- To understand animal diversity.
- To study detailed morphology of invertebrates.

Course Outcomes

- Learners will be able to comprehend the diversity of animals.
- Learners will be able to understand the importance of classification.
- Learners develop insight of particular group and type study.

Unit I: Diversity of animal Kingdom I **(15 Lectures)**

1.1: Levels of organization

1.1.1: Unicellularity Vs multicellularity, Colonization and organization of germ layers (diploblastic and triploblastic condition)

1.1.2: Division of labour and organization of tissues

(Brief fate of ectoderm, mesoderm and endoderm)

1.1.3: Development of coelom: Acoelomate, pseudocoelomate and coelomate organization

1.1.4: Radial and bilateral symmetry

1.1.5: Metamerism

1.2: Unicellular and multicellular organization

(Salient features with examples of phyla, subphyla and classes mentioned below)

1.2.1: Unicellular organization: Phylum Protozoa

1.2.2: Multicellular organization: Colonization level- Phylum Porifera

1.2.3: Multicellular organization: Division of labour (Cell differentiation)- Phylum Coelenterata

1.3 Triploblastic acoelomate and pseudocoelomate organization

1.3.1: Acoelomate organization - Phylum Platyhelminthes

1.3.2: Pseudocoelomate organization – Phylum Nemathelminths

1.4: Triploblastic coelomate organization

1.4.1: Animals with metameric segmentation- Phylum Annelida

1.4.2: Animals with jointed appendages- Phylum Arthropoda

Unit II: Animal Diversity- Non chordates (15 Lectures)

2.1 Non–Chordates: General characters and classification of the following up to classes with examples showing distinctive / adaptive features of the following phyla:

2.1.1: Kingdom Protista: Protozoa (Amoeba, Paramecium, Euglena, Plasmodium)

2.2: Kingdom Animalia

2.2.1: Porifera (Leucosolenia, Euplactella, Hyalonema, Euspongia)

2.2.2: Coelenterata (Cnidaria) (Physalia, Obelia, Aurelia, sea Anemone)

2.2.3: Ctenophora (Comb jelly)

2.2.4: Platyhelminthes (Fasciola, Planaria, Liverfluke, Tapeworm)

2.2.5: Nematohelminthes (*Ascaris, Ancyclostoma, Enterobius*)

2.2.6: Annelida (Nereis, Earthworm, Leech)

2.2.7: Arthropoda (Crab, Lobster, Beetle, Dragonfly, Butterfly, Moth, Spider, Centipede, Millipede)

2.2.8: Mollusca (Chiton, Dentalium, Pila, Unio, Sepia and Nautilus)

2.2.9: Echinodermata (Starfish, Brittle star, Sea urchin, Sea cucumber, Feather star)

2.2. General topics: Economic importance of Protozoa

Unit III: Type study- Earthworm: (15 Lectures)

Systematic position, Habits and habitat, External characters, Body wall, Digestive system, Blood Vascular System, Excretory system, Nervous system and sense organs. Reproductive system, Economic importance

SEMESTER I

Practical Code: USCZ1P

PRACTICAL – I

1. Study of levels of organization in Animal kingdom

A) Symmetry:

i) Asymmetric organization: Amoeba

ii) Radial symmetry: Sea anemone, Aurelia

iii) Bilateral symmetry: Planaria / liver fluke

B) Acoelomate: T.S. of Planaria / liver fluke

C) Pseudocoelomate: T.S. of Ascaris

D) Coelomate: T.S. of Earthworm

E) Segmentation

i) Pseudosegmentation: Tapeworm

ii) Metamerism: Earthworm

F) Specialization of body parts for division of labour: Head, thorax and abdomen - Insect

G) Cephalization

i) Cockroach – Head

ii) Prawn/ crab – Cephalothorax

2. Study of animal diversity with reference to-

i) Protozoa: Amoeba, Paramecium, Euglena, Plasmodium

ii) Porifera: Leucosolenia, bath sponge

iii) Coelenterate: Hydra, obelia colony, Aurelia, sea anemone and any one coral

iv) Platyhelminthes: Planaria, liver fluke and tapeworm

v) Nemathelminths: Ascaris- male and female

vi) Annelida: Nereis, earthworm and leech

vii) Arthropoda: Crab, lobster, Lepisma, beetle, dragonfly, butterfly, moth, spider, centipede, millipede

3. Preparation and observation of Paramecium.

4. Determination of the rate of heart beat in Daphnia and population density (Daphnia or any suitable organism) by sub sampling method.

5. Study of animal interaction:

- Commensalism: Echinus and shark
- Mutualism: Termite and Trichonympha

- Antibiosis: Effect of antibiotic on bacterial growth on a petri plate
- Parasitism: Ectoparasite – head louse and bed bug
- Endoparasite: *Trichinella spiralis*
- Predation: Praying mantis and spider

6. Demonstration of systems/ organs in Earthworm: Digestive system, Excretory system, Reproductive system and Nervous system (Use of permanent slide, model or photographs)

7. Study of life cycle and pathogenicity of *Entamoeba, Leishmania*, liver fluke and Tapeworm

8. Study of any 5 invertebrates available in nearby area (Submit the project)

REFERENCES AND ADDITIONAL READING

1. Invertebrate Zoology Volume II- Jordan andVerma , S. Chand and Co.
2. Invertebrate Zoology- T. C. Majupuria , S. Nagin and Co.
3. Invertebrate Zoology- P. S. Dhami and J. K. Dhami , R. Chand and Co.
4. Zoology- S. A. Miller and J. B. Harley, Tata McGraw Hill
5. Modern Textbook of Zoology, Invertebrates, R. L. Kotpal
6. Biodiversity- S.V.S Rana- Prentice Hall Publications
7. Modern Biology- V. B. Rastogi
8. Biology of Mollusca- D. R. Khanna
9. A Textbook of Zoology, Vol. II- T. Jeffery Parker and William. A. Haswell- Low Price Publications.
10. Manuals of Laboratory Specimens Invertebrates Gurudarshan Singh

Syllabus for F.Y.B.Sc.

Program: B.Sc.

Course: ZOOLOGY

Semester I

Paper II and Practical II

F.Y.B.Sc. ZOOLOGY (THEORY)
SEMESTER I
Course Code: USC1ZO2
Course -II Fundamentals of Cell biology **Credit 2**

Course Objectives:

- To study the cell as a basic unit of life and its different types
- To understand cell structure and function
- To study basic techniques used in cell biology

Course outcome:

- The learners can describe cell as structural and functional unit of life
- Learners will differentiate prokaryotic and eukaryotic cell and role of various cell organelles.
- Students are well known about use of techniques in cell biology.

Unit I: Introduction of Cell **(15 Lectures)**

1.1: The Cell

1.1.1. Introduction and History of cell Biology

1.1.2. Study of prokaryotic and eukaryotic cell

1.1.3. Scope of cell biology

1.2 : Organization of cell

1.3: Extranuclear

1.3.1. Structure and composition cell cytoplasm and cytoplasmic organelles.

1.3.2. Structure and functions of mitochondria, Endoplasmic reticulum, lysosomes, Golgi complex and nucleus

Unit II: Structure and function of cell membrane: **(15 Lectures)**

2.1. Cell membrane organization

2.2. Cell membrane:

2.2.1. Chemical composition

2.2.2. Fluid mosaic model

2.2.3. Functions of plasma membrane

Unit III: Tools and Techniques in cell biology **(15 Lectures)**

3.1. Microscopy

- Light microscopy
- Electron microscopy

3.2. Cytochemical stains

3.3. Cell fractionation

3.4. Chromatography -paper chromatography

SEMESTER I
Practical code: USC1ZOP
Course I

1. Study of Microscopy: Simple, Compound and Phase contrast
2. Study of prokaryotic and eukaryotic cell types with the help of chart, slide and video.
3. Observation of Prokaryotic and eukaryotic cell by simple staining
4. Study of mitosis from onion root tip/ bone marrow.
5. Study of meiosis from onion flowers/grasshopper testis.
6. Isolation of DNA from the liver tissue.
7. Detection of mitochondria by Janus green B using onion.
8. Study of membrane permeability of RBC using saline solution.
9. Project work.

REFERENCES AND ADDITIONAL READING

1. Cell Biology, Genetics, Molecular Biology, Evolution & Ecology – Verma, Agarwal – S. Chand & Co.
2. Molecular & Cell Biology – Bhamrah – Anmol Publ. Pvt. Ltd., New Delhi.
3. Molecular Biology of the Cell – Alberts, Bray, Lewis, Raff, Roberts, Watson – Garland Publishers, New York.
4. Molecular Biology of the gene – J. D. Watson, NH Hopkins, Roberts, Stertz, Weiner-Freeman.
5. Molecular Biology of the Gene – Watson, Hopkins, Roberts, Steitz, Weiner – Benjamin Cummings Publishing Co.
6. Molecular Cell Biology – Baltimore, Zipursky, Matsudaria, Darnel – W. H. Freeman & Co., New York.
7. Principles of Biochemistry – White, Handler, Smith – McGraw Hill Publ. 18) Cell & Molecular Biology – Phillip Sheller – Wiley Publ.
8. Lehninger Principles of Biochemistry -David L. Nelson, Michael M. Cox, Macmillan Worth Publishers.

Syllabus for F.Y.B.Sc.

Program: B.Sc.

Course: ZOOLOGY

Semester II

Paper I and Practical I

F.Y.B.Sc. ZOOLOGY (THEORY)
Course Code: USC2ZO1
SEMESTER II Paper I
Course III: Diversity in Chordates **Credit 2**

Course Objectives:

- To nurture interest in the students for the subject of Zoology.
- To understand animal diversity.
- To study detailed morphology of chordates

Course Outcomes:

- Learners will be able to comprehend the diversity of animals.
- Learners will be able to understand the importance of classification.
- Learners develop insight of particular group and type study.

Unit I: Animal Diversity in chordates **(15 Lectures)**

1.1: Phylum Chordata:

1.1.1. General characters and classification of Chordata.

1.1.2. Difference between Chordates and non-chordates.

1.1.3. Affinities of Balanoglossus

1.2: Group Protochordata:

1.2.1. Subphylum Hemichordata e.g., Balanoglossus

1.2.2: Subphylum Urochordata e.g., Herdmania

1.2.3: General characters of Ascidian

1.2.4: Retrogressive Metamorphosis in Ascidian

1.2.5: Subphylum Cephalochordata e.g., Amphioxus

Unit II: Group Eurochordata **(15 Lectures)**

2.1: Division: Agnatha

2.1.1: Class Ostracodermi

2.1.2: Class Cyclostomata

1.1.3: Division: Gnathostomata

1.1.3.1: Superclass Pisces (Cartilaginous and bony fish)

- Class Chondrichthyes
- Class Osteichthyes

1.1.3.2: Superclass Tetrapoda

- Class Amphibia
- Class Reptilia
- Class Aves
- Class Mammalia

Unit III: Type study- Shark: **(15 Lectures)**

3.1. Systematic position, Habits and habitat

3.2. External characters

3.3. Digestive system

3.4. Circulatory system

3.5. Excretory system

3.6. Reproductive system

3.7. Nervous system and sense organs

SEMESTER II PAPER I
Practical code: USC2ZOP
Practical I

1. Study of museum specimen of Herdmania, *Petromyzon* (Sea lamprey) and *Myxine* (Hagfish)
2. Study of permanent slide of Amphioxus and Balanoglossus.
3. Study of classification and morphological characteristics of vertebrates
    i. Superclass Pisces: Shark (Scoliodon), Skate (Rhinobatys), Sting ray (Dasiatias), Electric ray, Sciena, Flying fish, Tilapia
    ii. Class Amphibia: Frog, toad
    iii. Class Reptilia: Chameleon, Calotes, Turtle, Cobra
    iv. Class Aves: Duck, Kingfisher, Parakeet
    v. Class Mammalia: Bat, Shrew
4. Study of External morphology of Scoliodon (Demonstration).
5. Study of Digestive system of Scoliodon (Demonstration).
6. Study of Circulatory system of Scoliodon (Demonstration).
7. Study of Reproductive system of Scoliodon (Demonstration).
8. Study of Nervous system (Brain and Cranial Nerves) of Scoliodon (Demonstration).
9. Mounting of scales of fish (Placoid, Cycloid, Ctenoid)
10. Visit to forest/ wildlife sanctuary/ biodiversity park/ museum and preparation of field visit report.

REFERENCES AND ADDITIONAL READING

1. Vertebrate Zoology Volume I- Jordan and Verma, S. Chand and Co.

2. Chordate Zoology- P. S. Dhami and J. K. Dhami , R. Chand and Co.

3. Introduction to Vertebrates- Moore Cambridge University- Low Priced Edition

4. Zoology- S. A. Miller and J. B. Harley, Tata McGraw Hill

5. Modern Textbook of Zoology, Invertebrates, R. L. Kotpal

6. A Textbook of Zoology, Vol. II- T. Jeffery Parker and William. A. Haswell- Low Price Publications

7. Animal Behavior: Mechanisms, Ecology and Evolution Stephen Vessey, Elizabeth Jacob, S. H. Vessey and L. C. Drickamer, McGraw-Hill.

8. An introduction to Animal Behaviour- Manning and Dawkins

9. Animal Behaviour-Agarwal

10. Principles of Animal Communication. Bradbury, J.W. and S.L. Vehrencamp. Sinauer Assoc. Sunderland, Massachsets, USA.

11. The biology of Behaviour. Eibl-Eibesfeldt, I. Ethology. Holt, Rineheart & Winston, New York.

Syllabus for F.Y.B.Sc.

Program: B.Sc.

Course: ZOOLOGY

Semester II

Paper II and Practical II

F.Y.B.Sc. ZOOLOGY (THEORY)
SEMESTER II
Course Code: USC2ZO2
Course IV: Fundamentals of Genetics **Credit 2**

Course Objectives:

- To introduce the learners about basic concepts of genetics and
- To corelate Application of genetics in day-to-day life.
- To understand the basic concept of DNA, Gene and genome organization

Course Outcomes

- Learners will be able to understand the basic concepts of genetics.
- Learners will be able to understand recombination and interaction of Genes
- Learners will appreciate impact of genetics on diversity of animals.

Unit I: Mendelian Inheritance **(15 Lectures)**

1.1. Genetics: scope and importance.

1.2. Elements of heredity and variation:

1.2.1. Classical and Modern concept of Gene (Cistron, muton, recon), Alleles etc.

1.2.2. Mendel's laws of inheritance

1.2.3. Chromosomal basis of inheritance and its applications

1.3. Exceptions to Mendelian Inheritance: Incomplete dominance, Codominance, Multiple allelism, Lethal alleles, Pleiotropy, Epistasis - Recessive, Double recessive and double dominant

1.4. Autosomal dominant and autosomal recessive, X-linked dominant, and X-linked recessive.

Unit II: Sex determination and Sex linkage **(15 Lectures)**

2.1. Mechanism of Sex determination: XX/XO, XX/XY, ZZ/ZW

2.2. Multiple alleles

2.3. Genic balance theory, intersex, gynandromorphs.

2.4. Hormonal influence on sex determination-Freemartin and sex reversal.

2.5. Role of environmental factors- Bonellia and Crocodile.

Unit III: Basics of linkage and crossing over **(15 Lecture)**

3.1. Basics of linkage and its types

3.2. Basics of crossing over and its type, Factors influencing crossing over

3.3. Chromosomal mapping

F.Y.B.Sc. ZOOLOGY

SEMESTER II

PRACTICAL CODE: USC2ZOP

1. Study of Human karyotypes
2. Study of monohybrid ratio/ dihybrid ratio.
3. Study of multiple alleles/ epistasis.
4. Study of inheritance patterns by pedigree analysis in human for autosome and sex chromosome.
5. Mounting of Barr bodies.
6. Identification of the following genetic traits in human: widow's peak, attached ear lobe, dimple in chin, hypertrichosis, colour blindness, Rolling of tongue, Dimple in cheek.
7. Study of ABO blood group system. (Experimental)
8. Survey project based on genetics.

REFERENCE BOOKS AND ADDITIONAL READING

1. Principles of Genetics. Gardner, E.J., Simmons, M.J and Snustad, D.P. John Wiley and Sons
2. Concepts of Genetics. Klug, W.S., Cummings M.R., Spencer, C.A. Benjamin Cummings.
3. Genetics- A Molecular Approach. Russell, P. J Benjamin Cummings.
4. Genetics: Analysis of Genes and Genomes. Daniel L., Hartl, Elizabeth W. Jones Jones & Bartlett Publishers
5. Introduction to Genetic Analysis. Griffiths, A.J.F., Wessler. S.R., Lewontin, R.C. and Carroll, S.B. W. H. Freeman and Co.
6. Cell Biology, Genetics, Molecular Biology Evolution and Ecology. Verma P.S. and Agrawal P.K., 9^{th} edition, S. Chand Publication, New Delhi.
7. Principles of Genetics – Eight edition- Eldon john Gardner, Michael J. Simmons, D. Peter Snustad
8. Genetics- Weaver, Hedrick, third edition, Mc Graw Hill Education
9. Genetics A Mendelian approach Peter Russel, Pearson Benjamin Cummings
10. Genetics A conceptual approach, Benjamin A. Pierce, Southwestern University, W.H. Freeman and company, New York
11. Genetics, Third Edition, Monroe W. Strickberger
12. Genetics from gene to genome, third edition, Leeland H. Hartwell, Leeroy Hood, Michael 7. L. Goldberg, Ann E. Reynolds, Lee M. Silver, McGraw Hill Education

N.B.

I) It is pertinent to note that we have to adhere strictly to the directions as given in the UGC Circular F14-4/2006 (CPP-II).

II)Apart from the institutional Animal Ethics Committee (IAEC) and any other Committee appointed by a Competent Authority/Body from time to time, every college should constitute the following Committees:

1) A Committee for the Purpose of Care and Supervision of Experimental Animals (CPCSEA) and

2) A Dissection Monitoring Committee (DMC)

Composition of DMC shall be as follows:

i) Head of the Concerned Department (Convener/Chairperson)

ii) Two Senior Faculty Members of the concerned Department

iii) One Faculty of related department from the same College

iv) One or two members of related department from neighbouring colleges.

Janardan Bhagat Shikshan Prasarak Sanstha's

Changu Kana Thakur

Arts, Commerce and Science College, New Panvel

(Autonomous)

Re-accredited A+ Grade by NAAC

'College with Potential for Excellence 'Status Awarded by University Grants Commission

'Best College Award' by University of Mumbai

Affiliated to University of Mumbai with an Autonomous status

Revised Syllabus for

Program: B.Sc. Biotechnology

F.Y. B.Sc. Biotechnology

Choice based Credit & Grading system (60:40)

Total credits-132

(To be implemented from the academic year (2022-2023)

(Approved in the academic council meeting held on _____)

Preamble:

Biotechnology is one of the youngest branches of Life Science, which has expanded and established as an advanced interdisciplinary applied science in the last few years. Biotechnology at the core envisages the comprehensive study of Life and the Interdisciplinary potential of Biotechnology has led to a unique status for Biotechnology in Research and Industry.

Biotechnology has its applications in almost every field touching practically every human activity. The applied aspect of Biotechnology is now getting established with its applications in Industry, Agriculture, Health and Environment, Biotechnology is the leading science expanding exponentially.

Biotechnology demands a trained, skilled human resource to establish the Industry and Research sectors. The field is novel and still expanding which demands inputs in Infrastructure and Technology. The need of the hour is to design appropriate syllabi which keeps pace with changing times and technology with emphasis on applications while elucidating technology in depth. The syllabi till today had been sufficient to cater to the needs of students for building up their careers in industry and research. However, with the changing scenario at local and global level, we feel that the syllabus orientation should be altered to keep pace with developments in the education and industrial sector. Theory supplemented with extensive practical skill sets will help a graduate student to avail the opportunities in the applied fields (research, industry or institutions), without any additional training. Thus, the college itself will be developing trained and skilled man-power.

Biotechnology being an interdisciplinary subject, this restructured syllabus will combine the principles of physical, chemical, and biological sciences along with developing advanced technology. Biotechnology curricula are operated at two levels viz. undergraduate and postgraduate. The undergraduate curricula are prepared to impart primarily basic knowledge of the respective subject from all possible angles while postgraduate syllabus emphasizes on more applied courses. In addition, students are to be trained to apply this knowledge particularly in day-to-day applications of biotechnology and to get a glimpse of research.

Speciality Programme: Bachelor of Science (B.Sc.)
B.Sc. in Biotechnology

Eligibility: As per University of Mumbai rules.

Choice Based Credit System (CBCS)

Revised Scheme of Examination:

The performance of the learners shall be evaluated into two components. The learner's performance shall be assessed by Internal Assessment with 40% marks in the first component and by conducting the Semester End Examinations with 60% marks in the second component. The allocation of marks for the Internal Assessment and Semester End Examination are as shown below:

A) INTERNAL ASSESSMENT : 40% **40 Marks**

Sr. No	Particular	Marks
01	One periodical class test/ online examination to be conducted in the given semester.	20 Marks
02	Any two tools out of these (10 Marks each) 1. Group / Individual Project 2. Presentation and write-up on the selected topics of the subjects / Case studies 3. Test on Practical Skills 4. Open Book Test 5. Quiz	20 Marks

Question Paper Pattern

(Periodical Class Test / online examination for the Courses at Under Graduate Programme)

- Maximum Marks: 20
- Duration 30 Minutes

Particular	Marks
Match the Column / Fill in the Blanks / Multiple Choice Questions / True/False / Answer in One or Two Lines (Concept based Questions) (1 Mark each)	20 Marks

B) Semester End Examination : 60% **60 Marks**

- **Undergraduate Programme of F.Y. B.Sc. (Semester I and II)**
- Duration: The examination shall be of 2 hours duration.

Theory Question Paper Pattern
1. There shall be four questions of 15 marks each. (30 marks with internal options). 2. On each unit there will be one question and fourth question will be based on entire syllabus. 3. All questions shall be compulsory with internal options. 4. Questions may be subdivided into sub questions a,b,c…… and the allocation of marks depends on the weightage of the unit.

Passing Standard

The learners to pass a course shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment and Semester End Examination. The learners shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 24 out of 60) separately, to pass the course and minimum of Grade D, in each project wherever applicable to pass a particular semester. A learner will be said to have passed the course if the learner passes the Internal Assessment and Semester End Examination together.

F.Y. B.Sc. Biotechnology

Semester -I				
Course Code	**Course Type**	**Course Title**	**Credits**	**Lectures / Week**
UBT1BIT	Core Subject	Biotechnology- I	2	3
UBT1BOM	Core Subject	Basics of Microbiology	2	3
UBT1BCH	Core Subject	Basic Chemistry- I	2	3
UBT1BOC	Core Subject	Bioorganic Chemistry- I	2	3
UBT1CBI	Core Subject	Cell Biology	2	3
UBT1GEN	Core Subject	Genetics	2	3
UBT1ESS	General Elective	Environmental Science and Sustainable Development	2	3
UBT1CAB	Skill Enhancement Elective	Computer Applications in Biotechnology		30L/Sem.
UBT1PR1	Core Subject Practical	Practical of UBT1BIT & UBT1BOM	2	6
UBT1PR2	Core Subject Practical	Practical of UBT1BCH & UBT1BOC	2	6
UBT1PR3	Core Subject Practical	Practical of UBT1CBI & UBT1ESS	2	6

F.Y. B.Sc. Biotechnology

Semester -II				
Course Code	**Course Type**	**Course Title**	**Credits**	**Lecture /Week**
UBT2BIT	Core Subject	Biotechnology- II	2	3
UBT2MAI	Core Subject	Microbiology and Immunology	2	3
UBT2BCH	Core Subject	Basic Chemistry- II	2	3
UBT2BOC	Core Subject	Bioorganic Chemistry- II	2	3
UBT2MBG	Core Subject	Molecular Biology and Genetic Engineering	2	3
UBT2PAP	Core Subject	Plant and Animal Physiology	2	3
UBT2 LSB	Ability Enhancement Course	Laboratory Skills & Biostatistics	2	3
	Skill Enhancement Elective	Communication Skills	2	30L/Sem.
UBT2PR1	Core Subject Practical	Practical of UBT2BIT & UBT2MAI	2	6
UBT2PR2	Core Subject Practical	Practical of UBT2BCH & UBT2BOC	2	6
UBT2PR3	Core Subject Practical	Practical of UBT2MBG & UBT2PAP	2	6
			22	

SEMESTER-I THEORY

SEMESTER-I

Paper-I Biotechnology-I (UBT1BIT)

Course Objective: To familiarize the students with the potential and different applications and regulations of biotechnology

Learning Outcome: By the end of the course the student will:

- Develop an understanding of developments in various fields of Biotechnology.
- Be able to relate to applications and benefits of Biotechnology in the fields of agriculture, livestock, human health and environment.
- Justify the Biosafety rules and its implementation.
- To understand concept and significance of IPR.

Unit	Title	Credits	Lectures
UNIT I Introduction to Biotechnology	**What is biotechnology?** Biotechnology –an interdisciplinary biological science; Biotechnology – definition; History & Introduction to Biotechnology; Traditional and Modern Biotechnology; Scope and importance of biotechnology; **World of Biotechnology**- Plant Biotechnology, Animal Biotechnology, Pharmaceutical Biotechnology, , Industrial Biotechnology, Marine Biotechnology, Medical biotechnology, Environmental Biotechnology. **Biotechnology in India** – Bio-business in India, booming biotech market, success story of biotech market, policy initiatives; and global trends; Biotechnology research in India; Potential of modern biotechnology; Achievement of biotechnology; Prevention of misuse of biotechnology; Biotechnology Institutions in India (Public and Private Sector); Public Perception of Biotechnology. **Case study:** Serum Institute of India and its products	**2**	**15**

Unit II Applications of Biotechnology	Applications of Biotechnology: **Agriculture:** GM fruits- GM papaya, GM tomato, Insect resistant transgenic plants – Bt cotton, Bt brinjal, Modifications in nutrient quality – starch, oilseed protein, golden rice **Livestock:** Transgenic Animal: Mice, Rabbit, Cattle, Goat, Sheep, Pigs & Fish, animals **Human welfare:** Cloned genes for production of -Insulin; recombinant vaccine for Hepatitis B virus. Molecular farming, Edible vaccines and their advantages Environment **Case study: GMOs Pros and Cons**		**15**
UNIT III Rules and Regulations in Biotechnology	Biosafety- Introduction, Risk assessment- Assessment of risk during laboratory research, Risk assessment of biotechnology products; Containment – physical and biological containment; Planned introduction of GMOs; Biosafety during industrial production using GMO's ; Biosafety guidelines in India. Intellectual Property Right (IPR) and Protection (IPP) - Forms of protection- Patents, Copy rights, Trade secret, Trademarks, Plant variety protections. Patenting of biological material, significance of patent in India. The World Intellectual Property Organization (WIPO), General Agreement on Tariffs and Trade (GATT), Trade related IPRs (TRIP's) Patent status International scenario.		**15**

References

1. Dubey, R. C. (1993). A textbook of Biotechnology. S. Chand Publishing.
2. Dubey, R. C. (2014). Advanced biotechnology. S. Chand Publishing.
3. Singh, B. D., & Singh, B. D. (2007). Biotechnology expanding horizons. Kalyani publishers.

SEMESTER-I
Paper-II Basics of Microbiology (UBT1BOM)

Course Objective: To build a firm foundation in microbiology, sterilization techniques and staining.

Learning Outcome: By the end of the course the student will:

- Build skill towards use of microscopy and staining techniques.
- Explain the concepts of sterilization and the mechanism of disinfection.
- Categorize different types of microorganisms based on their nutritional requirements.
- Apply different methods and techniques for growth and enumeration of microorganisms.

Unit	Title	Credits	Lectures
UNIT I Introduction to Microbiology	Fundamentals, History and Evolution of Microbiology: Discovery of Microorganisms, Conflict over spontaneous generation. Role of microorganisms in disease Classification: The place of Microorganisms in the living world, Classification Whittaker's five kingdom classification, Introduction to Bergey's Manual, Groups of Microorganisms, Applications of microbiology in various fields Nutrition, Cultivation and Maintenance of microorganisms: Nutritional categories of microorganisms, Design and Types of Culture Media, methods of isolation.(Pure Culture Techniques- Streak plate, Pour, Spread plate, Tube dilution)	**2**	**15**
UNIT II Sterilization Techniques	Introduction: Definition and concept of Sterilization and Disinfection. Types and Applications: Dry Heat, Steam under pressure Gases, Radiation and Filtration Chemical Agents and their Mode of Action: Aldehydes, Halogens, Quaternary Ammonium Compounds, Phenol and Phenolic Compounds, Heavy Metals, Alcohol, Dyes, and Detergents.		**15**

	Disinfectant: Ideal Disinfectant. Examples of Disinfectants and Evaluation of Disinfectant (Tube dilution & Agar plate techniques, Phenol coefficient , Tissue toxicity index)		
UNIT III Microscopy and stains	**Simple and Compound Microscope:** General principles of optics; various parts and their functions - objectives – numerical aperture, resolving power, depth of focus, working distance, aberrations; oculars; condensers. Principle, working and applications of Dark Field Microscope; Phase Contrast Microscope, Fluorescent Microscope, TEM and SEM **Stains and Staining Solutions-** Definition of Dye and Chromogen; acidic and basic dyes; functions and types of chromophore and auxochrome groups. Definition and function of stain; mordant, intensifiers and Fixative. Simple, negative, differential staining and special staining.		**15**

References:

1. Prescott, L. M. (2002). Microbiology 5th Edition.
2. Prescott, L. M. (2015). Microbiology 10th Edition.
3. Pelczar, Microbiology. (1993). India: McGraw-Hill Education.
4. Ananthanarayan, R., Paniker, C. J. (2006).
5. Ananthanarayan and Paniker's Textbook of Microbiology. India: Orient Longman.
6. Salle, A. J., &, A. J. Salle (1954). Fundamental principles of bacteriology McGraw-Hill.
7. Frobisher M. Fundamentals of Microbiology (9th Ed)

SEMESTER-I
Paper-III Basic Chemistry-I (UBT1BCH)

Course Objective: To acquaint the students with basic concepts of Chemistry like Chemical bonds, Titrimetry, Garvimetry, Stereochemistry Isomerism.

Learning Outcome: By the end of the course the student will able to:

- Explain chemical bonds.
- Develop skills towards use of titrimetric and gravimetric analysis.
- Differentiate between chiral and achiral molecules and different enantiomers.
- Illustrate of different types of chemical formulas.

Unit	Title	Credits	Lectures
UNIT I **Chemical bonds**	Chemical Bonds: Types and transition between the main types of bonding. Ionic Bond: Nature of Ionic Bond, factors influencing the formation of Ionic Bond. Structure of NaCl and CsCl. Covalent Bond: Nature of Covalent Bond, Types of covalent bond (Polar and Coordinate. covalent bonds). Structure of CH4, NH3, Shapes of BeCl2, BF3. Hydrogen Bond: Theory of Hydrogen Bonding and Types of Hydrogen Bonding (with examples of RCOOH, ROH, Salicylaldehyde, Amides and Polyamides) Interactions stabilizing biomolecules – Hydrophobic Interactions, Dipole-Dipole Interactions, Van der Waals interactions and Disulfide bonds	**2**	**15**
UNIT II **Titrimetry and Gravimetry**	Titrimetric Analysis: Titration, Titrant, Titrand, End Point, Equivalence Point, Titration Error, Indicator, Primary and Secondary Standards, Characteristics and examples. Types of Titrations – Acid –Base, Redox, Precipitation, Complexometric Titration. Acid – Base Titration – Strong Acid Vs Strong Base. Theoretical aspects of Titration Curve and		**15**

	End Point Evaluation. Theory of Acid –Base Indicators, Choice and Suitability of Indicators. Gravimetric Analysis: Solubility and Precipitation, Factors affecting Solubility, Nucleation, Particle Size, Crystal Growth, Colloidal State, Ageing/Digestion of Precipitate. Co-Precipitation and Post-Precipitation. Washing, Drying and Ignition of Precipitate.		
UNIT III **Stereochemistry** **Isomerism**	Types of Isomerism: Structural Isomerism and Stereoisomerism with Suitable examples. Geometric Isomerism and Optical Isomerism: Enantiomers, Diastereomers, and Racemic mixtures Cis-Trans, Threo, Erythro and Meso isomers. Diastereomers (Cis-Trans Isomerism) in Alkenes. Conformation: Conformations of Ethane. Difference between Configuration and Conformation. Configuration: Asymmetric Carbon Atom, Stereogenic/ Chiral Centers, Chirality Representation of Configuration by —Flying Wedge Formula Projection formulae: Fischer, Newman and Sawhorse. The Interconversion of the Formulae. E, Z System of Nomenclature-Rules and Examples		**15**

Referencing:

1. Bahl, B. S., & Bahl, A. (2017). A textbook of organic chemistry. S. Chand Publishing.
2. Lee, J. D. (2008). Concise inorganic chemistry. John Wiley & Sons.
3. Skoog, D. A., West, D. M., Holler, F. J., & Crouch, S. R. (2013). Fundamentals of analytical chemistry. Cengage learning.
4. Vogel, A. I., & Jeffery, G. H. (1989). Vogel's textbook of quantitative chemical analysis. Wiley.
5. Mosher, M. (1992). Organic Chemistry. (Morrison, Robert Thornton; Boyd, Robert Neilson)

SEMESTER-I
Paper-IV Biochemistry-I (UBT1BOC)

Course Objectives: To acquaint the students with different concepts of biomolecules.

Learning Outcomes: By the end of the course the student will:

1. Discuss the chemistry of carbohydrates with their roles.
2. Explain Classification and general properties of Proteins.
3. Elaborate protein structure and function.
4. Understand structure and functions of Nucleic acids

Unit	Title	Credits	Lectures
UNIT I **Basics of Carbohydrate Chemistry**	**Carbohydrates:** Introduction, definition and general formula. Classification of carbohydrates: **Monosaccharides:** Classification, Chemical reactions and significance of Monosaccharides, Epimers, Anomers and Mutarotation. Biologically important Derivatives of Hexoses: Glucosamine, Gluconic acid, uronic acid, N-acetyl glucosamine, N-Acetylmuramic acid **Disaccharides:** Maltose, Lactose, Sucrose, Cellobiose (structures, Reducing and Non reducing sugars biological significance, structure and bond type) **Polysaccharides:** Homo-polysaccharides and Hetero-polysaccharides; Structure and Storage Polysaccharides. Industrial applications of carbohydrates.	**2**	**15**
UNIT II **Amino acids and Proteins**	**Amino acids:** General introduction, Classification and structures, properties (physical chemical). Isomerism. Titration Curve of Amino Acids. Concept of Isoelectric pH, Zwitterion Reactions of Amino Acids: Sorenson‘s Titration, Ninhydrin Test. **Classification of Proteins:** Simple- Fibrous and Globular Conjugated- Nucleoprotein, Lipoprotein, Glycoprotein, Phosphoprotein, Chromoprotein, Metalloprotein Derived- Primary and Secondary		

	Peptide bond: Features Example of Dipeptide, tripeptide,Nonapeptide e.g., Oxytocin, Vasopressin Amino acid composition of Bovine Cytochrome C and Bovine Chymotrypsinogen **Three-dimensional Structure of proteins:** Concept of Monomeric, dimeric and multimeric proteins ,Primary structure - Peptide linkage, Native Secondary structure - Alpha Pleat and Beta fold; Spatial arrangements of adjacent amino acid residues Tertiary structure - Three-Dimensional arrangement Quaternary structure Di and Multimeric proteins E.g., structure of human Insulin **Properties of proteins:** Solubility, Molecular weight, Shape, Iso electric pH, Salting out of proteins for purification **Protein Denaturation and folding:** Denaturing agents and properties of denatured proteins.		
UNIT III **Nucleic acids**	**The Composition and structure of DNA and RNA:** Structure, Function of Nucleic Acids, Properties and Types of DNA, RNA. Structure of Purine and Pyrimidine Bases Hydrogen Bonding between Nitrogenous Bases in DNA. Structure of Nucleosides, Nucleotides and Polynucleotides. Watson and Crick's Model. DNA Denaturation. Structure of RNA. Types of RNA. Differences between DNA and RNA. Difference between A, B and Z forms of DNA		**15**

References :

1. Stryer, L. (2015). Biochemistry. (8th edition) New York: Freeman.
2. Lehninger, A. L. (2017). Principles of Biochemistry (7th edition). New York, NY: W
3. Voet, D., &Voet, J. G. (2018). Biochemistry (5th edition). Hoboken, NJ: J. Wiley & Sons.
4. Cox, M. M., & Nelson, D. L. (2017). Lehninger principles of biochemistry (Vol. 7). New York: Wh Freeman.
5. Conn, E., & Stumpf, P. (2009). Outlines of biochemistry. John Wiley & Sons.
6. Satyanarayana U. and Chakrapani U. (2007). Biochemistry. 3rd Edition. Books and Allied (P) Ltd.
7. Mu, P., & Plummer, D. T. (2001). Introduction to practical biochemistry. Tata McGraw-Hill Educatio

SEMESTER-I
Paper-V Cell Biology (UBT1CBI)

Course Objective: To build a firm foundation of concepts related to cell biology

Learning Outcome: By the end of the course the student will:

- Discuss the ultrastructure, function and location of organelles in prokaryotic and eukaryotic cells
- Illustrate the principles of membrane transport with different types of pumps and cell junctions.
- Compare different phases of cell cycle along with roles of restriction points and checkpoints
- Define the role of apoptosis in maintenance and development of healthy cells.

Unit	Title	Credits	Lectures
UNIT I **Structure of Prokaryotic and Eukaryotic Cell**	Ultra-structure of Prokaryotic Cell: Cell theory, Concept of Cell Shape and Size, Detail Structure of Slime Layer, Capsule, Flagella, Pilli, Cell Wall (Gram Positive and Negative), Cell Membrane, Cytoplasm and Genetic Material Storage Bodies and Spores Ultra-structure of Eukaryotic Cell: Plasma membrane, Cytoplasmic Matrix, Microfilaments, Intermediate Filaments, and Microtubules Organelles of the Biosynthetic-Endoplasmic Reticulum & Golgi apparatus. Lysosome, Eukaryotic Ribosomes, Mitochondria, and Chloroplasts. Nucleus –Nuclear Structure, Nucleolus Cilia and Flagella Comparison of Prokaryotic and Eukaryotic Cells.	**2**	**15**
UNIT II **Cell membrane**	Membrane Structure and Function- Chemical composition of membranes, Membrane lipids; Membrane proteins **Functions of membranes:** Transport, Cell-cell interactions, Receptors. **Membrane Model:** Fluid Mosaic Model **Membrane transport:** Active Transport, Passive Transport, Diffusion and Osmosis, Membrane		**15**

	transport associated disease e.g. cystic fibrosis. Bulk transport: endocytosis and exocytosis Membrane junctions Classification of junctions: Occluding: Tight, Anchoring: Desmosomes, Channel- forming: Gap, Plasmodesmata. Cell Coat and Cell Recognition.		
UNIT III **Cell cycle**	**Cell cycle, cell division and cell death** Cycle in Prokaryotic and Eukaryotic cell (G0, G1, G2, M phases)Cell cycle phases, Control of mitosis by cyclins, MPF activity and cyclin-dependent kinases, checkpoint s in cell cycle regulation Mitosis and Meiosis and their significance; Eukaryotic cell division Programmed Cell Death- Introduction to Apoptosis, Apoptosis pathways and its regulation; Difference in Apoptosis and Necrosis.		**15**

References:

1. Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., & Walter, P. (2008). Molecular Biology of the Cell (5th Ed.). New York: Garland Science.
2. Lodish, H. F. (2016). Molecular Cell Biology (8th Ed.). New York: W.H. Freeman.
3. Cooper, G. M., & Hausman, R. E. (2013). The Cell: a Molecular Approach (6th Ed.). Washington: ASM; Sunderland.
4. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.
5. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition.Lippincott Williams and Wilkins, Philadelphia.

SEMESTER-I
Paper-VI Genetics (UBT1GEN)

Course Objective: To provide insight to students on fundamental concepts of mendelian genetics, microbial genetics and cytogenetics.

Learning Outcome: By the end of the course the student will able to:

- Compare different mechanisms of Genetic Exchange in Bacteria.
- Illustrate Incomplete dominance, codominance and multiple alleles.
- Explain the organization of Eukaryotic Genetic Material, in Chromosomal aberrations and Sex Determination

Interpret the Mendel's Principle in Human Genetics

Unit	Title	Credits	Lectures
UNIT I Genetics Fundamentals	**Introduction to genetic and sub-disciplines of genetics:** Transmission genetics, Molecular genetics, Population genetics and Quantitative genetics. **Basic Terminologies in genetics** **Mendelian Genetics:** Monohybrid Crosses and Mendel's Principle of Segregation Dihybrid crosses and Mendel's Principle of Independent Assortment. **Extensions of and Deviations from Mendelian Genetic Principles:** Multiple Alleles - ABO Blood groups Modifications of Dominance Relationships: Incomplete Dominance and Co-dominance. Environmental effect on the expression of the Human Genes. **Gene Interactions and Modified Mendelian Ratios-** Epistatic and non-epistatic interactions Essential Genes and Lethal Alleles	**2**	**15**
UNIT II Cytogenetics	**Structure and organization of eukaryotic genetic material –** Histone and non-histone proteins, nucleosome structure. Heterochromatin, Euchromatin, Polytene Chromosomes, Lampbrush chromosome. **Chromosomal banding techniques** **Karyotype and Idiogram**		**15**

	Variation in Chromosomal Structure and Number: Deletion, Duplication, Inversion, Translocation, Aneuploidy, Euploidy and Polyploidy and Syndromes- Klinefelter, Turner, Cri-du-Chat, Trisomy-21, Trisomy-18and Trisomy-13. **Sex Determination and Sex Linkage:** Mechanisms of Sex Determination (XX-XY, ZZ-ZW, XX-XO) **Dosage Compensation and Barr Body.**		
UNIT III Microbial Genetics	**Genetic analysis in Bacteria-** Prototrophs, Auxotrophs. **Bacteriophages:** Lytic and Lysogenic development of Phage. **Mechanism of Genetic Exchange in Bacteria:** Conjugation; Transformation; Transduction (Generalized Transduction, Specialized Transduction); **Bacterial Transposable Elements.**		**15**

1. Russell, P. J., & Gordey, K. (2002). IGenetics, San Francisco: Benjamin Cummings.
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3. Simmons, M. J., & Snustad, D. P. (2006). Principles of genetics. John Wiley & Sons.
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5. Karp, G. (2009). Cell and molecular biology: concepts and experiments. John Wiley & Sons.
6. Strickberger M., Genetics. (1995). Australia: Deakin University.

SEMESTER-I

Paper-VII Environmental Science and Sustainable Development (UBT 1ESS)

Course Objectives: To sensitize and create awareness about Ecology, renewable energy and different Environmental Issues.

Learning Outcomes: By the end of the course the student will:

- Develop an understanding of the structure and functioning of the ecosystems.
- Gain insights about the concept of pollution, climate change and sustainable development
- Understand the relevance of renewable energy sources and conservation of biodiversity
- Understand the relevance of conservation of biodiversity

Unit	Title	Credits	Lectures
UNIT I Ecological interactions and Biodiversity	**Concept of Ecosystems:** Definition and Components- Structure and function of ecosystem aspects of ecosystems Food Chain and Food Web, Ecological Pyramids (Energy, Biomass and Number) Aquatic and Terrestrial Ecosystems, Different Abiotic Factors of ecosystem and adaptations to different abiotic factors **Ecological Interactions:** Commensalism, Mutualism, Predation and Antibiosis, Parasitism, competition **Biodiversity and its conservation:** Introduction – definition: genetic, species, ecosystem diversity, biogeographic classification of India, value of biodiversity, biodiversity at global, national and local levels, India as a mega diversity nation, Hotspots of biodiversity, threats to biodiversity, conservation of biodiversity	**2**	**15**
UNIT II Pollution and climate change	**Environmental Pollution:** Definition, Cause, effects and control measures of- Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards. Role of an individual in prevention of pollution. Pollution case studies. **Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.**		**15**

	Sustainable development: **Concept, basic principles of** sustainable development, post-brundtland world, roots of sustainability, Indicators, paradigm towards new discipline-sustainability science.		
UNIT III **Renewable sources of energy**	**Introduction:** Renewable and Non-renewable resources. The need for a sustainable lifestyle. **Energy resources:** **Types of energy** Non- renewable energy - Oil, coal and its environmental impacts. Renewable energy: Hydroelectric power, Solar energy, Biomass energy, Biogas, Wind power and Geothermal energy. **Biogas technology:** Biogas plant & types, biodigester. Biogas- composition, production and factors affecting production and uses. **Biofuels:** Ethanol production, Microbial hydrogen production, Biodiesel, Petrocrops.		**15**

References :

1. Verma, V. (2010). Botany. India: Ane Books Pvt Ltd.
1. Bharucha, E. (2005). Textbook of Environmental Studies for Undergraduate Courses. India: Universities Press (India) Pvt. Limited.
2. Verma, P. S. (2004). Cell Biology, Genetics, Molecular Biology: Evolution and Ecology. India: S. Chand Limited.
3. Khoiyangbam, R. S. (2015). Introduction to Environmental Sciences. India: Energy and Resources Institute.
4. Fulekar, M. H. (2010). Environmental Biotechnology. United Kingdom: CRC Press.
5. Scragg, A. H. (2004). Environmental Biotechnology. United Kingdom: Oxford University Press

SEMESTER-I
Paper-VIII Computer Applications in Biotechnology (UBT1CAB)

Course Objectives: To develop the students' understanding of computers.

Learning Outcomes: By the end of the course the student will:

- Develop an understanding of computer networking and internet
- Develop skills to use word processing, spreadsheet, and presentation software.
- Develop skills to present biological data.

Unit	Title	Credits	Lectures
UNIT I Introduction to computers	**Overview and functions of a computer system** Input and output devices, Storage devices. **Modern computers:** The workstation, The Minicomputer, Mainframe Computers, Parallel processing Computer Super Computer. **Introduction to operating systems**: Operating System concept, Windows, Unix / Linux & servers. **Word Processing:** Basic Operations, Creating and Editing documents, Formatting documents. **Spreadsheet:** Creating and editing workbook, organizing and formatting worksheets; Data analysis and management; Using formulas and functions **Presentation Graphics:** Creating and Editing Presentations, Designing and Enhancing Presentation, Delivering Presentation, Advanced Presentation Graphics.	**2**	**15**
UNIT II Computer networking	**Introduction to networking and Internet:** Various terminologies Associated hardware devices, gadgets (Router, Switch) tools, services, and resources Network Topologies and Protocols, LAN, WAN and MAN, World Wide Web (WWW), **Network security:** fire walls **Internet:-**Introduction, History of Internet, Internetworking Protocol, **Email:-**E-mail Address, E-mail Message Format, E-mail Services, How E-mail Works File Transfer Protocol (FTP), How FTP Works? **Computer viruses:** An overview of Computer viruses: What is a virus? Virus signs, how do they		**15**

	get transmitted? What are the dangers? General Precautions. **Introduction to R:** Data input, Arithmetic Operators, Vector Operations, Matrix Operations, Data Frames, Built-in Functions. Frequency Distribution, Grouped Frequency Distribution, Diagrams and Graphs, Summary statistics for raw data and grouped frequency distribution.		

References:

1. Sinha, P. K., Sinha, P. (2004). Computer Fundamentals. India: BPB Publications.
2. Goel, A. (2010). Computer Fundamentals. India: Pearson Education.
3. Wempen, F. (2014). Computing Fundamentals: Introduction to Computers. Germany: Wiley.
4. Tanenbaum, A. S., Wetherall, D. (2014). Computer Networks. United Kingdom: Pearson Education. 5. Khanal, A. B. (2015).

F.Y. B.Sc. Biotechnology
Semester –I
PRACTICALS

Course Code	Title	Credits
UBT1PR1 Practical of UBT1BIT & UBT1BOM	1. Assignment on any one branch of Biotechnology. 2. Analyze a case-study and write a report on any one recent application of Biotechnology (Not older than past 5 years) 3. Field visit/ Virtual visit (website) of National/ International research institutes for research in biotechnology and have a group discussion during the lab session. 4. Study of Microscope – Compound Microscope (Including Handling and storage), Dark Field Microscope, Phase Contrast Microscope, Fluorescent Microscope, TEM, SEM. 5. Monochrome staining using any suitable material. (Bacteria/Plant/Animal tissue) 6. Negative staining 7. Differential staining – a. Gram staining, b. Acid fast staining, 8. Romanowsky staining. 9. Special staining – a. Cell wall b. Capsule c. Spores 10. Fungal staining – Wet mount (Lactophenol cotton blue/Methylene Blue) 11. Preparation of media- Nutrient broth and Agar, MacConkey Agar, Sabouraud's Agar 12. Sterilization of Laboratory Glassware and Media using Autoclave and Hot air oven 13. Aseptic transfer technique (tube to tube, tube to plate, pipette to tube). 14. Isolation techniques: T-streak, polygon method 15. Colony Characteristics of Microorganisms. 16. Qualitative Assay of enzyme urease, amylase, dehydrogenase, catalase and protease from Plant/Animal/Microbial source. 17. Use of Bergey's manual to help identify any one isolate	**2**

UBT1PR2 Practical of UBT1BCH & UBT1BOC	1. Safety in Chemistry Laboratory: Dress code, Dos and Don't, First Aid 2. Preparation of Normal, Molar, Molal, Percent solution 3. Preparation of solution - PPM and PPB 4. Determine the rate constant for the saponification reaction between ethyl acetate and NaOH by back titration method 5. Determination of Acetic acid in Vinegar by Titrimetric Method. 6. Determination of the amount of Fe (II) present in the given solution titrimetrically. 7. Determination of amount of NaHCO3 + Na2CO3 in the given solid mixture titrimetrically. 8. Determination of the amount of Mg (II) present in the given solution complexometrically. 9. Determination of percent composition of BaSO4 and NH4Cl in the given mixture gravimetrically. 10. Characterization of Organic Compounds any three organic compounds 11. Structures of Aldo series and Keto series of Monosaccharides, disaccharides and Polysaccharides 12. Qualitative tests for carbohydrates; Molisch test, Benedict's test, Iodine test, Osazone formation 13. Estimation of carbohydrates by Lane-Eynon method 14. Tutorial: Structure of Amino acids. 15. Titration curve of amino acid. 16. Qualitative analysis of amino acids and proteins. 17. Separation by Paper Chromatography a. Amino acids b. Sugars. 18. Estimation of Protein by Biuret method. 19. Study of Watson and Crick model of DNA using micrographs/ Schematic representations. 20. Qualitative analysis of DNA and RNA. 21. Extraction of DNA from suitable material. 22. Assignment - Practice problems on stereochemistry (Identifying - stereoisomers, conformations of specific compounds, chirality and symmetry elements; drawing stereoisomers; locating and naming stereogenic centers)	**2**

UBT1PR3 Practical of UBT1CBI & UBT1GEN	1. Study of mitosis from suitable plant material 2. Study of meiosis from suitable plant material/Permanent slides/Photographs 3. Study of mitosis using pre-treated root tips of Allium cepa to study the effect of mutagens- chemical (colchicine/ PDB) on mitosis 4. Problems based on Mendelian Genetics, its modifications and gene interactions. 5. Study of Karyotype - Normal and abnormal 6. Barr body identification in cells of Buccal smear 7. Preparation of competent cells and demonstration of Bacterial transformation and mapping 8. Demonstration of Bacterial Conjugation and interrupted mating-based mapping 9. Demonstration of transduction and mapping 10. Conduct a survey on observable genetic traits and compare those inventories with other students in groups. (Blood group, tongue rolling, earlobe attachment, PTC tasting etc.) 11. Study of blood groups ABO in humans	**2**

SEMESTER-II THEORY

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SEMESTER-II
Paper-I Biotechnology- II (UBT2BIT)

Course Objectives: To acquaint students with the applications of biotechnology in the field of food, medicine and fermentation

Learning Outcomes: By the end of the course the student will:

- Explain the basic principles of PTC and callus culture.
- Develop an understanding of the application of biotechnology in the food industry.
- Gain insight into details of genetic engineering.
- Discuss tools and techniques used in medical biotechnology

Unit	Title	Credits	Lectures
UNIT I **Plant Tissue Culture**	Concept of Cell Culture, Cellular Totipotency. **Organization of Plant Tissue Culture Laboratory:** Equipment's and Instruments **Aseptic Techniques:** Washing of Glassware, Media Sterilization, Aseptic Workstation, Precautions to maintain Aseptic Conditions. **Culture Medium**: Nutritional requirements of the explants, PGR's and their in-vitro roles, Media Preparation. **Callus Culture Technique:** Introduction, Principle, Protocols and Applications.	**2**	**15**
UNIT II **Food Biotechnology**	**Introduction to food biotechnology:** History of microorganisms in food science and key developments, Applications of biotechnology in fermented food products **Introduction to Unit Operations and Processes:** Basic unit operations, food processing & packaging (canning & bottling), Production of cultures **Fermented food products:** Bread, Vinegar, Sauerkraut, Single Cell Protein (SCP), Probiotics. Food spoilage, food deterioration, food contamination and Food Adulteration **Methods of food preservation** Indicators of Food Microbial Quality & Safety: HACCP, FSSAI & FDA		**15**

Unit-III Applications of Microbes in Biotechnology	**Microbiology of Fermented Foods:** Fermented Milks, Chocolates, Cheese Production, Meat, Fish, Wines and Champagne & Beers, Ales, Distilled Spirit and Breads. **Microbes as a source of Products of Industrial Importance-**Antibiotics, amino acids, Organic Acids, Biosurfactants, Biopolymers and Vaccines **Microbial energy conversion**-Biofuel **Microbes in agriculture Biotechnology-** Bio insecticides and bio pesticides. **Roles of microbes in Environmental Biotechnology-**Microbial Fuel Cells: Batteries Powered by Microbes. Biodegradation and Bioremediation Harness Microbes to Clean the Environment.		**15**

References

1. K.K. De Plant tissue culture.
2. Bhojwani and Razdan plant tissue culture, Elsevier.
3. Frazier, W. C., & Westhoff, D. C. (1983). Food microbiology 5th Ed. 2. Lee, B. H. (2014).
4. Fundamentals of food biotechnology. John Wiley & Sons.
5. Jay, J. M., Loessner, M. J., & Golden, D. A. (2008). Modern food microbiology. Springer Science & Business Media. 4. Woolverton, C. J., Sherwood, L., Willey, J. (2014).
6. Prescott's Microbiology. India: McGraw-Hill Education.
7. Patel, A. H. (1984). Industrial Microbiology. Macmillan India. 6. Khan, F. A. (2011). Biotechnology fundamentals. CRC Press

SEMESTER-II
Paper-II Microbiology and Immunology (UBT2MAI)

Course Objective: To build a firm foundation of concepts related to Microbiology and Immunology.

Learning Outcome: By the end of the course the student will:

- Compare replication mechanisms used by viruses along with their cultivation, purification techniques
- Apply different methods and techniques for growth and enumeration of microorganisms.
- Elaborate the concept of Immunity and role of antigens and immunoglobulin in the immune system.
- Explain the Humoral and Cellular Immune Response

Unit	Title	Credits	Lectures
UNIT I Virology	**Introduction to virology:** Historical perspective, General Characteristics of Viruses: Host Range **Viral Structure:** Nucleic Acid, Capsid and Envelope General Morphology- Helical, Polyhedral, Enveloped, Complex. Taxonomy of Viruses **Viral Multiplication:** Multiplication of Bacteriophages and Animal Viruses Isolation, Cultivation, and Identification of Viruses: Growing Bacteriophages and animal viruses in the Laboratory, Viral Identification Case studies- TMV, Influenza COVID-19	**2**	**15**
UNIT II Microbial Growth	Definition of Growth Mathematical and expression of growth Growth curve Measurement of growth Efficiency of growth yield ,Synchronous growth **Factors influencing microbial growth**: oxygen, temp., pH, salt etc. Batch Culture Continuous Culture of microorganisms Chemostat and Turbidostat **Enumeration of Microorganisms:** Direct and Indirect Methods Preservation and Maintenance of cultures, Culture Depositories		**15**

UNIT III Immunology	**Introduction to Immunology:** Overview of Immune Systems: Innate Immunity, Mechanisms of innate immunity, Acquired Immunity, Local and Herd Immunity, Humoral and Cellular Immunity - Factors Influencing and Mechanisms of each. **Antigens:** Immunogenicity Versus Antigenicity, Factors That Influence Immunogenicity, Epitopes, Haptens, Superantigens **Antibodies:** Basic Structure of Antibodies, Antibody-Mediated Effector Functions, Antibody Classes and Biological Activities, Antigenic Determinants on Immunoglobulins. Monoclonal Antibodies Introduction to vaccination		**15**

References :

1. Pelczar, Microbiology. (1993). India: McGraw-Hill Education.
2. Stanier, R. Y. (1987). General Microbiology. Hong Kong: Macmillan.
3. Funke, B. R., Case, C. L., Tortora, G. J. (2013). Microbiology: An Introduction. United Kingdom: Pearson.
4. Woolverton, C. J., Sherwood, L., Willey, J. (2014). Prescott's Microbiology. India: McGraw-Hill Education
5. Goldsby, U. R. A., Kuby, J., Kindt, T. J., Goldsby, R. A., Osborne, B. A., Marcus, D. A. (2003). Immunology. United Kingdom: W. H. Freeman.
6. Rao, C. V. (2017). Immunology. United Kingdom: Alpha Science International, Limited.

SEMESTER-II
Paper-III Basic Chemistry- II (UBT2BCH)

Course Objective: To acquaint the students with some core concepts of Physical Chemistry.

Learning Outcome: By the end of the course the student will:

- Develop an understanding of thermodynamics.
- Learn about reaction kinetics and order of reaction.
- Gain insight into the details of reaction mechanisms in Organic Chemistry.

Unit	Title	Credits	Lectures
UNIT I Thermodynamics	**Thermodynamics:** System, Surrounding, Boundaries Sign Conventions, State Functions, Internal Energy and Enthalpy: Significance, examples, (Numericals expected.) **Laws of Thermodynamics and its Limitations:** Mathematical expression. Qualitative discussion of Carnot Cycle for ideal Gas and Mechanical Efficiency. Laws of Thermodynamics as applied to Biochemical Systems. Concept of Entropy, Entropy for Isobaric, Isochoric and Isothermal Processes. Thermodynamics of ATP; Helmholtz	**2**	**15**
UNIT II Chemical Kinetics	Reaction Kinetics: Rate of Reaction, Rate Constant, Measurement of Reaction Rates Order & Molecularity of Reaction, Integrated Rate Equation of First and Second order Reactions (with equal initial concentration of reactants). Determination of Order of Reaction: a) Integration Method b) Graphical Method c) Ostwald's Isolation Method d) Half Time Method.		**15**
UNIT III Reaction Mechanisms in Organic Chemistry	Review of organic reaction mechanisms with special reference to Nucleophilic and electrophilic substitution (SN1, SN2, SNi, SE 1, SE2) Reactions. Elimination (E1 and E2) Reactions. Addition reactions- (regioselectivity: Markovnikov's addition-carbocation		**15**

	mechanism, anti- Markovnikov's addition-radical mechanism). Oxidation Reduction reactions: Principles of Oxidation & Reduction Reactions: Oxidizing and Reducing Agents.		

References

1. Rao, C. N. R. (1973). University General Chemistry: An Introduction To Chemical Science. India: Macmillan India Limited.
2. Chang, R. (2000). Physical Chemistry for the Chemical and Biological Sciences. United Kingdom: University Science Books.
3. Lee, J.D., Concise Inorganic Chemistry, 5TH ED. (2008). India: Wiley India Pvt. Limited.
4. Bajpai, D. N. (2001). Advanced Physical Chemistry. India: S. Chand, Limited.
5. Singh, A. K., Singh, N. B., Das, S. S. (2009). Physical Chemistry: Volume II. India: New Age International

SEMESTER-II
Paper-IV Bioorganic Chemistry- II (UBT2BOC)

Course Objective: To build a firm foundation on the fundamentals of Bioorganic Chemistry and analytical techniques

Learning Outcome: By the end of the course the student will:

- Discuss the basics of lipid biochemistry.
- Illustrate structure, functions and applications of enzymes.
- Develop skills towards the principle, working and applications of different analytical techniques.

Unit	Title	Credits	Lectures
Unit I **Basics of Lipid Chemistry**	Definition and Biological functions of fats and Lipids. Definition of Fatty acids. Sources, Cis-trans forms **Classification of Fatty acids:** Saturated Fatty Acids, Unsaturated Fatty Acids: Definition of MUFA and PUFA. C16- C20. Palmitoleic acid, Oleic, Linoleic, Lenolenic, Arachidonic acid **Storage Lipids**: AcylGlycerols, Types and properties of Triacylglycerols: Hydrolysis, Saponification, Antioxidant, Rancidity, Acid number, RM number, Action of lipase. **Structural lipids:** Phospholipids, Cardiolipin Action of Phospholipase Sterols: Structure and functions Eg: Cholesterol	**2**	**15**
UNIT II **Enzymes**	**Introduction to biocatalysis:** Properties of Enzymes Substrate, Optimum conditions, Co-substrate, Coenzyme, Cofactors Classification and Nomenclature (one reaction per Class) Mechanism of Enzyme Action, Active Sites, Enzyme Specificity, Factors affecting enzyme activity (Effect of pH, Temperature, Substrate Concentration, Enzyme concentration) **Enzyme Kinetics:** Derivation of Michaelis-Menten Equation, Lineweaver-Burk plot, Concept of Km **Types of Enzyme Inhibitions:** Irreversible & Reversible (Competitive, Uncompetitive, Non-Competitive)		**15**

	Isoenzymes Allosteric Modulators, Co-Factors, Zymogens, Enzyme units Oxidizing and Reducing Agents.		
UNIT III Basics of Analytical techniques	**Methods of Separation:** Precipitation, Filtration, Distillation and Solvent Extraction **Chromatography:** Definition, Principles, and applications of Paper Chromatography, Thin Layer Chromatography, Column Chromatography **Spectroscopy, Colorimetry:** Properties of electromagnetic radiation, interaction with matter, lasers Colorimetric assays - Principle, Beer-Lambert's Law, Limitations of Beer-Lambert's Law, **Electrophoresis:** General principles, Factors affecting electrophoresis, Types of support media used, Types of electrophoresis (Agarose gel electrophoresis, PAGE): Oxidizing and Reducing Agents.		**15**

References

1. Cox, M. M., & Nelson, D. L. (2008). Lehninger principles of biochemistry (Vol. 5). New York: Wh Freeman.
2. Conn, E., & Stumpf, P. (2009). Outlines of biochemistry. John Wiley & Sons.
3. Satyanarayana U. and Chakrapani U. (2007). Biochemistry. 3rd Edition. Books and Allied (P) Ltd.
4. Plummer, D. T. (2001). Introduction to practical biochemistry. Tata McGraw-Hill Education.
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6. Skoog, D. A., West, D. M., Holler, F. J., Crouch, S. R. (2014). Fundamentals of Analytical Chemistry. India: Brooks/Cole, Cengage Learning.
7. Principles and Techniques of Biochemistry and Molecular Biology. (2010). United States: Cambridge University Press.
8. Basic principles in Physical and analytical Chemistry F. Y. B. Sc. Pure Chemistry Sem I Unit III.
9. Analytical Chemistry sixth edition by Caryd christian

SEMESTER-II
Paper-V Molecular Biology and Genetic Engineering (UBT2MBG)

Course Objective: To build a firm foundation of molecular biology and Genetic Engineering

Learning Outcome: By the end of the course the student will:

- Compare the replication in prokaryotes and eukaryotes
- Classify the different types of mutations
- Illustrate different DNA repair mechanisms.
- Explain details of genetic engineering

Unit	Title	Credits	Lectures
UNIT I Replication	**DNA Replication in Prokaryotes and Eukaryotes-** Semi-conservative DNA replication, DNA Polymerases and its role, *E.coli* Chromosome Replication, Bidirectional Replication of Circular DNA molecules. Rolling Circle Replication, DNA Replication in Eukaryotes	**2**	**15**
UNIT II Mutation and DNA Repair	**Mutations:** Definition and Types of Mutations. Mutagenesis and Mutagens. (Examples of Physical, Chemical and Biological Mutagens), Types of Point Mutations. **DNA Repair:** Photoreversal, Base excision Repair, Nucleotide Excision Repair, Mismatch Repair, SOS Repair and Recombination Repair		**15**
UNIT III Genetic Engineering	Genetic engineering: Definition and developments. What is gene cloning? Strategy for cloning How to clone a gene? How to construct rDNA? Source DNA [insert], Isolation of DNA from bacterial cell Enzymes in genetic engineering: Restriction endonuclease; DNA ligase; Enzymes to modify ends of DNA molecules - exonuclease; endonuclease; S1 nuclease; alkaline phosphatase; polynucleotide kinase; DNA polymerase and klenow fragment; reverse transcriptase; terminal deoxynucleotidyl transferase.		**15**

	Vectors: Role as agents of transfer Features of plasmid vectors, Plasmid vectors - pBR322, pUC BAC Plant virus vectors and Animal virus vectors Shuttle vector; Expression vector. Host cells: E. coli; Bacillus subtilis; Saccharomyces cerevisiae; Xenopus oocytes; Mammalian fertilized egg cell.		

References

1. Russell, P. J., & Gordey, K. (2002). IGenetics, San Francisco: Benjamin Cummings.
2. Simmons, M. J., & Snustad, D. P. (2006). Principles of genetics. John Wiley & Sons.
3. Russell, P. J. (2000). Fundamentals of genetics. Longman Publishing Group. Nicholl, D. S. T. (2002).
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5. Brown, T. A. (2013). Gene Cloning and DNA Analysis: An Introduction. Germany: Wiley.
6. Genetic Engineering: Principles and Practice. (n.d.). India: McGraw-Hill Education.
7. A Textbook of Biotechnology by R C Dubey 4th Ed
8. Biotechnology: Fundamentals and Applications by S. S. Purohit

SEMESTER-II
Paper-VI Plant and Animal Physiology (UBT2PAP)

Course Objective: To provide an insight in to the different physiological processes of plants and animals.

Learning Outcome: By the end of the course the student will:

- Interpret the intracellular organization of photosynthesis and Pathway
- Explain the Physiological Processes of Plants and functions of plant growth regulators.
- Develop a comprehensive and deep understanding of the vital physiological processes of animals.
- Understand concept of Human Nutrition

Unit	Title	Credits	Lectures
UNIT I Plant Physiology	**Photosynthesis:** Hill's Reaction and its Significance, Light Reactions, Cyclic and Non-Cyclic Photo-induced Electron Flow, Energetics of Photosynthesis, Dark Phase of Photosynthesis, Calvin Cycle, C-3, C-4, CAM pathways, Rubisco oxygenase activity. **Plant hormones:** Structure and physiological roles- Auxin, Gibberellins, Cytokinins, Ethylene, Abscisic acid.	**2**	**15**
UNIT II Animal Physiology	**Introduction to physiology:** Concept of homeostasis. Blood: Functions of blood, general properties of blood, Composition of blood. Coagulation and Haemolysis of Blood. **Respiratory system:** Phases of Respiration, Principle of gaseous exchange, Mechanism of breathing. Digestion and absorption: Digestion and Absorption in humans. **Excretion:** Structure of kidney, Structure of nephron. Function of kidney, Urine formation, Dialysis		
UNIT III Human Nutrition	Definition of Nutrition, **Basal metabolic rate:** Factors affecting BMR, Measurements and its Significance, Human Energy requirement		**15**

	Nutritional importance of Carbohydrates, Fibers Lipids and Proteins		

References

1. Cox, M. M., & Nelson, D. L. (2008). Lehninger principles of biochemistry (Vol. 5). New York: Wh Freeman.
2. Verma, S. K., Verma, M. (2008). A Textbook of Plant Physiology, Biochemistry and Biotechnology. India: S. Chand Limited.
3. Gujral, S. K., Kochhar, S. L. (2020). Plant Physiology: Theory and Applications. United States: Cambridge University Press.
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7. Sherwood, L. (2012). Introduction to Human Physiology. United States: Brooks/Cole.
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SEMESTER-II
Paper-VII Laboratory Skills & Biostatistics (UBT2LSB)

Course Objective: To develop understanding of Laboratory Skills & Biostatistics

Learning Outcome: By the end of the course the student will:

- Make use of GLP,SOP and Biosafety guidelines
- Develop skills towards preparation of standard solutions in the laboratory.
- Understand the role of buffers
- Organize the biological data using statistical tool

Unit	Title	Credits	Lectures
UNIT I Good Laboratory Practices and Biosafety Guidelines	**GLP:** Concept of GLP, Objectives, Practicing GLP, Guidelines to GLP; Documentation of Laboratory work, Preparation of SOPs, Decontamination and Disposal **Safety measures in Laboratory:** Common safety symbols, General Work Procedure, Emergency Procedure, Apparel in the Laboratory, Chemical Handling.	**2**	**15**
UNIT II Standard solutions and Buffers	**Preparation of standard Solutions:** Concept and significance of Chemical and Biological solutions. Normality, Molarity, Molality, Mole fraction, Mole concept, Solubility, Weight ratio, Volume ratio, Weight to Volume ratio, ppb, ppm, millimoles, milliequivalents (Numerical expected). **Primary and Secondary Standards:** Preparation of Standard Solutions, Principle of Volumetric Analysis. **Concept of pH:** Buffer solutions –Concept of Buffers, Derivation of Henderson -Hasselback equation for Acidic and Basic buffers. Buffering capacity **Biological buffers:** Significance of biological buffers, Carbonate, Acetate and Phosphate buffers. Protein buffers (Introduction) Significance of TRIS buffers (Introduction)		**15**
Unit III Biostatistics	**Introduction to Biostatistics:** Definition & Importance of Statistics in Biology Variables, Types of variables (Quantitative & Qualitative) **Types of Data and data visualization:** Concept of Data, Sources of data, Types of data (Quantitative & Qualitative), **Representation of Data and Graphs**		**15**

	Sampling strategies: Population and Sample, Significance of using samples, , Sampling techniques **Types of Statistics:** Introduction to Descriptive & Inferential statistics Measures of central tendency: Mean, Mode, Median (Ungrouped & Grouped data) **Measures of dispersion:** Range, Variance, Standard deviation (Ungrouped & Grouped data), Coefficient of variation **Measures of location:** Percentiles, Interquartile range (Box-Whisker plot) Normal/Gaussian distribution, Standard normal deviate, Sampling variation, Standard error of mean		

References

1. World Health Organization, Laboratory biosafety manual – 3rd ed.2004.
2. A Guide to Biosafety and Biological Safety Cabinets ESCO.
3. Cox, M. M., & Nelson, D. L. (2008). Lehninger principles of biochemistry (Vol. 5). New York: Wh Freeman.
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SEMESTER-II
Paper-VII Communication Skills

Course Objective: To acquaint the students with different aspects of communication skills

Learning Outcome: By the end of the course the student will:

- Develop an understanding of communication skills required to excel in real work environment and corporate life.
- Make use of technical and non-technical qualities in career planning
- Learn about Leadership, team building, decision making and stress management

Unit	Title	Credits	Lectures
UNIT I Academic Skills	Essentials of Grammar: Parts of speech, Articles, Modals, Sentences and their types., Punctuation marks Employment Communication: Introduction, Resume, Curriculum Vitae, Scannable Resume, Developing an Impressive Resume, Formats of Resume, Job Application or Cover Letter. Email Writing Professional Presentation: Nature of Oral Presentation, planning a Presentation, Preparing the Presentation, Delivering the Presentation Job Interviews: Introduction, Importance of Resume, Definition of Interview, Background Information, Types of Interviews, Preparatory Steps for Job Interviews, Interview Skill Tips, Changes in the Interview Process, FAQ During Interviews Group Discussion: Introduction, Ambience/Seating Arrangement for Group Discussion, Importance of Group Discussions, Difference between Group Discussion, Panel Discussion and Debate, Traits, Types of Group Discussions, topic based and Case based Group Discussion, Individual Traits	**2**	**15**
UNIT II Soft and Professional Skills	Introduction to Soft Skills and Hard Skills Personality Development: Knowing Yourself, Positive Thinking, Johari's Window, Communication Skills, Non-verbal Communication, Physical Fitness Definition		**15**

	Etiquette and Mannerism: Introduction, Professional Etiquette, Technology Etiquette Communication Techniques: Ethical Values: Ethics and Society, Theories of Ethics, Correlation, between Values and behavior, Nurturing Ethics, Importance of Work Ethics, Problems in the Absence of Work Ethics Leadership and Team Building: Leader and Leadership, Leadership Traits, Culture and Leadership, Leadership Styles and Trends, Team Building, Types of Teams		

References

1. Kumar, Sanjay, and Lata, Pushp. Communication Skills, Second Edition. India, Oxford University Press, 2015.
2. Chauhan, G. S., Sharma, S. (2016). Soft Skills: An Intergrated Approach to Maximise Personality. India: Wiley.
3. Mitra, B. K. (2011). Personality development and soft skills (Vol. 156). Oxford University Press. 16
4. Guffey, M. E., & Loewy, D. (2012). Essentials of business communication. Cengage Learning.
5. Rao, M. S. (2010). Soft skills-enhancing employability: connecting campus with corporate. IK International Pvt Ltd.
6. Sherfield, R. M. (2009). Cornerstone: Developing Soft Skills. Pearson Education India

PRACTICALS

Course Code	Title
UBT2PR1 (Practical of UBT2BIT2 & UBT2MAI)	1. Preparation of Stock Solutions and Preparation of Media for PTC. 2. Aseptic Transfer Technique, Surface Sterilization (Seed sterilization) 3. Inoculation for Callus Culture. 4. Isolation and characterization of organisms causing Food Spoilage (Using Bergey's Manual) 5. Isolation and characterization of food fermenting organism from idli batter (Using Bergey's Manual) 6. Determination of food preservative concentration (salt & sugar) using MIC. 7. Detection of Food adulterants in food samples 8. Electron micrographs/diagrammatic study of: a. animal viruses (rhabdo, influenza, paramyxo, hepatitis and retroviruses) b. plant viruses (caulimo, gemini, tobacco ringspot, cucumber mosaic and alpha-alpha mosaic viruses) 9. Demonstration of Isolation and enumeration of bacteriophages (PFU) from water/sewage sample using double agar layer technique. 10. Motility by hanging drop method/stab culture 11. Methods of preservation of culture 12. Study of Growth Curve of *E. coli* 13. Preparation of vaccine (Demonstration) and Sterility testing of vaccine 14. Enumeration by Breed's count 15. Isolation and Enumeration of microorganisms- 16. Serial dilution, Surface spread method 17. Serial dilution, Pour plate method

	18. Study of reaction pattern of an antigen with a set of antibodies by Ouchterlony double diffusion method 19. Demonstration of Phagocytosis 20. Study of bacterial flora of skin (as a physical barrier in innate immunity) by swab method/Hand imprint method.
UBT2PR2 (Practical of UBT2BCH2 & UBT2BOC2)	1. To determine enthalpy of dissolution of salt like KNO_3. 2. Determine the rate constant for hydrolysis of ester using HCl as a catalyst. 3. Study the kinetics of reaction between Thiosulphate ion and HCl. 4. Study reaction between potassium Persulphate and Potassium Iodide kinetically and hence to determine order of reaction. 5. Study the reaction between NaHSO3 and KMnO4 and balancing the reaction in acidic, alkaline and neutral medium. 6. Study transfer of electrons (Titration of sodium thiosulphate with potassium dichromate). 7. Determination of the volume strength of hydrogen peroxide solution by titration with standardized potassium permanganate solution. 8. Determination of amount of K oxalate and oxalic acid in the given solution titrimetrically. 9. Qualitative tests for lipids. 10. Iodine value of Oil. 11. Separation by Thin layer chromatography a. Plants Pigments b. Fatty acids. 12. Enzyme Kinetics: 13. Study of the effect of pH 14. Temperature on activity of Amylase 15. Study of Effect of substrate concentration on amylase enzyme activity and determination of Vmax and Km.

	16. Study of Effect of enzyme concentration on amylase enzyme activity. 17. Study of Effect of inhibitors on amylase enzyme activity. 18. Determination of absorption maxima of CuSO4/ K2Cr2O7. 19. Verification of Beer and Lambert's Law. 20. Quantitative estimation of sugars by DNSA method 21. Estimation of DNA by DPA method.
UBT2PR3 (Practical of UBT2MBG & UBT2PAP)	1. Study of Semiconservative replication of DNA through micrographs/ Schematic representation. 2. Agarose gel electrophoresis of genomic DNA 3. Study the effect of UV radiation as a mutagenic agent 4. Identification of types of point mutations from given DNA sequences 5. Isolation of antibiotic/ dye resistant mutants using replica plate technique. 6. Demonstration of Ames test for mutagenicity 7. Study of Hill's reaction 8. To measure the rate of photosynthesis by Winkler's method 9. Effect of PGRs on seed germination 10. Solvent extraction of plant pigments and study the absorption spectra of pigments 11. Qualitative detection of plant secondary metabolites using standard tests - e.g. Tests for tannins, flavonoids, alkaloids, terpenoids, saponins, steroids. 12. Separation of Carotenoids by thin layer chromatography 13. Separation of serum from blood 14. Effect of different concentrations of sodium chloride on RBC and determination of the concentration isotonic to blood. 15. Study of human blood count (RBC and WBC) using haemocytometer 16. Estimation of Hemoglobin in human blood. 17. Analysis of Urine

Janardan Bhagat Shikshan Prasarak Sanstha's
CHANGU KANA THAKUR
ARTS, COMMERCE & SCIENCE COLLEGE,
NEW PANVEL (AUTONOMOUS)

Re-accredited 'A+' Grade by NAAC
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Program: B.Sc
Revised Syllabus of F.Y.B.Sc. Computer Science
Choice Based Credit & Grading System (60:40)
w.e.f. Academic Year 2022-23

Preamble

The rise of Information and Communication Technology (ICT) has profoundly affected modern society. Increasing applications of computers in almost all areas of human endeavor has led to vibrant industries with concurrent rapid change in technology. As the computing field advances at a rapid pace, the students must possess a solid foundation that allows and encourages them to maintain relevant skills as the field evolves. Specific languages and technology platforms change over time. Thus, students must continue to learn and adapt their skills throughout their careers. To develop this ability, students will be exposed to multiple programming languages, tools, paradigms and technologies as well as the fundamental underlying principles throughout this programme. The programme offers required courses such as programming languages, data structures, computer architecture and organization, algorithms, database systems, operating systems, and software engineering; as well as specialized courses in artificial intelligence, computer-based communication networks, distributed computing, information security, graphics, human-computer interaction, multimedia, scientific computing, web technology, and other current topics in computer science. The core philosophy of this programme is to –

- Form strong foundations of Computer Science
- Nurture programming, analytical & design skills for real-world problems.
- Introduce emerging trends to the students in a gradual way.
- Groom the students for the challenges of ICT industry

The students these days not only aspire for a career in the industry but also look for research opportunities. The main aim of this programme is to deliver a modern curriculum that will equip graduates with strong theoretical and practical backgrounds to enable them to excel in the workplace and to be lifelong learners. Not only does it prepare the students for a career in the Software industry, it also motivates them towards further studies and research opportunities. Graduating students, can thus take up postgraduate programmes in CS leading to research as well as R&D, can be employable at IT industries, or can adopt a business management career in the first year i.e., for semester I & II, basic foundation of important skills required for software development is laid.

The syllabus proposes to have four core subjects of Computer science and two core courses of Mathematics-Statistics. All core subjects are proposed to have theory as well as practical tracks. While the Computer Science courses will form fundamental skills for solving computational problems, the Mathematics & Statistics course will inculcate research-oriented acumen. Ability Enhancement Courses on Soft Skill Development will ensure an overall and holistic development of the students. The syllabus design for further semesters encompasses more advanced and specialized courses of Computer Science. We sincerely believe that any student taking this programme will get a very strong foundation and exposure to basics, advanced and emerging trends of the subject. We hope that the students‟ community and teachers‟ fraternity will appreciate the treatment given to the courses in the syllabus.

We wholeheartedly thank all experts who shared their valuable feedback and suggestions in order to improvise the contents; we have sincerely attempted to incorporate each of them. We further thank the members of the Board of Studies for their confidence in us.

Scheme of Examination

A) Internal Assessment: 40 % **40 Marks**

Sr. No.	Particular	Marks
01	One periodical class test / online examination to be conducted in the given semester	20 Marks
02	Continuous Assessment	20 Marks

Question Paper Pattern for Continuous Assessment (Total Marks 20 to be converted in 10 marks)

Marks	Group Project*/ Individual Project	Presentation and write-up	Practical Skills	Open book test	Quiz
5	Hypothesis/Topic of the project	Presentation skill	Demonstration of skill	High order thinking questions (HOTS)	Quiz on application of subject in real life
5	Actual laboratory work/Field work	Knowledge	Viva		
5	Result/output	Quality of ppt	Report		
5	Dissertation/Report	Writing skill	Problem solving ability		

B) Semester End Examination: 60 % **60 Marks**

- Duration: The examination shall be of 2 hours duration.

Theory question paper pattern
1. There shall be four questions each of 15 marks. 2. All questions shall be compulsory with internal options. 3. Question may be subdivided into sub-questions a, b, c… and the allocation of marks depends on the weightage of the unit.

➢ **Passing Standard**

The learners to pass a course shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment and Semester End Examination. The learners shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 24 Out of 60) separately, to pass the course and minimum of Grade D, wherever applicable, to pass a particular semester. A learner will be said to have passed the course if the learner passes the Internal Assessment and Semester End Examination together.

I. **Practical Examination :** – 300 (50 marks x 6 core papers)

II. **Each core subject carries :- 50 Marks**

Sr. No.	Particulars of External	Marks
1	Laboratory Work	40
2	Journal	05
3	Viva	05
	TOTAL	50

Minimum 75 % practical from each core subjects are required to be completed and written in the journal.

(Certified Journal is compulsory for appearing at the time of Practical Exam) ----------

Semester - I *[Under CBCS Scheme]*

Course	Course Type	Course code	Hrs./ week	Internal assessment	Semester - end examination	Total	Credits
Computer Organization and Design	Core	UCS1COD	3	40	60	100	2
Programming with Python I	Core	UCS1PP1	3	40	60	100	2
Programming with C	Core	UCS1PWC	3	40	60	100	2
Database Management Systems – I	Core	UCS1DM1	3	40	60	100	2
Discrete Mathematics	Core	UCS1DMA	3	40	60	100	2
Descriptive Statistics	Core	UCS1DST	3	40	60	100	2
Soft Skill Development	Ability enhancement	UCS1SSD	3	40	60	100	2
Environmental Science		USC1EVS	2	40	60	100	2
Practical of UCS1COD and UCS1PP1	Core	UCS1PR1	6	--	100	100	2
Practical of UCS1PWC and UCS1DM1	Core	UCS1PR2	6	--	100	100	2
Practical of UCS1DMA and UCS1DST	Core	UCS1PR3	6	--	100	100	2

Semester - II
[Under CBCS Scheme]

Course	Course Type	Course code	Hrs./ week	Internal assessment	Semester - end examination	Total	Credits
Object Oriented Programming using C++	Core	UCS2OOP	3	40	60	100	2
Programming with Python II	Core	UCS2PP2	3	40	60	100	2
LINUX	Core	UCS2LIN	3	40	60	100	2
Data Structure	Core	UCS2DST	3	40	60	100	2
Calculus	Core	UCS2CAL	3	40	60	100	2
Statistical Methods	Core	UCS2STM	3	40	60	100	2
Digital Marketing	Ability enhancement	UCS2DIM	3	40	60	100	2
Spoken English		USC2SPC	2	40	60	100	2
Practical of UCS2OOP and UCS2PP2	Core	UCS2PR1	6	--	100	100	2
Practical of UCS2LIN and UCS2DST	Core	UCS2PR2	6	--	100	100	2
Practical of UCS2CAL and UCS2STM	Core	UCS2PR3	6	--	100	100	2

Semester I

Computer Organization and Design

Course Description	
Semester	**I**
Course Name	**Computer Organization and Design**
Course Code	**UCS1COD**
Credit	**2**
Hours	**45**

Course Objectives

1. To understand the basic structure and organization of computers
2. To understand the structure and operation of modern processors and their instruction sets
3. To understand the working of microcontroller

Course Outcomes

1. Explain the underlying principles of computers
2. Analyze the Instruction set architecture
3. Analyze the role of various hardware components of processor
4. Analyze how data is transferred between various peripheral devices in the computer

Course Code **UCS1COD**	**Course Title** **Computer Organization and Design**	**Credits** **02**
Unit I	**Computer Abstractions and Technology:** Basic structure and operation of a computer, functional units and their interaction. Representation of numbers and characters. **Logic circuits and functions:** Combinational circuits and functions: Basic logic gates and functions, truth tables; logic circuits and functions. Minimization with Karnaugh maps. Synthesis of logic functions with and-or-not gates, Nand gates, nor gates. Fan-in and fan-out requirements; tri state buffers. Half adder, full adder, ripple carry adder. (Flip flops) Gated S-R and D latches, edge-triggered D latch. Shift registers and registers. Decoders, multiplexers. Sequential circuits and functions: State diagram and state table; finite state machines and their synthesis.	**15 L**

Unit II	**Microcontroller:** Introduction to microcontroller, Difference between microcontroller and microprocessor Types of microcontrollers, Memory, Instruction set, Applications 8051 microcontroller Architecture **Instruction set architectures:** Memory organization, addressing and operations; word size, big-endian and little-endian arrangements. Instructions, sequencing. Instruction sets for RISC and CISC (examples Altera NIOS II and Free scale ColdFire). Operand addressing modes; pointers; indexing for arrays. Machine language, assembly language, assembler directives. Function calls, processor runtime stack, stack frame. Types of machine instructions: arithmetic, logic, shift, etc. Instruction sets, RISC and CISC examples.	**15 L**
Unit III	**Basic Processor Unit:** Main components of a processor: registers and register files, ALU, control unit, instruction fetch unit, and interfaces to instruction and data memories. Datapath. Instruction fetch and execute; executing arithmetic/logic, memory access and branch instructions; hardwired and micro programmed control for RISC and CISC. Basic I/O: Accessing I/O devices, data transfers between processor and I/O devices. Interrupts and exceptions: interrupt requests and processing.	**15 L**

Textbooks:

1) Carl Hamacher et al., Computer Organization and Embedded Systems, 6 ed., McGraw-Hill 2012
2) Microprocessors and Microcontrollers: Architecture, Kant Krishna

Additional References:

1) Patterson and Hennessy, Computer Organization and Design, Morgan Kaufmann, ARM Edition, 2011
2) R P Jain, Modern Digital Electronics, Tata McGraw Hill Education Pvt. Ltd., 4th Edition, 2010

Sr. No.	Practicals of Computer Organization and Design
1	Study and verify the truth table of various logic gates (NOT, AND, OR, NAND, NOR, EX-OR, and EX-NOR).
2	Simplify given Boolean expression and realize it.
3	Design and verify a half/full adder.
4	Design and verify half/full subtractor.
5	Design a 4-bit magnitude comparator using combinational circuits.
6	Design and verify the operation of flip-flops using logic gates.
7	Verify the operation of a counter.

8	Verify the operation of a 4-bit shift register.
9	Using SPIM, write and test an adding machine program that repeatedly reads in integers and adds them

	into a running sum. The program should stop when it gets an input that is 0, printing out the sum at that point.
10	Perform arithmetic operations based on 8051 microcontrollers using KEIL simulator.

Module/Unit	**Course Description**	Hrs.	CO No.	PSO No.	PO No.
1	Computer Abstraction and technology	15h	1	1	1
2	Instruction set architecture	15h	2	1	2
3	Basic processor unit	15h	3	1	2

Programming with Python-I

Course Description	
Semester	**I**
Course Name	**Programming with Python-I**
Course Code	**UCS1PP1**
Credit	**2**
Hours	**45**

Course Objectives:

1. Master the fundamentals of writing Python scripts
2. Learn core Python scripting elements such as variables and flow control structures
3. Discover how to work with lists and sequence data

Course Outcomes:

1. Understand the pros and cons of scripting languages vs. classical programming languages
2. Understand Python programming basics and paradigm
3. Apply loops, control statements, and string manipulations
4. Illustrate the use of lists, tuples & dictionaries for representing compound data

Course Code UCS1PP1	Course Title Programming with Python-1	Credits 02
Unit I	**Overview of Python**: History; Features of Python, Execution of a Python Program, Python Interpreter, Comparison of Python with C and Java, Installing Python, Writing and Executing First Python Program, Getting Help, IDLE **Data Types, Variables and Other Basic Elements:** Comments, Docstrings, Data types- Numeric Data type, Compound Data Type, Boolean Data type, Dictionary, Sets, Mapping, Basic Elements of Python, Variables **Input and Output Operations:** Input Function, Output Statements, The print () function, The print("string") function, The print (variables list) function, The print(object) function, The print (formatted string) function, Command Line Arguments. **Operators**: Arithmetic operators, Assignment operators, Unary minus operator, Relational operators, Logical operators, Bitwise operators, Membership operators, Identity operators, Precedence of Operators, Associativity of Operators **Control Statements**: The if statement, the if … else Statement, the „if…elif … else" Statement, Loop Statement- while loop, for loop, Infinite loop, Nested loop, the else suite, break statement, continue statement, pass statement, assert statement, return statement	**15 L**
Unit II	**Arrays:** Creating Arrays, Indexing and Slicing of Arrays, Basic Array Operations, Arrays Processing, Mathematical Operations on Array, Aliasing Arrays, Slicing and Indexing in NumPy Arrays, Basic slicing, Advanced Indexing, Dimensions of Arrays, Attributes of an Array, The ndim Attribute, The shape Attribute, The size Attribute, The item size Attribute **Functions**: Function definition and call, Returning Results, Returning Multiple Values from a Function, Built-in Functions, Difference between a Function and a Method, Pass Value by Object Reference, Parameters and Arguments, Formal and Actual Arguments, Positional Arguments, Keyword Arguments, Default Arguments, Arbitrary Arguments, Recursive Functions, Anonymous or Lambda Functions, Using Lambda with the filter() Function, Using Lambda with the map() Function, Using Lambda with the reduce() Function Modules: **OOPS**: What is Object Oriented Programming, what is Procedural Programming, Difference between object-oriented Programming and Procedural Programming, Python OOP's Concept- Object, Class, Encapsulation, Inheritance, Polymorphism, Data Abstraction	**15 L**

Unit III	**Strings**: Creating Strings, Functions of Strings, Working with Strings, Length of a String, Repeating and Concatenating Strings, Checking Membership, Comparing Strings, Removing Spaces, Finding Substrings, Counting Substrings, Immutability, Splitting and Joining Strings, Changing Case, Checking Starting and Ending of a String, Sorting Strings, searching in the Strings, Testing Methods, Formatting Strings, Finding the Number of Characters and Words, Inserting Substrings into a String **List and Tuples**: Lists, List Functions and Methods, List Operations, List Slices, Nested Lists, Tuples, Functions in Tuple **Dictionaries:** Creating a Dictionary, Operators in Dictionary, Dictionary Methods, Using for Loop with Dictionaries, Operations on Dictionaries, Converting Lists into Dictionary, Converting Strings into Dictionary, Passing Dictionaries to Functions, Sorting the Elements of a Dictionary using Lambda, Ordered Dictionaries	**15 L**

Textbooks:

1. Practical Programming: An Introduction to Computer Science Using Python 3, Paul Gries, Jennifer Campbell, Jason Montojo, Pragmatic Bookshelf, 2nd Edition, 2014
2. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016.

Additional References:

1. Programming through Python, M. T Savaliya, R. K. Maurya& G M Magar, Sybgen Learning India, 2020

Sr. No.	Practicals of Programming with Python-1
1	Script and interactive modes; defining a function in the two modes; executing a script; interactively executing a statement list (semicolon-separated sequence of simple statements)
2	Programs using built-in and user-defined functions.
3	Programs based on conditional constructs, the for statement and the range function.
4	Programs related to string manipulation.
5	Write a Python Program for demonstration of an Array, and Adding an element in an array.
6	Programs based on the while statement with break and continue.
7	Programs using built in functions from the time, math and random modules.
8	Programs related to dictionaries.
9	Programs using list comprehensions and anonymous functions.
10	Programs using the built-in methods of the string, list and dictionary classes.
11	Programs using OOP

Module/Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
1	Introduction to Python-1	15h	1	2	1
2	Array, Function, OOPS	15h	2	2	2
3	Strings, List, Tuples, Dictionary	15h	4	2	3

Programming With C

Course Description	
Semester	**I**
Course Name	**Programming with C**
Course Code	**UCS1PWC**
Credit	**2**
Hours	**45**

Course Objectives:

1. Provide basic knowledge of concepts and programming language.
2. Describe implementation of operators, data types and loops.
3. Illustrate the array, pointer and file handling techniques.
4. Use of string functions and evaluation of string operations.

Course Outcome:

1. Explain the basic programming concepts and broad view of programming language.
2. Apply programming concepts such as operators, primitive data types, and loops.
3. Illustrate the use of an array, pointer, and file handling techniques.
4. Demonstrate the use of strings and string handling functions.

Course Code: UCS1PWC	Course Title Programming with C	Credits 02

Unit I	**Programming Paradigms:** Use of Algorithms/Flow Charts for problem solving **Structure of C program**: Header and body, Use of comments. Interpreters' vs compilers, Python vs C. Compilation of a program. **Formatted I/O:** print(), scan (). **Data**: Variables, Constants, data types like: int, float char, double and void, short and long size qualifiers, signed and unsigned qualifiers. Compare with datatypes in Python. Compare static typing in C vs dynamic typing in Python **Variables**: Declaring variables, scope of the variables according to block, hierarchy	**15 L**

	of data types. Compare explicit declarations in C with implicit declarations in Python. **Types of operators**: Arithmetic, relational, logical, compound assignment, increment and decrement, conditional or ternary, bitwise and comma operators. Precedence and order of evaluation, statements and Expressions. Automatic and explicit type conversion. **Iterations**: Control statements for decision making: (i) Branching: if statement, else. if statement, (does the writer mean if-else or nested ifs) switch statement. (ii) Looping: while loop, do…While, for loop. (iii) Jump statements: break, continue and goto	
Unit II	**Arrays:** (One and two dimensional), declaring array variables, initialization of arrays, accessing array elements. Compare array types of C with list and tuple types of Pythons. **Data Input and Output functions**: Character I/O format: getch(), getche(), getchar(), getc(), gets(), putchar(), putc(), puts(). **Manipulating Strings**: Declaring and initializing String variables, Character and string handling functions. Compare with Python strings. **Functions**: Function declaration, function definition, Global and local variables, return statement, calling a function by passing values. **Recursion**: Definition, Recursive functions.	**15 L**
Unit III	**Pointer:** Fundamentals, Pointer variables, Referencing and de-referencing, Pointer Arithmetic, Using Pointers with Arrays, Using Pointers with Strings, Array of Pointers, Pointers as function arguments, Functions returning pointers. **Dynamic Memory Allocation**: malloc (), calloc (), realloc (), free () and sizeof operator. Compare with automatic garbage collection in Python. **Structure**: Declaration of structure, reading and assignment of structure variables, Array of structures, arrays within structures, structures within structures. Compare C structures with Python tuples. **Unions**: Defining and working with unions. **File handling**: Different types of files like text and binary, Different types of functions: fopen (), fclose (), fgetc (), fputc (), fgets (), fputs (), fscanf (), fprintf (), getw (), putw (), fread (), fwrite (), fseek ().	**15 L**
	Textbooks: 1. Programming in ANSI C (Third Edition): E Balagurusamy, TMH **Additional References:** 1. Pradip Dey, Manas Ghosh, "Programming in C", second edition, Oxford University Press 2. Yashavant P. Kanetkar. "Let Us C", BPB Publications	

Sr. No.	Practicals of Programming with C
1	Programs to understand the basic data types and I/O.
2	Programs on Operators and Expressions
3	Programs on decision statements
4	Programs on looping.
5	Programs on arrays.
6	Programs on functions.
7	Programs on structures and unions.
8	Programs on pointers
9	Programs on string manipulations.
10	Programs on basic file operations.

Module/Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
1	Introduction to basic concepts of C	15h	1	1	1
2	Array Implementation	15h	2	1	2
3	Pointer Implementation	15h	3	1	1

Database Management Systems-I

Course Description	
Semester	**I**
Course Name	**Database Management Systems-I**
Course Code	**UCS1DM1**
Credit	**2**
Hours	**45**

Course Objectives:

1. The objective of this course is to introduce the concept of the DBMS with respect to the relational model, to specify the functional and data requirements for a typical database application and to understand creation, manipulation and querying of data in databases

Course Outcome:

After completing the course, students will be able to

1. Evaluate business information problem and the requirements of a problem in terms of data

2. Design the database schema with the use of appropriate data types for storage of data in database
3. Create, manipulate, query and back up the databases
4. Analyze various security mechanisms required for database protection

Course Code UCS1DM1	Course Title Database Management System-I	Credi ts 02
Unit I	**Introduction to DBMS:** Database, DBMS–Definition, Overview of DBMS, Advantages of DBMS, Levels of abstraction, Data independence, DBMS Architecture **Data models:** Client/Server Architecture, Object Based Logical Model, Record Based Logical Model (relational, hierarchical, network) **Entity Relationship Model:** Entities, attributes, entity sets, relations, relationship sets, Additional constraints (key constraints, participation constraints, weak entities, aggregation / generalization, Conceptual Design using ER (entities VS attributes, Entity Vs relationship, binary Vs ternary, constraints beyond ER) **Relational data model:** Domains, attributes, Tuples and Relations, Relational Model Notation, Characteristics of Relations, Relational Constraints - primary key, referential integrity, unique constraint, Null constraint, Check constraint	**15 L**
Unit II	**ER to Table:** Entity to Table, Relationship to tables with and without key constraints. **Schema refinement and Normal forms:** Functional dependencies, first, second, third, and BCNF normal forms based on primary keys, lossless join decomposition. **Relational Algebra:** operations (selection, projection, set operations union, intersection, difference, cross product, Joins –conditional, equi join and natural joins, division) **DDL Statements:** Creating Databases, Using Databases, datatypes, Creating Tables (with integrity constraints – primary key, default, check, not null), Altering Tables, Renaming Tables, Dropping Tables, Truncating Tables, Backing Up and Restoring databases	**15 L**
Unit III	**DML Statements:** Viewing the structure of a table insert, update, delete, select all columns, specific columns, unique records, conditional select, in clause, between clause, limit, aggregate functions (count, min, max, avg, sum), group by clause, having clause **Functions:** String Functions (concat, instr, left, right, mid, length, lcase/lower, ucase/upper, replace, strcmp, trim, ltrim, rtrim), Math Functions (abs, ceil, floor, mod, pow, sqrt, round, truncate) Date Functions (adddate, datediff, day, month, year, hour, min, sec, now, reverse) Joining Tables: inner join, outer join (left outer, right outer, full outer) **Subqueries:** subqueries with IN, EXISTS, subqueries restrictions, Nested subqueries, ANY/ALL clause, correlated subqueries **Database Protection:** Security Issues, Threats to Databases, Security Mechanisms, Role of DBA, Discretionary Access Control Views: (creating, altering dropping, renaming and manipulating views)	**15 L**

	DCL Statements: (creating/dropping users, privileges introduction, granting/revoking privileges, viewing privileges)	

Textbooks:

1) Ramez Elmasri & Shamkant B.Navathe, Fundamentals of Database Systems, Pearson Education, Sixth Edition, 2010
2) Ramakrishnam, Gehrke, Database Management Systems, McGraw-Hill, 2007
3) Joel Murach, Murach's MySQL, Murach, 2012

Additional References:

1) Robert Sheldon, Geoff Moes, Begning MySQL, Wrox Press, 2005.

Sr. No.	Practicals of Database Management System
1	For given scenario • Draw an E-R diagram and convert entities and relationships to tables.
2	Write relational algebra queries on the tables created in Practical-1.
3	Perform the following: • Viewing all databases • Creating a Database • Viewing all Tables in a Database • Creating Tables (With and Without Constraints) • Inserting/Updating/Deleting Records in a Table • Saving (Commit) and Undoing (rollback)
4	Perform the following: • Altering a Table • Dropping/Truncating/Renaming Tables • Backing up / Restoring a Database
5	Perform the following: • Simple Queries • Simple Queries with Aggregate functions • Queries with Aggregate functions (group by and having clause)
6	Queries involving • Date Functions • String Functions • Math Functions
7	Join Queries • Inner Join • Outer Join
8	Subqueries • With IN clause • With EXISTS clause
9	Views • Creating Views (with and without check option) • Dropping views • Selecting from a view

10	DCL statements • Granting and revoking permissions

Module/Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
1	Introduction to DBMS	15h	1	1	2
2	Schema refinement and normal forms	15h	2	2	3
3	Database Protection	15h	4	3	4

Discrete Mathematics

Course Description	
Semester	**I**
Course Name	**Discrete Mathematics**
Course Code	**UCS1DMA**
Credit	**2**
Hours	**45**

Course Objectives:

1. The purpose of the course is to familiarize the prospective learners with mathematical structures that are fundamentally discrete.
2. This course introduces sets and functions, forming and solving recurrence relations and different counting principles. These concepts are useful to study or describe objects or problems in computer algorithms and programming languages.

Course Outcome:

After completing the course, Student will be able to

1. Explain function and relation
2. Solve the problems on recurrence relation
3. Solve the problems by using the permutation, combination and counting principle
4. Examine the properties of graph, application of graph and tree

Course Code: UCS1DMA	Course Title Discrete Mathematics	Credits 02
UNIT I	**Functions:** Definition of function. Domain, co domain and the range of a function. Direct and inverse images. Injective, surjective and bijective functions. Composite and inverse functions. **Relations**: Definition and examples. Properties of relations, Partial Ordering sets, Linear Ordering Hasse Daigrams , Maximum and Minimum elements, Lattices **Recurrence Relations:** Definition of recurrence relations, formulating recurrence	**15L**

	relations, solving recurrence relations- Back tracking method, Linear homogeneous recurrence relations with constant coefficients. Solving linear homogeneous recurrence relations with constant coefficients of degree two when characteristic equation has distinct roots and only one root, Particular solutions of nonlinear homogeneous recurrence relation, Solution of recurrence relation by the method of generation functions, Applications- Formulate and solve recurrence relation for Fibonacci numbers, Tower of Hanoi, Intersection of lines in a plane, Sorting Algorithms	
Unit II	**Counting Principles Permutations and Combinations:** Partition and Distribution of objects, Permutation with distinct and indistinct objects, Binomial numbers, Combination with identities: Pascal Identity, Vandermonde's Identity, Pascal triangle, Binomial theorem, Combination with indistinct objects. **Counting Principles:** Sum and Product Rules, Two-way counting, Tree diagram for solving counting problems, Pigeonhole Principle (without proof); Simple examples, Inclusion Exclusion Principle (Sieve formula) (Without proof).	**15 L**
Unit III	**Graphs :** Definition and elementary results, Adjacency matrix, path matrix, representing relations using diagraphs, Warshall's algorithm- shortest path, Linked representation of a graph, Operations on graph with algorithms – searching in a graph; Insertion in a graph, Deleting from a graph, Traversing graph- Breadth First search and Depth-First search. **Trees:** Definition and elementary results. Ordered, rooted tree, Binary tree, Complete and extended binary trees, representing binary trees in memory, traversing binary trees, binary search tree, Algorithms for searching and inserting in binary search trees, Algorithms for deleting in a binary search tree.	**15 L**

Textbooks:

1. Discrete Mathematics and Its Applications, Seventh Edition by Kenneth H. Rosen, McGraw Hill Education (India) Private Limited. (2011)
2. Norman L. Biggs, Discrete Mathematics, Revised Edition, Clarendon Press, Oxford 1989.
3. Data Structures Seymour Lipschutz, Schaum's out lines, McGraw- Hill Inc.

Additional References:

1. Elements of Discrete Mathematics: C.L. Liu, Tata McGraw- Hill Edition
2. Concrete Mathematics (Foundation for Computer Science): Graham, Knuth, Patashnik Second Edition, Pearson Education.
3. Discrete Mathematics: Semyour Lipschutz, Marc Lipson, Schaum's outlines, McGraw- Hill Inc.

Foundations in Discrete Mathematics: K.D. Joshi, New Age Publication, New Delhi.

Sr. No.	Practical of Discrete Mathematics
1	Graphs of standard functions such as absolute value function, inverse function, logarithmic and exponential functions, flooring and ceiling functions, trigonometric functions over suitable intervals.
2	Equivalence Relation and Partial ordering sets.
3	Hasse diagram and Lattices.
4	Recurrence relation.

5	Permutations and Combinations.
6	Different counting principles.
7	Shortest Path algorithms.
8	Operations on graph.
9	Breadth and Depth First search algorithms.
10	Concept of searching, inserting and deleting from binary search trees.

Module/Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
1	Recurrence Relations	15h	1,2		6
2	Counting Principles	15h	3		1
3	Graphs and Trees	15h	4		1

Descriptive Statistics

Course Description	
Semester	**I**
Course Name	**Descriptive Statistics**
Course Code	**UCS1DST**
Credit	**2**
Hours	**45**

Course Objectives:

The purpose of this course is to familiarize students with the basics of Statistics. This will be essential for prospective researchers and professionals to know these basics.

Course Outcome:

After completing the course, students will be able to

1. Understand and present data using table and graphs
2. Apply measures of central tendency and dispersion to draw conclusions
3. Apply the basic probability rules and theorem in problem-solving
4. Apply the method of least squares to estimate the parameters in a regression model

Course Code UCS1STS	Course Title Descriptive Statistics	Credits 02
Unit I	**Data types and Data presentation:** Data Types: attribute, variable, discrete and continuous variable, Different types of scales: nominal, ordinal, interval and ratio. Data presentation: frequency distribution, histogram o gives, curves, stem and leaf display. **Introduction to R:** Data input, Arithmetic Operators, Vector Operations, Matrix Operations, Data Frames, Built-in Functions. Frequency Distribution, Grouped Frequency Distribution, Diagrams and Graphs, Summary statistics for raw data and grouped frequency distribution. **Measures of Central tendency:** Mean, Median, mode for raw data, discrete, grouped frequency distribution. Partition Values: Quartiles, Deciles and Percentiles - examples for ungrouped and grouped data.	**15 L**
Unit II	**Measures dispersion:** Concept of dispersion, Absolute and Relative measure of dispersion, characteristics of good measure of dispersion. Range, Semi-interquartile range, Quartile deviation, Standard deviation - Definition, examples for ungrouped and grouped data, effect of shift of origin and change of scale, merits and demerits. Combined standard deviation, Variance. Coefficient of range, Coefficient of quartile deviation and Coefficient of variation (C.V.) **Moments:** Concept of Moments, Raw moments, Central moments, Relation between raw and central moments. Measures of Skewness and Kurtosis: Concept of Skewness and Kurtosis, measures based on moments, quartiles.	**15h**
Unit III	**Time-series:** Concepts and components of a time series. Representation of trend by freehand curve method, estimation of trend using the moving average method and least-squares methods. **Correlation:** Concept of correlation, Types and interpretation, Measure of Correlation: Scatter diagram and interpretation; Karl Pearson's coefficient of correlation (r): Definition, examples for ungrouped and grouped data, effect of shift of origin and change of scale, properties; Spearman's rank correlation coefficient: Definition, examples of with and without repetition. Concept of Multiple correlation. **Regression:** Concept of dependent (response) and independent (predictor) variables, the concept of regression, Types and prediction, difference between correlation and regression, Relation between correlation and regression	**15h**

Textbooks:

1. Gupta, S.C. and Kapoor, V.K. (1987): Fundamentals of Mathematical Statistics, S. and Sons, New Delhi
2. Goon, A. M., Gupta, M. K. and Dasgupta, B. (1983). Fundamentals of Statistics, Vol. 1, Sixth Revised Edition, The World Press Pvt. Ltd., Calcutta.

Additional References:

1. Mood, A. M. and Graybill, F. A. and Boes D.C. (1974). Introduction to the Theory of Statistics, Ed. 3, McGraw Hill Book Company.
2. Hoel P. G. (1971). Introduction to Mathematical Statistics, John Wiley and Sons, New York.
3. Hogg, R.V. and Craig R.G. (1989). Introduction to Mathematical Statistics, Ed. MacMillan Publishing Co., New York.
4. Walpole R. E., Myers R. H. and Myers S. L. (1985), Probability and Statistics for Engineers and Scientists Agarwal, B. L. (2003). Programmed Statistics, Second Edition, New Age International Publishers, New Delhi

Sr. No.	Practical of Descriptive Statistics
1	Data entry using, functions, c(), scan (), Creating vectors, Mathematical Operations: ** +/-/*/ / ^ , exp, log, log10, etc., creating vector of text type.
2	Useful functions of R: data frame, matrix operations, seq(), split() etc.
3	Frequency distribution
4	Data presentation
5	Measures of central tendency
6	Measures of dispersion
7	Summary Statistics (measures of central tendency, dispersion)
8	Moments: Raw moments and central moments
9	Measures of skewness and kurtosis
10	Correlation and regression

Module/Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
1	Data types and Data presentation, Introduction to R, Measures of Central tendency	15h	1, 2	2	1
2	Measures dispersion, Moments, Measures of Skewness and Kurtosis	15h	2	2	7
3	Time-series, Correlation, Regression	15h	4	3	2

Course Description	
Semester	**I**

Course Name	**Soft Skill Development**
Course Code	**UCS1SSD**
Credit	**2**
Hours	**45**

Course Objectives:

- Understand the significance and essence of a wide range of soft skills
- Learn how to apply soft skills in a wide range of routine social and professional settings
- Learn how to employ soft skills to improve interpersonal relationships
- Learn how to employ soft skills to enhance employability and ensure workplace and career success

Course Outcomes

After completing the course, students will be able to

- Learners will be able to understand the importance and types soft skills
- Learners will develop skills for Academic and Professional Presentations.
- Learners will able to understand Leadership Qualities and Ethics.
- Ability to understand the importance of stress management in their academic & professional life.

Course Code UCS1SSD	**Course Title** **Soft Skill Development**	**Credits 02**
Unit I	**Introduction to Soft Skills** **Soft Skills: An Introduction –** Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development. **Personality Development:** Knowing Yourself, Positive Thinking, Johari‟s Window, Physical Fitness **Emotional Intelligence:** Meaning and Definition, Need for Emotional Intelligence, Intelligence Quotient versus Emotional Intelligence Quotient, Components of Emotional Intelligence, Competencies of Emotional Intelligence, Skills to Develop Emotional Intelligence **Positivity and Motivation:** Developing Positive Thinking and Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels **Etiquette and Mannerism:** Introduction, Professional Etiquette, Technology Etiquette **Ethical Values:** Ethics and Society, Theories of Ethics, Correlation between Values and Behavior, Nurturing Ethics, Importance of Work Ethics, Problems in the Absence of Work Ethicsand Graphs, Summary statistics for raw data and grouped frequency distribution.	**15 L**

Unit II	**Basic Skills in Communication:** **Components of effective communication:** Communication process and handling them, Composing effective messages, Non – Verbal Communication: its importance and nuances: Facial Expression, Posture, Gesture, Eye contact, appearance (dress code). **Communication Skills:** Spoken English, Phonetics, Accent, Intonation **Employment Communication:** Introduction, Resume, Curriculum Vitae, Scannable Resume, Developing an Impressive Resume, Formats of Resume, Job Application or Cover Letter **Job Interviews:** Introduction, Importance of Resume, Definition of Interview, Background Information, Types of Interviews, Preparatory Steps for Job Interviews, Interview Skill Tips, Changes in the Interview Process, FAQ During Interviews	**15h**

	Group Discussion: Introduction, Ambience/Seating Arrangement for Group Discussion, Importance of Group Discussions, Difference between Group Discussion, Panel Discussion and Debate, Traits, Types of Group Discussions, topic based and Case based Group Discussion, Individual Traits	
Unit III	**Academic and Professional Skills:** **Professional Presentation:** Nature of Oral Presentation, planning a Presentation, Preparing the Presentation, Delivering the Presentation **Creativity at Workplace:** Introduction, Current Workplaces, Creativity, Motivation, Nurturing Hobbies at Work, The Six Thinking Hat Method. **Capacity Building: Learn, Unlearn and Relearn**: Capacity Building, Elements of Capacity Building, Zones of Learning, Ideas for Learning, Strategies for Capacity Building **Leadership and Team Building:** Leader and Leadership, Leadership Traits, Culture and Leadership, Leadership Styles and Trends, Team Building, Types of Teams. **Decision Making and Negotiation:** Introduction to Decision Making, Steps for Decision Making, Decision Making Techniques, Negotiation Fundamentals, Negotiation Styles, Major Negotiation Concepts **Stress and Time Management:** Stress, Sources of Stress, Ways to Cope with Stress	**15h**

Textbooks:

1. Managing Soft Skills for Personality Development – edited by B.N.Ghosh, McGraw Hill India, 2017.
2. Soft Skills: An Integrated Approach to Maximize Personality, Gajendra S. Chauhan, Sangeeta Sharma, Wiley India

Additional References:

1. Personality Development and Soft Skills, Barun K. Mitra, Oxford Press
2. Business Communication, ShaliniKalia, Shailja Agrawal, Wiley India
3. Cornerstone: Developing Soft Skills, Sherfield, Pearson India

Module/Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
Unit I	Personality Development	15L	1	3	5
Unit II	Employment Communication	15L	2	3	5
Unit III	Leadership and Team Building	15L	3	3	9

Semester II

Object Oriented Programming using C++

Semester	**II**
Course Name	**Object Oriented Programming with C++**
Course Code	**UCS2OOP**
Credit	**2**
Hours	**3**

Course Objectives

The objective of course is to develop programming skills of students, using object oriented programming concepts, learn the concept of class and object using C++ and develop classes for simple applications.

Course Outcomes

After completing the course, Student will be able to

1. Understand object-oriented programming and the difference between structured oriented and object-oriented programming features.
2. Explain use of objects and classes for developing programs.
3. Apply virtual and pure virtual function & complex programming situations.

4. Illustrate various object-oriented concepts to solve different problems.

Course Code UCS2OOP	Course Title Object Oriented Programming using C++	Credits 02
Unit I	**Introduction to Programming Concepts:** Object oriented programming paradigm, basic concepts of object oriented programming, benefits of object oriented programming, object oriented languages, applications of object oriented programming. Tokens-keywords, identifiers, constants-integer, real, character and string constants, backslash constants, features of C++ and its basic structure, simple C++ program without class, compiling and running C++program. **Data Types, Data Input Output and Operators:** Basic data types, variables, rules for naming variables, programming constants, the type cast operator, implicit and explicit type casting, cout and cin statements, operators, precedence of operators. **Decision Making, Loops, Arrays and Strings:** Conditional statements-if, if...else, switch loops- while, do...while, for, types of arrays and string and string manipulations **Unified Modeling Language (UML):** Introduction to UML & class diagrams. **Classes, Abstraction & Encapsulation:** Classes and objects, Dot Operator, data members, member functions, passing data to functions, scope and visibility of variables in function	**15L**
Unit II	**Constructors and Destructors:** Default constructor, parameterized constructor, copy constructor, private constructor, destructors. **Working with objects:** Accessor - mutator methods, static data and static function, access specifiers, array of objects. **Polymorphism** - Binding-static binding & overloading, constructor overloading function overloading, operator overloading, overloading unary and binary operators. **Modelling Relationships in Class Diagrams:** Association, Aggregation Composition and examples covering these principles	**15L**

Unit III	**Inheritance:** Defining base class and its derived class, access specifiers, types of inheritance-single, multiple, hierarchical, multilevel, hybrid inheritance, friend function and friend class, constructors in derived classes. **Modelling Relationships:** Generalization-Specialization and examples covering these principles Run time Polymorphism - Dynamic Binding, Function overriding, virtual function, pure virtual function, virtual base class, abstract class. **Pointers:** Introduction to pointers, * and & operators, assigning addresses to pointer variables, accessing values using pointers, pointers to objects & this pointer, pointers to derived classes File Handling: File Stream classes, opening and closing file-file opening modes, text file handling, binary file handling. **Applying OOP to solve real life applications:** To cover case studies like library management, order management etc. to design classes covering all relationships	**15L**

Textbooks:

1. Object Oriented Programming with C++, Balagurusamy E., 8th Edition, McGraw Hill Education India.
2. UML & C++: A Practical Guide to Object Oriented Development, Lee/Tepfenhart, Pearson Education, 2nd Edition2015

Additional References:

1. Mastering C++ by Venugopal, Publisher: McGraw-Hill Education, 2017
2. Let Us C++ by KanetkarYashwant, Publisher: BPB Publications, 2020
3. Object Oriented Analysis and Design by Timothy Budd TMH, 2001

Sr. No.	Practicals of Object Oriented Programming Using C++
1.	**Classes and methods**
	a. Design an employee class for reading and displaying the employee information, the getInfo() and displayInfo() methods will be used respectively. Where getInfo() will be private method
	b. Design the class student containing getData() and displayData() as two of its methods which will be used for reading and displaying the student information respectively. Where getData() will be private method
2.	**Classes and methods**
	a. Design the class Demo which will contain the following methods: readNo(), factorial() for calculating the factorial of a number, reverseNo() will reverse the given number, isPalindrome() will check the given number is palindrome, isArmstrong() which will calculate the given number is armStrong or not.
	b. Write a program to demonstrate function definition outside class and accessing class members in function definition.

3.	**Using friend functions**
	a. Write a friend function for adding the two complex numbers, using a single class.
	b. Write a friend function for adding the two different distances and display its sum, using two classes
4.	**Constructors and method overloading**
	a. Design a class Geometry containing the methods area() and volume() and also overload the area() function .
	b. Design a class Complex for adding the two complex numbers and also show the use of constructor.
5.	**Operator Overloading**
	a. Overload the operator unary(-) for demonstrating operator overloading.
	b. Overload the + for concatenating the two strings. For e.g., “Py” + “thon” = Python.
6.	**Inheritance**
	a. Design a class for single level inheritance.
	b. Design a class for multiple inheritance.
	c. Implement hierarchical inheritance.
7.	**Virtual functions and abstract classes**
	a. Implement the concept of method overriding.
	b. Show the use of virtual functions.
	c. Show the implementation of abstract class.
8.	**Exception handling**
	a. Show the implementation of exception handling.
	b. Show the implementation for exception handling for strings.
9.	**Multi-Threading**
	Program to demonstrate multithreading concept.
10.	**Mini project on OOPs/ Case Study**

Module/Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
Unit I	Introduction to OOP’s	15L	1	2	2
Unit II	Core Concepts of OOP’s	15L	2	2	6
Unit III	Advance Concepts of OOP’s	15L	3	2	9

Programming with Python-II

Course Description	
Semester	**II**
Course Name	**Programming with Python –II**
Course Code	**UCS2PP2**
Credit	**2**
Hours	**3**

Course Objectives:

1. Use Python to read and write files
2. Make their code robust by handling errors and exceptions properly
3. Work with the Python standard library
4. Explore Python's object-oriented features
5. Search text using regular expressions

Course Outcomes:

1. Demonstrate programs using simple Python statements and expressions.
2. Explain files, exceptions, modules and packages in Python for solving problems.
3. To develop the skill of designing Graphical user Interfaces in Python
4. To Learn how to import modules and packages and game development using Python and the use of Database Connectivity.

Module/Unit	Course Title Programming With Python II	Credits 02
Unit I	**Python File Input-Output:** Opening and closing files, various types of file modes, reading and writing to files, manipulating directories. **Iterables:** iterators and their problem-solving applications. **Exception handling:** What is an exception, various keywords to handle exceptions such try, catch, except, else, finally, raise. **Regular Expressions:** Concept of regular expression, various types of regular expressions, using match function.	**15L**

Unit II	**GUI Programming in Python** (using Tkinter/wxPython/Qt) What is GUI, Advantages of GUI, Introduction to GUI library. Layout management, events and bindings, fonts, colors, drawing on canvas (line, oval, rectangle, etc.) Widgets such as : frame, label, button, check button, entry, list box, message, radio button, text, spin box etc.	**15L**
Unit III	**Database connectivity in Python**: Installing MySQL connector, accessing connector module, using connect, cursor, execute & close functions, reading single & multiple results of query execution, executing different types of statements, executing transactions, understanding exceptions in database connectivity **Game Design**: - Introduction to google collab notebook, Introduction to Jupiter notebook, Pygame:-, how to create the game window, Creating Basic Movements and key Press, changing title and background color, adding images, Adding Sounds Adding Effects etc.	**15L**

Textbooks:

Paul Gries , Jennifer Campbell, Jason Montojo, Practical Programming: An Introduction to Computer Science Using Python 3, Pragmatic Bookshelf, 2/E 2014

Additional References:

1. James Payne , Beginning Python: Using Python 2.6 and Python 3, Wiley India, 2010
2. A. Lukaszewski, MySQL for Python: Database Access Made Easy, Pact Publisher, 2010
3. Making Games with Python & Pygame

Sr. No.	Practicals of Programming with Python-II
1	Programs to read and write files.
2	Programs with iterables and iterators.
3	Program to demonstrate exception handling
4	Program to demonstrate the use of regular expressions
5	Program to show draw shapes & GUI controls.:- a. Advance Calculator b. Simple Interest Form
6	Program to show draw shapes & GUI controls.:- a. Pizza Ordering GUI Form b. BMI Calculator GUI Form
7	Write a Python Program on database connectivity to illustrate the use of DML statements such as update & table
8	Create a Python Game in Google-Collaboratory notebook.
9	Create a Python Game in Jupyter Notebook

Module/Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
1.	Python File Input-Output	15h	2	2	2
2.	GUI	15h	3	2	2
3.	Database Connectivity& Game Design	15h	4	2	3

Linux

Course Description	
Semester	**II**
Course Name	**Linux**
Course Code	**UCS2LIN**
Credit	**2**
Hours	**3**

Course Objectives:

1. This course introduces various tools and techniques commonly used by Linux programmers, system administrators and end users to achieve their day-to-day work in Linux environment.
2. It is designed for computer students who have limited or no previous exposure to Linux.

Course Outcomes:

After completing the course, Student will be able to

1. Explain the Importance of Linux in Software Ecosystem and Architecture of Linux
2. Apply various command line utilities.
3. Design Network using IP address, DNS and different network protocols.
4. Apply System Administrative task on network.

Course Code UCS2LIN	Course Title Linux	Credits 02
Unit I	**Introduction:** History of Linux, Philosophy, Community, Terminology, Distributions, Linux kernel vs distribution. Why learns Linux? Importance of Linux in software ecosystem: web servers, supercomputers, mobile, servers. **Installation:** Installation methods, Hands on Installation using CD/DVD or USB drive. **Linux Structure:** Linux Architecture, Filesystem basics, The boot process, init scripts, runlevels, shutdown process, very basic introductions to Linux processes, Packaging methods: rpm/deb, Graphical Vs Command line.	**15L**

Unit II	**Graphical Desktop:** Session Management, Basic Desktop Operations, Network Management, Installing and Updating Software, Text editors: gedit, vi, vim, emacs, Graphics editors, Multimedia applications. **Command Line:** Command line mode options, Shells, Basic Commands, General Purpose Utilities, Installing Software, User management, Environment variables, Command aliases. **Linux Documentation:** man pages, GNU info, help command, More documentation sources. **File Operations:** Filesystem, Filesystem architecture, File types, File attributes, Working with files, Backup, compression	**15L**
Unit III	**Security:** Understanding Linux Security, Uses of root, sudo command, working with passwords, Bypassing user authentication, Understanding ssh **Networking:** Basic introduction to Networking, Network protocols: http, ftp etc., IP address, DNS, Browsers, Transferring files. ssh, telnet, ping, traceroute, route, hostname, networking GUI. **Basic Shell Scripting:** Features and capabilities, Syntax, Constructs, modifying files, Sed, awk command, File manipulation utilities, dealing with large files and Text, String manipulation, Boolean expressions, File tests, Case, Debugging, Regular expressions	**15L**

Textbooks:

1. "Linux Command line and Shell Scripting Bible", Richard Blum, Wiley India.
2. "Unix: Concepts and Applications", Sumitabha Das, 4th Edition, McGraw Hill.
3. "Official Ubuntu Book", Matthew Helmke& Elizabeth K. Joseph with Jose Antonio Rey and Philips Ballew, 8th Ed.

Additional References:

1. "Linux Administration: A Beginner's Guide", Fifth Edition, Wale Soyinka, Tata McGraw-Hill, 2008.
2. "Linux: Complete Reference", Richard Petersen, 6th Edition, Tata McGraw-Hill
3. "Beginning Linux Programming", Neil Mathew, 4th Edition, Wiley Publishing, 2008.

Sr. No.	Practicals of Linux
1.	**Installation of Ubuntu Linux operating system.** a. Booting and Installing from (USB/DVD) b. Using Ubuntu Software center / Using Synaptic Explore useful software packages.

2	**Becoming an Ubuntu power user** a. Administering system and User setting b. Learning Unity keyboard c. Using the Terminal d. Working with windows programs
3	**File System Commands:** touch, help, man, more, less, pwd, cd, mkdir, rmdir, ls, find, ls, etc **File handling Commands:** cat, cp, rm, mv, more, file, wc, od, cmp, diff, comm, chmod, chown, chgrp, gzip and gunzip, zip and unzip, tar, ln, umask,, chmod, chgrp, chown, etc
4.	**General purpose utility Commands:**cal, date, echo, man, printf, passwd, script, who, uname, tty, stty, etc **Simple Filters and I/O redirection:** head, tail, cut paste, sort, grep family, tee, uniq, tr, etc. **Networking Commands:** who, whoami, ping, telnet, ftp, ssh, etc
5.	**Editors:** vi, sed, awk
6.	**Working and Managing with processes-** sh, ps, kill, nice, at and batch etc.
7.	**Shell scripting I:** Defining variables, reading user input, exit and exit status commands, , expr, test, [], if conditional, logical operators
8.	**Shell scripting II:** Conditions (for loop, until loop and while loop) arithmetic operations, examples
9.	**Shell scripting III:** Redirecting Input / Output in scripts, creating your own Redirection
10.	Installation of C/C++/Java/Python Compiler and creating an environment for app development. Basic programming using C and Python Languages.

Module/Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
1.	Introduction, Installation, Linux Structure	15h	1	3	1
2.	Graphical Desktop, Command Line , Linux Documentation, File Operations	15h	2	2	1
3.	Security, Networking, Basic Shell Scripting	15h	3	3	3

Data Structures

Course Description	
Semester	**II**
Course Name	**Data Structures**
Course Code	**UCS2DST**

Credit	**2**
Hours	**45**

Course Objectives:

1. Explain data structures and different abstract data types.
2. Learn how to implement linked and linear structures.
3. Discuss various probing techniques and clustering.
4. Demonstrate binary tree traversals, heap and search trees.

Course Outcomes:

1. Describe data structures and different abstract data types.
2. Apply implementation of linked and linear structures.
3. Differentiate linear probing, rehashing and clustering.
4. Evaluate different binary tree traversals, heap and search trees and its implementation.

Course Code: UCS2DST	**Course Title Data Structure**	**Credits 02**
Unit I	**Abstract Data Types:** Introduction, The Date Abstract Data Type, Bags, Iterators. Application **Arrays:** Array Structure, Python List, Two Dimensional Arrays, Matrix Abstract Datatype, Application **Sets and Maps:** Sets-Set ADT, Selecting Data Structure, List based Implementation, Maps-Map ADT, List Based Implementation, Multi- Dimensional Arrays-Multi-Array ADT, Implementing Multiarray, Application **Algorithm Analysis:** Complexity Analysis-Big-O Notation, Evaluating Python Code, Evaluating Python List, Amortized Cost, Evaluating Set ADT, Application **Searching and Sorting:** Searching-Linear Search, Binary Search, Sorting- Bubble, Selection and Insertion Sort, **Working with Sorted Lists-**Maintaining Sorted List, Maintaining sorted Lists	**15 L**
Unit II	**Linked Structures:** Introduction, Singly Linked List-Traversing, Searching, Prepending and Removing Nodes, Bag ADT-Linked List Implementation. Comparing Implementations, Linked List Iterators, More Ways to Build Linked Lists, Applications-Polynomials. **Stacks:** Stack ADT, Implementing Stacks-Using Python List, Using Linked List, Stack Applications-Balanced Delimiters, Evaluating Postfix Expressions. **Queues:** Queue ADT, Implementing Queue-Using Python List, Circular Array, Using List, Priority Queues- Priority Queue ADT, Bounded and unbounded Priority Queues. **Advanced Linked List:** Doubly Linked Lists-Organization and Operation, Circular Linked List-Organization and Operation, Multi Lists	**15 L**

Unit III	**Recursion:** Recursive Functions, Properties of Recursion, Its working, Recursive Applications. **Hash Table:** Introduction, Hashing-Linear Probing, Clustering, Rehashing, Separate Chaining, Hash Functions Advanced Sorting: Merge Sort, Quick Sort, Radix Sort, Sorting Linked List **Binary Trees:** Tree Structure, Binary Tree-Properties, Implementation and Traversals, Expression Trees, Heaps and Heapsort, Search Trees	**15 L**

Textbooks:

1. Data Structure and algorithm Using Python, Rance D. Necaise, 2016 Wiley India Edition
2. Data Structure and Algorithm in Python, Michael T. Goodrich, Robertom Tamassia, M. H. Goldwasser, 2016 Wiley India Edition

Additional References:

1. Data Structure and Algorithmic Thinking with Python- Narasimha Karumanchi, 2015, Careermonk Publications
2. Fundamentals of Python: Data Structures, Kenneth Lambert, Delmar Cengage Learning

Sr.No.	Practicals of Data Structure
1	Implement Linear Search to find an item in a list.
2	Implement binary search to find an item in an ordered list
3	Implement Sorting Algorithms a. Bubble sort b. Insertion sort c. Quick sort d. Merge sort
4	Implement use of Sets and various operations on Sets.
5	Implement working of Stacks. (pop method to take the last item added off the stack and a push method to add an item to the stack)
6	Implement Program for a. Infix to Postfix conversion b. Postfix Evolution
7	Implement the following a. A queue as a list which you add and delete items from. b. A circular queue. (The beginning items of the queue can be reused).
8	Implement Linked list and demonstrate the functionality to add and delete items in the linked list.
9	Implement Binary Tree and its traversals.
10	Recursive implementation of a. Factorial b. Fibonacci c. Tower of Hanoi

Module/Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
1	Introduction to data structures and ADTs	15h	1	1	1
2	Linked and linear structures	15h	2	1	2
3	Clustering, Binary tree	15h	4	1	2

Calculus

Course Description	
Semester	**II**
Course Name	**Calculus**
Course Code	**UCS2CAL**
Credit	**2**
Hours	**45**

Course Objectives:

The course is designed to have a grasp of important concepts of Calculus in a scientific way. It covers topics from as basic as definition of functions to partial derivatives of functions in a gradual and logical way. The learner is expected to solve as many examples as possible to a get compete clarity and understanding of the topics covered.

Course Outcome:

After completing the course, Student will be able to

1. Recall the limit, continuity and derivative of a function
2. Analyze the properties of Functions
3. Evaluate partial derivatives, directional derivatives , maxima and minima of functions of two variables
4. Classify the first order differential equation

Course Code: UCS2CAL	Course Title Calculus	Credits 02
Unit I	**Derivatives and its applications:** Review of Functions, limit of a function, continuity of a function, derivative of a function. Derivative in Graphing and Applications: Analysis of Functions: Increasing, Decreasing, Concavity, Relative Extrema. Graphing Polynomials, Rational Functions, Cusps and Vertical Tangents. Absolute Maxima and Minima, Applied Maximum and Minimum Problems, Newton's Method.	**15 L**
Unit II	**Partial derivatives and its applications:** Functions of Two or More Variables, Limits and Continuity, Partial Derivatives, Differentiability, Differentials and Local Linearity, Chain Rule, Directional Derivatives and Gradients, Tangent Planes and Normal Vectors, Maxima and Minima of Functions of Two Variables.	**15 L**
Unit III	**First order first degree differential equations:** Solutions of homogeneous and non-homogeneous differential equations of first order and first degree, Notion of partial derivative, solving exact differential equations. Rules for finding integrating factor (I.F) (without proof) for non-exact equations such as: (a) 1Mx+Ny is an I.F., if Mx+Ny0 and Mdx+Ndy is homogeneous (b) 1Mx-Ny is an I.F., if Mx-Ny0 and Mdx+Ndy is of the type f1xyydx+f2xyxdy=0 (c) efxdx is an I.F., if N0 and 1N∂M∂y-∂N∂x is a function of x alone say f(x) (d) egydy is an I.F., if M0 and 1M∂N∂x-∂M∂y is a function of y alone say g(y) Finding solutions of first order differential equations of the type dydx+Pxy=Q(x)yn, for n0. Applications to orthogonal trajectories, population growth, and finding the current at a given time.	**15 L**

Textbooks:

1. Calculus: Early Transcendental (10th Edition): HOward Anton , Irl Bivens, Stephen Davis, John Wiley & sons, 2012

Additional References:

1. Calculus and analytic geometry (9th Edition) : George B Thomas, Ross L Finney, Addison Wesley, 1995
2. Calculus: Early Transcendental (8th Edition): James Stewart, Brooks Cole, 2015
3. Calculus (10th Edition): Ron Larson, Bruce H. Edwards, Cengage Learning, 2013
4. Thomas Calculus (13th Edition): George B. Thomas, Maurice D. Weir, Joel R. Hass, Pearson, 2014

Sr. No.	Practicals of Calculus
1	Continuity of functions, Derivative of Functions
2	Increasing, Decreasing, Concave up and Concave down functions

3	Relative maxima, relative minima, absolute maxima, absolute minima
4	Newton’s method to find approximate solution of an equation
5	Calculation of Partial derivatives of functions
6	Local linear approximation and directional derivatives

7	Maxima and minima of functions of two variables
8	Solution of a Homogeneous, Non-Homogeneous differential equation
9	Solution of a Exact, Non-exact differential equation
10	Solution of a first order first degree differential equation by using integrating factor

Module/Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
1	Derivatives and its applications	15h	1,2	1,2	6
2	Partial derivatives and its applications	15h	3	2	6
3	First order first degree differential equations	15h	4	1	6

Statistical Methods

Course Description	
Semester	**II**
Course Name	**Statistical Methods**
Course Code	**UCS2STM**
Credit	**2**
Hours	**45**

Course Objectives

1. The purpose of this course is to familiarize students with the basics of Statistics this will be essential for prospective researchers and professionals to know these basics.

Course Outcomes

After completing the course, Students will be able to

1. Illustrate different probability functions with respect to discrete and continuous random variables.
2. Determine the hypotheses and validate using appropriate statistical tests.
3. Recognize when analysis of variance (ANOVA) is appropriate and be able to perform one-way and two-way ANOVAs.
4. CO4 Comparison of parametric and nonparametric tests and identification of applications where nonparametric approaches are appropriate.

Course Code UCS1STM	Course Title Statistical Methods	Credits 02
Unit I	**Probability**: Random experiment, sample space, events types and operations of events, Probability definition: classical, axiomatic, Elementary Theorems of probability (without proof). Conditional probability, Bayes' theorem, independence, Examples on Probability. **Random Variables**: Concept and definition of a discrete random variable and continuous random variable. Probability mass function, Probability density function and cumulative distribution function of discrete and continuous random variable, Properties of cumulative distribution function.	**15 L**
Unit II	**Mathematical Expectation and Variance**: Expectation of a function, Variance and S.D of a random variable, properties. **Standard Probability distributions**: Introduction, properties, examples and applications of each of the following distributions: Binomial distribution, Normal distribution, Chi-square distribution, t distribution, F distribution	**15h**
Unit III	**Hypothesis testing:** one-sided, two-sided hypothesis, critical region, p-value, tests based on t, Normal and F, confidence intervals. **Analysis of variance**: one-way, two-way analysis of variance **Non-parametric tests:** need of non-parametric tests, sign test, Wilcoxon's signed rank test, run test, Kruskal-Wallis tests.	**15h**

Textbooks:

1. Gupta, S.C. and Kapoor, V.K. (1987): Fundamentals of Mathematical Statistics, S. and Sons, New Delhi
2. Goon, A. M., Gupta, M. K. and Dasgupta, B. (1983). Fundamentals of Statistics, Vol. 1, Sixth Revised Edition, The World Press Pvt. Ltd., Calcutta.

Additional References:

1. Mood, A. M. and Graybill, F. A. and Boes D.C. (1974). Introduction to the Theory of Statistics, Ed. 3, McGraw Hill Book Company.
2. Hoel P. G. (1971). Introduction to Mathematical Statistics, John Wiley and Sons, New York.
3. Hogg, R.V. and Craig R.G. (1989). Introduction to Mathematical Statistics, Ed. MacMillan Publishing Co., New York.
4. Walpole R. E., Myers R. H. and Myers S. L. (1985), Probability and Statistics for Engineers and Scientists
5. Agarwal, B. L. (2003). Programmed Statistics, Ed 2, New Age International Publishers, New Delhi.

Sr. No.	Practicals of Statistical Methods
1	Probability a. Examples based on Probability definition: classical, axiomatic b. Examples based on elementary Theorems of probability

2	Conditional probability and independence a. Examples based on Conditional probability b. Examples based on Bayes‟ theorem c. Examples based on independence
3	Problems based on binomial distribution

4	Problems based on normal distribution
5	Discrete random variable- a. Probability distribution of discrete random variable. b. Probability mass function.
6	Continuous random variable- a. Probability distribution of continuous random variable. b. Probability density function.
7	t test, normal test, F test
8	Analysis of Variance
9	Non parametric tests- I
10	Non- Parametric tests – II

Module/Unit	**Course Description**	**Hrs.**	**CO No.**	**PSO No.**	**PO No.**
I	Probability, Random Variables	15h	1	2	1
II	Mathematical Expectation and Variance, Standard Probability distributions	15h	1	2	1, 2
III	Hypothesis testing, Analysis of variance, Non-parametric tests	15h	2, 3, 4	2, 3	2, 7

Digital Marketing

Course Description	
Semester	**II**
Course Name	**Digital Marketing**
Course Code	**UCS2DIM**
Credit	**2**
Hours	**45**

Course Objectives:

1. To understand the key concepts of social media and Digital Marketing
2. To understand Legal and Ethical issues in digital marketing
3. To learn various tools of social media and Digital Marketing
4. To acquaint with the techniques of SEO and SEM

Course Outcome:

After completion of this course, student will be able to:

1. Explain use of Digital Media in Marketing.
2. Aware about cyber laws related to digital marketing
3. Explain benefits of digital marketing over traditional marketing
4. Summarize various tools of social media and Digital Marketing
5. Use SEO and SEM techniques to improve website's performance.

Course Code USCDIM	Course Title Digital Marketing	Credits 02
Unit I	**Introduction of Digital Marketing:** Definition of digital marketing, origin of digital Marketing, Benefits of Digital marketing, The Digital Landscape, P-O-E-M Framework, Digital Advertising Market in India, Segmenting and Customizing Messages, Digital Marketing Plan **Digital Marketing VS Traditional Marketing :** Difference between digital marketing and traditional marketing. Benefits of Traditional Marketing, The Downside to Traditional Marketing. Why Digital Marketing Wins Over Traditional Marketing, How We Use Both Digital & Traditional marketing? **Digital marketing and law:** Legal and Ethical issues in digital marketing, Privacy, Digital property and Digital protection, Security of clients and service provider, Cyber laws- Relevant provisions of information Technology Act 2000	**15L**
Unit II	**Tools of Social Media Marketing:** Meaning, Purpose, types of social media websites, social media engagement, Target audience **Facebook Marketing:** Business through Facebook Marketing, Creating Advertising Campaigns, Adverts, Facebook Marketing Tool **LinkedIn Marketing:** Introduction and Importance of LinkedIn Marketing , Framing LinkedIn Strategy ,Lead Generation through LinkedIn ,Content Strategy, Analytics and Targeting **Twitter Marketing:** Introduction to Twitter Marketing How Twitter Marketing is different than other forms of digital marketing, Framing content strategy , Twitter Advertising Campaigns **Content Marketing:** Introduction, Content marketing statistics, Types of Content, Types of Blog posts, Content Creation, Content Optimization, Content Management & Distribution, Content Marketing strategy, Content creation tools and apps, Challenges of Content Marketing.	**15L**
Unit III	**Mobile Advertising:** Forms of Mobile Marketing, Features, Mobile Campaign Development, Mobile Advertising Analytics **Email marketing:** Types of Emails, Mailing List, Email Marketing tools, Email Deliverability & Email Marketing automation **Search Engine optimization and Search Engine Marketing** Meaning, Common SEO techniques, Understanding Search Engines, basics of Keyword search, Google rankings, Link Building, Steps to optimize website **Search Engine Marketing:** Introduction to SEM, Introduction to Ad words-Google Ad Words, Ad Words fundamentals, Ad Ranks, Creating Ad Campaigns, display marketing, Buying Models cost per Click (CPC), Cost per Milli (CPM), Cost per Lead (CPL), Cost per Acquisition (CPA).	**15L**

Textbooks:

1. "Digital Marketing" : Seema Gupta, McGraw Hill Education 2nd Edition
2. "Introduction to Digital Marketing 101" : Cecilia Figuera, bpb Publications
3. "The Art of Digital Marketing " : Ian Dodson , Wile Publication

Additional References:

1. "Moving from Traditional to Digital": Philip Kotler Marketing 4.0, Wile Publications
2. "Fundamentals of Digital Marketing ", Puneet Singh Bhatia, Pearson Edition
3. "Digital Social Media Marketing" , Prof. Nitin C. Kamat, Mr. Chinmay Nitin Kama, Himalaya Publishing House Pvt. Ltd.
4. "Social Media Marketing: A Strategic Approach" , Melissa S. Barker, Donald I. Barker, Nicholas F. Bormann, Debra Zahay, Mary Lou Roberts , Cengage Publication

Module/Unit	**Course Description**	Hrs.	CO No.	PSO No.	PO No.
1	Introduction of Digital Marketing	15L	1,2,3	2	3,11
2	Tools of Social Media Marketing	15L	4	2	7
3	Search Engine optimization and Search Engine Marketing	15L	5	2	6

Practical:
Practical's of UCS1COD+UCS1PP1

Module/Unit	**Course Description**	Hrs.	CO No.	PSO No.	PO No.
1	Computer Organization and Design	15L	1	1	1
2	Programming with python-1	15L	3	2	3

Course: Practical's of UCS1PWC+UCS1DM1

Module/Unit	**Course Description**	Hrs.	CO No.	PSO No.	PO No.
1	Programming with C	15L	2	2	3
2	Datbase Management System-1	15L	3	2	3

Practical's of UCS1DMA+UCS1DST

Module/Unit	**Course Description**	Hrs.	CO No.	PSO No.	PO No.

1	Discrete Mathematics	15L	1	2	5
2	Descriptive Statistics	15L	3	3	6

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR ARTS, COMMERCE & SCIENCE COLLEGE, NEW PANVEL (AUTONOMOUS)

Re-accredited 'A+' Grade by NAAC
'College with Potential for Excellence' Status Awarded by UGC
'Best College Award' by University of Mumbai

Program: Bachelor's in Science (B. Sc.)

Information Technology

Credits: 132

SYLLABUS

(Approved in the Academic council meeting held on--------)

F. Y. B. Sc. Information Technology

Revised as per
Choice Based Credit System (60:40)
w. e. f. Academic Year 2022-23

BACHELOR'S IN SCIENCE (B. Sc.)

Programme Outcomes

S. N.	After completion of B.Sc. program students will acquire	Graduate Attribute
PO1	The knowledge of the disciplines and in-depth and extensive knowledge, understanding and skills in a specific field of interest.	Disciplinary knowledge
PO2	An ability to develop and conduct experiments, analyze, and interpret data and use scientific judgment to draw conclusions	Scientific reasoning
PO3	An ability to use current technology, and modern tools necessary for creation, analysis, dissemination of information.	Digital literacy
PO4	Innovative, professional, and entrepreneurial skills needed in various disciplines of science.	Life-long learning
PO5	An ability to achieve high order communication skills.	Communication skills
PO6	An ability to collect, analyze and evaluate information and ideas and apply them in problem solving using conventional as well as modern approaches	Problem solving
PO7	A sense of social responsibility; intellectual and practical skills and demonstration of ability to apply it in real-world settings.	Reflective thinking
PO8	An ability to engage in independent and life-long learning through openness, curiosity, and a desire to meet new challenges.	Life-long learning
PO9	A capacity to relate, collaborate, and lead others, and to exchange views and ideas to work in a team to achieve desired outcomes	Teamwork
PO10	An ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	Leadership
PO11	An ability to understanding values, ethics, and morality in a multidisciplinary context.	Moral and ethical awareness

Program Specific outcomes

Name of the Programme: **B.Sc.I.T.**	**Programme Coordinator:** **Dr. J. S. Thakur**	**Head of the Department:** **Mrs. I. S. Thakare**
	After completing the programme in Information Technology, Student will be able to:	
PSO1	**Gain proficiency in the field of Networking and Security.**	
PSO2	**Develop Programming skills that help to meet the needs of the IT industry.**	
PSO3	**Build soft skills for employability and personality development in the Industrial environment.**	

Preamble:

The B.Sc. Information Technology programme is started with an aim to make the learners employable and impart industry oriented training.

The main objectives of the course are:

- To think analytically, creatively and critically in developing robust, extensible and highly maintainable technological solutions to simple and complex problems.
- To apply their knowledge and skills to be employed and excel in IT professional careers and/or to continue their education in IT and/or related post graduate programmes.
- To be capable of managing complex IT projects with consideration of the human, financial and environmental factors.
- To work effectively as a part of a team to achieve a common stated goal.
- To adhere to the highest standards of ethics, including relevant industry and organizational codes of conduct.
- To communicate effectively with a range of audiences both technical and non-technical.
- To develop an aptitude to engage in continuing professional development.

Semester - I

[Under CBCS Scheme]

Course	Course Type	Course code	Hrs. / week	Internal assessment	Semester-end examination	Total	Credits
Introduction to C++ Programming	Core Subject	UIT1CPT	5	40	60	100	2
Digital Electronics	Core Subject	UIT1DET	5	40	60	100	2
Operating Systems	Core Subject	UIT1OST	5	40	60	100	2
Discrete Mathematics	Core Subject	UIT1DMT	5	40	60	100	2
Communication Skill	Ability Enhancement Skill Course	UIT1CST	5	40	60	100	2
Course on Environmental Studies	Generic	USC1EVS	-	-	-	-	2
Introduction to C++ Programming Practical	Core Subject Practical	UIT1CPP	5	--	50	50	2
Digital Electronics Practical	Core Subject Practical	UIT1DEP	5	--	50	50	2
Operating Systems Practical	Core Subject Practical	UIT1OSP	5	--	50	50	2
Discrete Mathematics Practical	Core Subject Practical	UIT1DMP	5	--	50	50	2
Communication skill Practical	Ability Enhancement Skill Course	UIT1PCP	5	--	50	50	2

Semester - II
[Under CBCS Scheme]

Course	Course Type	Course code	Hrs/ week	Internal assessment	Semester -end examination	Total	Credits
Object Oriented Programming	Core Subject	UIT2OPT	5	40	60	100	2
Microprocessor Architecture	Core Subject	UIT2MAT	5	40	60	100	2
Database Management System	Core Subject	UIT2DST	5	40	60	100	2
Numerical Methods	Core Subject	UIT2NMT	5	40	60	100	2
Web Programming	Ability Enhancement Skill Course Practical	UIT2WPT	5	40	60	100	2
Object Oriented Programming Practical	Core Subject Practical	UIT2OPP	5	40	60	100	2
Microprocessor Architecture Practical	Core Subject Practical	UIT2MAP	5	--	50	50	2
Database Management System Practical	Core Subject Practical	UIT2DSP	5	--	50	50	2
Numerical Methods Practical	Core Subject Practical	UIT2NMP	5	--	50	50	2
Web Programming Practical	Ability Enhancement Skill Course Practical	UIT2WPP	5	--	50	50	2
Spoken English	Generic	USC2CSK	-	-	-	-	2

Examination Scheme

Choice Based Credit System (CBCS)

- **Revised Scheme of Examination**

The performance of the learners shall be evaluated into two components. The learner's Performance shall be assessed by Internal Assessment with 40% marks in the first component by conducting the Semester End Examinations with 60% marks in the second component. The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below:-

A) Internal Assessment: 40 % 40 Marks

Sr. No.	Particular	Marks
01	One periodical class test examination to be conducted in the given semester	20 Marks
02	Any two tools out of these (10 Marks each) 1. Presentation and write up on the selected topics of the subjects / Case studies. 2. Quiz	20 Marks

- Maximum Marks: 20
- Duration: 30 Minutes

Particular	Marks
Match the Column / Fill in the Blanks / Multiple Choice Questions/ True/False/Answer in One or Two Lines (Concept based Questions) (1 Marks each)	20 Marks

Question Paper Pattern for Semester End Examination

(Periodical Class Test/ online examination for the Courses at Under Graduate Programmes)

- **Undergraduate Programmes for B.Sc. in Information Technology**
  - Duration: The examination shall be of 2 hours duration.

Question Paper Pattern

Theory question paper pattern
1. There shall be five questions each of 12 marks. 2. All questions shall be compulsory with internal options. 3. Question may be subdivided into sub-questions a, b, c… and the allocation of marks depends on the weightage of the unit.

- **Passing Standard**

The learners to pass a course shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment and Semester End Examination. The learners shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 24 Out of 60) separately, to pass the course and minimum of Grade D, wherever applicable, to pass a particular semester. A learner will be said to have passed the course if the learner passes the Internal Assessment and Semester End Examination together.

Question Paper Pattern for Continuous Assessment

Presentation and write-up	**Quiz**
Presentation skill	**Quiz on application of subject in real life**
Knowledge	
Quality of ppt.	
Writing skill	

Question Paper Pattern for Practical Examination

Sr. No.	Particular		Marks
01	Practical		50 Marks
	Practical Question	40 Marks	
	Journal	5 Marks	
	Viva	5 Marks	

Course Description: B.Sc. (Information Technology)	
Semester	**I**
Course Name	**Introduction to C++ programming**
Course Code	**UIT1CPT**
Eligibility for the Course	
Credit	**2**
Hours	**5Hrs per week**

Course Objectives	The objective of this course is to introduce the concept of the basic programming language with C++.

Course Outcomes	**After completing the course, Student will be able to:**
	1) Define basic concepts of C++ programming language.
	2) Illustrate different types of operators of C++ language.
	3) Explain functions in C++.
	4) Elaborate Arrays and Structures in C++.

Module/ Unit	**Course Description**	**Hrs.**	**CO No.**	**PSO No.**	**PO No.**
I	**Programming Logic and techniques** : Algorithms, Flow-charts, Program Design **Introduction to C++**: Origin of C++ C++ Program Structure, A Sample C++ program, Applications of C++, Variables and Assignments: variables, identifiers, variable declarations, local and global variables, Assignment Statements, reference variable, symbolic constant. **Input and Output:** cin, cout, escape sequences, include directives and Namespaces, Indenting and Comments, Data types, Expressions, Type compatibilities. **Operators:** Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Operator Precedence.	12hrs	1	3	2

II	**Manipulators:** endl, setw, sizeof, Increment and decrement operators, Type Cast Operators, Scope resolution operators. **Flow of Control:** Compound statements, Loops: while, for, do while, nested loops, Decision making: if, if – else, nested if else, switch, break and continue.	12hrs	1		
III	**Functions:** Function Definition, Function Declaration, Function Prototypes, built in functions and user defined functions, Call by reference, Call by value, const member functions. Inline Functions and recursive functions, Maths Library Functions.	12hrs	2		
IV	**Derived Data Types:** **Arrays:** Declaring Arrays, Initializing Arrays, Types of Arrays, Arrays in functions. **Pointers:** Pointers, use of pointers, Void Pointers, Null Pointers, Pointer to pointer, Passing Pointers to Functions, constant pointer, Generic Pointer.	12hrs	3		
V	**Strings and Vectors:** Strings, String functions: strcmp, strcat, strlen, strcpy. Vector Basics. **Introduction to Structures: Declaring the structure,** Structure Variables, Initialization, Structure Assignment, Nested Structure. Structures and Functions, Structures and Arrays: Arrays of Structures, Structures Containing Arrays, Unions.	12hrs	4		

References

1. "Let us C++" , Y.P.Kanetkar, Seventh edition, BPB publication
2. "Problem Solving with C++" , Walter Savitch, Sixth Edition, Pearson Education.
3. Schaum's outlines "Programming with C++", J.R.Hubbard, Second Edition, Tata McGrawHill
4. Object Oriented programming with C++ , E Balagurusamy , Third Edition ,Tata McGraw Hill.
5. Pure C++ programming , Amir Afzal, Pearson Education.
6. Computer Science – A structured Approach using C++ by B. Forouzan, R. F. Gilberg, Cengage Publication

Course Description BSc(Information Technology)	
Semester	**I**
Course Name	**Digital Electronics**
Course Code	**UIT1DET**
Eligibility for the Course	
Credit	**2**
Hours	**5Hrs per week**

Course Objectives	The objective of this course is to acquire the basic knowledge of digital logic levels and the application of knowledge to understand digital electronics circuits. To prepare the learners to perform the analysis and design of various digital electronic circuits.

Course Outcomes	**After completing the course, Student will be able to:**
	1) Define the various types of number systems & conversions.
	2) Explain the various types of logic gates along with the truth tables.
	3) Distinguish combinational and sequential logic circuits.
	4) Classify different types of flip-flops, registers and counters.

Module/ Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
I	**Number System:** Analog System, digital system, numbering system, binary number system, octal number system, hexadecimal number system, conversion from one number system to another, floating point numbers, weighted codes binary coded decimal, non-weighted codes Excess – 3 code, Gray code, Alphanumeric codes –ASCII Code, EBCDIC, ISCII Code, Hollerith Code, Morse Code, Teletypewriter (TTY), Error detection and correction, Universal Product Code, Code conversion. **Binary Arithmetic and Arithmetic Circuits:** Binary addition, Binary subtraction, Negative number representation, Subtraction using 1's complement and 2's complement,Binary multiplication and division, Arithmetic in octal number system, Arithmetic in hexadecimal number system, BCD and Excess-3 arithmetic,Introduction to Arithmetic Circuits : Adder, BCD Adder, Excess – 3 Adder, Binary Subtractors, BCD Subtractor, Multiplier, Comparator	12hrs	1	1	6
II	**Boolean Algebra and Logic Gates:** Introduction, Logic (AND OR NOT), Boolean theorems, Boolean Laws, De Morgan's Theorem, Perfect Induction, Reduction of Logic expression using Boolean Algebra, Deriving Boolean expression from given circuit, exclusive OR and Exclusive NOR gates, Universal Logic gates, Implementation of other gates using universal gates, Input bubbled logic, Assertion level. **Minterm, Maxterm and Karnaugh Maps:** Introduction, minterms and sum of minterm form, maxterm and Product of maxterm form, Reduction technique using Karnaugh maps – 2/3/4/5/6 variable K-maps, Grouping of variables in K-maps, K-maps for product of sum form, minimize Boolean expression using K-	12hrs	2		

	map and obtain K-map from Boolean expression, Quine Mc Cluskey Method				
III	**Combinational Logic Circuits:** Introduction, Multi-input, multi-output Combinational circuits, Code converters design and implementations **Read only Memory :** Diode Rom, Programmable ROMs, Erasable PROMs, Programmable array logic, Programmable Logic arrays	12hrs	3		
IV	**Multiplexer, Demultiplexer, ALU, Encoder and Decoder:** Introduction, Multiplexer, Demultiplexer, Decoder, ALU, Encoders. **Sequential Circuits:** Flip-Flop: Introduction, Terminologies used, S-R flip-flop, D flip-fop, JK flipflop, Race-around condition, Master – slave JK flip-flop, T flip-flop, 12 14 | Page conversion from one type of flip-flop to another, Application of flipflops **Clocks And Timing Circuits :** Introduction to clocks : Astable, Monostable, Bistable, 555 Timer	12hrs	3		
V	**Counters:** Introduction, Asynchronous counter, Terms related to counters, IC 7493 (4-bit binary counter), Synchronous counter, Bushing, Type T Design, Type JK Design, Presettable counter, IC 7490, IC 7492, Synchronous counter ICs, Analysis of counter circuits. **Shift Register:** Introduction, parallel and shift registers, serial shifting, serial–in serial– out, serial–in parallel–out , parallel–in parallel–out, Ring counter, Johnson counter, Applications of shift registers, Pseudo-random binary sequence generator, IC7495, Seven Segment displays, analysis of shift counters.	12hrs	4		

References:

1. Digital Electronics and Logic Design, N. G. Palan, Technova
2. Make Electronics, Charles Platt, O'Reilly,1st, 2010
3. Modern Digital Electronics, R. P. Jain, Tata McGraw Hill, 3rd
4. Digital Principles and Applications, Malvino and Leach, Tata McGraw Hill
5. Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley, 2007

Course Description: BSc(Information Technology)	
Semester	**I**
Course Name	**Operating Systems**
Course Code	**UIT1OST**
Eligibility for the Course	
Credit	**2**
Hours	**5Hrs per week**

Course Objectives	To learn the fundamentals of Operating Systems, its functions and services. To learn the mechanisms of OS to handle processes and threads and their communication .To learn the mechanisms involved in memory management in contemporary OS.

Course Outcomes	**After completing the course, Student will be able to:**
	1) Explain the importance of Computer Systems, Process Management Policies.
	2) Define the memory management and its allocation policies.
	3) Elaborate the Cloud concepts, file systems, its structure and operations.
	4) Determine the requirement for process synchronization and coordination handled by the operating system.

Module/ Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
I	**Introduction:** What is an operating system? History of operating system, computer hardware, different operating systems, operating system concepts, system calls, operating system structure. Examples of OS: Android OS, Linux OS, Windows OS. **Processes and Threads:** Processes, threads, interprocess communication, scheduling, IPC problems.	12hrs	1	2	4
II	**Memory Management:** No memory abstraction, memory abstraction: address spaces, virtual memory, page replacement algorithms, design issues for paging systems, implementation issues, and segmentation.	12hrs	2		

III	**File Systems:** Files, directories, file system implementation, file-system management and optimization, MS-DOS file system, UNIX V7 file system, CD ROM file system. **Protection of File Systems:** Types of Access, Access Control, Other Protection Approaches.	12hrs	3		
IV	**Input-Output:** Principles of I/O hardware, Principles of I/O software, I/O software layers, disks, clocks, user interfaces: keyboard, mouse, monitor, thin clients, power management. **Deadlocks:** Resources, introduction to deadlocks, the ostrich algorithm, deadlock detection and recovery, deadlock avoidance, deadlock prevention, issues.	12hrs	4		
V	**Virtualization:** History, requirements for virtualization, type 1 and 2 hypervisors, techniques for efficient virtualization, hypervisor microkernel, memory virtualization, I/O virtualization, Virtual appliances, virtual machines on multicore CPUs **Cloud:** Introduction, Characteristics, Types of Clouds, Examples.	12hrs	1		

References:

1. Modern Operating Systems, Andrew S. Tanenbaum and Herbert Bos, 4th Edition, Pearson Publishers
2. Operating System Concepts, Abraham Silberschatz and Peter B. Galvineg Gagne, 8th Edition, Wiley Publishers
3. Operating Systems – Internals and Design Principles, Willaim Stallings, 8th Edition, Pearson Publishers
4. Operating Systems, Godbole and Kahate, 3rd Edition, McGraw Hill Publishers

Course Description: BSc(Information Technology)	
Semester	**I**
Course Name	**Discrete Mathematics**
Course Code	**UIT1DMT**
Eligibility for the Course	
Credit	**2**
Hours	**5Hrs per week**

Course Objectives	The purpose of the course is to familiarise the prospective learners with mathematical structures that are fundamentally discrete. This course introduces sets and functions, forming and solving recurrence relations and different counting principles. These concepts are useful to study or describe objects or problems in computer algorithms and programming languages.

Course Outcomes	**After completing the course, Student will be able to:**
	1) Recall basic set theory, logic, functions and relations.
	2) Solve problems using recurrence relations, counting principles and probability.
	3) Examine the properties of graphs, applications of graphs and trees.
	4) Solve the problems by using different methods of proofs, divisibility.

Module/ Unit	**Course Description**	Hrs	CO No.	PSO No.	PO No.
I	**Set Theory**: Definitions and the Element Method of Proof, Properties of Sets, Disproofs, Algebraic Proofs, Boolean Algebras, Russell's Paradox and the Halting Problem. **The Logic of Compound Statements**: Logical Form and Logical Equivalence, Conditional Statements, Valid and Invalid Arguments. **Quantified Statements:** Predicates and Quantified Statements, Statements with Multiple Quantifiers, Arguments with Quantified Statements.	12hrs	1	6	2

II	**Functions**: Functions Defined on General Sets, One-to-One and Onto, Inverse Functions, Composition of Functions, Cardinality with Applications to Computability. **Relations**:Relations on Sets, Reflexivity, Symmetry, and Transitivity, Equivalence Relations, Partial Order Relations **Recursion Relation**:Solving recurrence relations by iteration, Second order linear homogeneous recurrence relations with constant coefficients. general recursive definitions and structural induction.	12hrs	2		
III	**Counting Principles and probability:** Introduction, Possibility Trees and the Multiplication Rule, Counting Elements of Disjoint Sets: The Addition Rule, The Pigeonhole Principle, Counting Subsets of a Set: Combinations, r-Combinations with Repetition Allowed, Mathematical Induction, Strong Mathematical Induction and the Well-Ordering Principle for the Integers .Probability Axioms and Expected Value, Conditional Probability, Bayes' Formula, and Independent Events.	12hrs	2		
IV	**Graphs and Trees**: Definitions and Basic Properties, Trails, Paths, and Circuits, Matrix Representations of Graphs, Isomorphism of Graphs, Trees, Rooted Trees, Isomorphism of Graphs, Spanning trees and shortest paths.	12hrs	3		
V	**Elementary Number Theory and Methods of Proof**: Introduction to Direct Proofs, Rational Numbers, Divisibility, Division into Cases and the Quotient-Remainder Theorem, Floor and Ceiling, Indirect Argument: Contradiction and Contraposition, Two Classical Theorems, Applications in algorithms.	12hrs	4		

References;

1. Discrete Mathematics with Applications, Sussana S. Epp, 4th Edition, 2010
2. Discrete Mathematics, Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson Tata MCGraw Hill 2007
3. Discrete Mathematics and its Applications , Kenneth H. Rosen , Tata MCGraw Hill
4. Discrete mathematical structures , B Kolman RC Busby, S Ross , PHI
5. Discrete structures , Liu , Tata MCGraw Hill

Course Description: BSc(Information Technology)	
Semester	**I**
Course Name	**Communication Skills**
Course Code	**UIT1CMT**
Eligibility for the Course	
Creit	**2**
Hours	**5Hrs per week**

Course Objectives	To understand the basics of Professional as well as Business Communication Skills.

Course Outcomes	**After completing the course, Student will be able to:**
	1) Elaborate examples on how to write business messages appropriately and propose the views in meetings and group discussions
	2) Develop Communication in different fields or departments.
	3) Design presentations and how to present one.

Module/ Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
I	**Understanding Business Communication:** Nature and Scope of Communication, process of communication, components **The Seven Cs of Effective** Communication: Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness **Non-verbal communication:** Personal appearance, facial expressions, movements, posture, gestures, eye contact, vocal communication techniques, voice, volume, pitch, rate of delivery, pronunciations, pause Communication barriers	12hrs	2	3	5
II	**Effective writing, reading skills, listening skills** **Writtng:** Notes making, Precis making **Reading skill:** mechanics of reading, guidelines to improving reading skills, types of readings, techniques of comprehension		1		

III	**Writing Business Messages and Documents:** Business writing, Business Correspondence, Instructions, Business Reports and Proposals, Career building, Job Application and Resume writing. **Group Communication:** Meetings and Conferences, Email correspondence Group Discussions and Team Presentations, Team Briefing, notices, agenda writing,	12hrs	1		
IV	**Understanding Specific Communication Needs:** Corporate Communication, Persuasive Strategies in Business Communication, Ethics in Business Communication, Business Communication Aids	12hrs	2		
v	**Presentation Skills:** Planning the presentations, executing the presentations, Impressing the audience by performing, Planning stage: Brainstorming, mind maps / concept maps, executing stage: chunking theory, creating outlines, Use of templates. Adding graphics to your presentation: Visual communication, Impress stage: use of font, colour, layout, Importance of practice and performance.	12hrs	3		

References:

1. Business Communication, Edited by Meenakshi Raman and Prakash Singh, Second Edition, Oxford University Press,
2. Professional Communication, ArunaKoneru, Tata McGraw Hill
3. Business Communication, Dr.Rishipal and Dr.JyotiSheoran, SPD
4. Strategies for improving your business communication, Prof. M. S. Rao, Shroff publishers and distributors
5. Graphics for Learning: Proven Guidelines for Planning, Designing, and Evaluating Visuals in Training Materials, Ruth C. Clark, Chopeta Lyons, Pfeiffer

Course Description: BSc(Information Technology)	
Semester	**I**
Course Name	**Environmental Studies**
Course Code	**USC1EVS**
Eligibility for the Course	
Credit	**2**
Hours	**30Hrs.**

Course Objectives	To develop environmental consciousness among the students

Course Outcomes	**After completing the course, Student will be able to:**
	1) Describe Environment
	2) Predict the consequences of human activities on the web of life
	3) Extend the values and responsibilities in solving current environmental problems and avoid future destruction

Module/ Unit	**Course Description**	Hrs.	CO No.	PSO No.	PO No.
1	**Introduction to Environmental Studies**	15hrs			
1.1	Definition, scope and importance of environmental studies, Need for Public awareness				
1.2	Ecosystem 1.2.1. Concept of ecosystem 1.2.2. Types of ecosystems, structure, characteristics and functions: Forest, Grassland, Desert, Aquatic ecosystem				
1.3	Biodiversity and its conservation 1.3.1. Introduction – Definition: genetic, species and ecosystem diversity. 1.3.2. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values 1.3.3. Threats to biodiversity: habitat				

	loss, poaching of wildlife, man-wildlife conflicts. 1.3.4. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.				
2	**Environmental Pollution and Control**	15hrs			
2.1	Environmental pollution 2.1.1 Definition 2.1.2 Cause, effects and control measures of – a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards 2.1.3 Role of an individual in prevention of pollution.				
2.2	Environment Protection Act.: Brief introduction				

Course Description: B.Sc.(Information Technology)	
Semester	**I**
Course Name	**Introduction to C++ Programming Practical**
Course Code	**UIT1CPP**
Eligibility for the Course	
Credit	**2**
Hours	**3Hrs per week**

Course Objectives	The objective of this course is to introduce the concept of the basic programming language with C++.

Course Outcomes	**After completing the course, Student will be able to:**
	1) Develop Simple C++ Programs.
	2) Construct C++ programs using conditional statements and loops.
	3) Make use of functions in C++ programs.
	4) Build C++ Programs using Arrays.

Module/ Unit	**Course Description**	Hrs	CO No.	PSO No.	PO No.
1	**Basic Programs of C++** a. Write a program to display the message HELLO WORLD. b. Write a program to declare some variables of type int, float and double. Assign some values to these variables & display these values. c. Write a program to find the addition, subtraction, multiplication and division of two numbers**.**	3hrs	1	2	6

2	**Programs on variables** a. Write a program to swap to number using the third variable. b. Write a program to swap two numbers without using a third variable. c. Write a program to find the area of rectangle, square and circle. d. Write a program to find the volume of a cube, sphere, and cylinder.	3hrs	1		
3	**Conditional statements and loops(basic)** a. Write a program to enter a number from the user and display the month name. b. If number>13 then display invalid input using switch case. c. Write a program to check whether the number is even or odd. d. Write a program to check whether the number is positive, negative or zero. **e.** Write a program to find the smallest of three numbers.	3hrs	2		
4	**Conditional statements and loops(advanced)** a. Write a program to find the sum of squares of digits of a number. b. Write a program to reverse the digits of an integer. c. Write a program to find the sum of numbers from 1 to 100. **d.** Write a program to print the Fibonacci series.	3hrs	2		
5	**Programs on patterns** Programs on different patterns.	3hrs	1		
6	**Functions:** a. Programs on Functions. **b.** Write a program to demonstrate example of Inline Function	3hrs	3		

7	**Recursive functions** a. Write a program to find the factorial of a number using a recursive function. b. Write a program to find the sum of natural numbers using a recursive function.	3hrs	3		
8	**Arrays** a. Write a program to find the largest value that is stored in the array. b. Write a program to compute the sum of all elements stored in an array. c. Write a program to arrange the 'n' numbers stored in the array in ascending and descending order. **d.** Write a C++ program to rearrange a given sorted array of positive integers.	3hrs	4		
9	**String handling** a. String operations for string length , string concatenation b. String operations for string reverse, string comparison, **c.** Console formatting functions.	3hrs	4		
10	**Programs on Structures and Unions** a. Programs on structures. **b.** Programs on unions	3hrs	4		

References:

1. "Let us C++" , Y.P.Kanetkar, Seventh edition, BPB publication
2. "Problem Solving with C++" , Walter Savitch, Sixth Edition, Pearson Education.

Course Description: BSc(Information Technology)	
Semester	**I**
Course Name	**Digital Electronics Practical**
Course Code	**UIT1DEP**
Eligibility for the Course	
Credit	**2**
Hours	**3Hrs per week**

Course Objectives	The objective of this course is to acquire the basic knowledge of digital logic levels and the application of knowledge to understand digital electronics circuits. To prepare the learners to perform the analysis and design of various digital electronic circuits.

Course Outcomes	**After completing the course, Student will be able to:**
	1) Classify logic gates and their ICs and universal gates.
	2) Simplify the given Boolean expressions using a minimum number of logic gates and ICs.
	3) Build combinational circuits and code converters.
	4) Design Encoder, Decoder, Multiplexer and Demultiplexer

Module/ Unit	**Course Description**	Hrs	CO No.	PSO No.	PO No.
1	**1. Study of Logic gates and their ICs and universal gates:** a. Study of AND, OR, NOT, XOR, XNOR, NAND and NOR gates b. IC 7400, 7402, 7404, 7408, 7432, 7486, 74266 c. Implement AND, OR, NOT, XOR, XNOR using NAND gates. d.Implement AND, OR, NOT, XOR, XNOR using NOR gates.	3hrs	1	1	7

2	**Implement the given Boolean expressions using minimum number of gates.** a. Verifying De Morgan's laws. b. Implement other given expressions using minimum number of gates. c. Implement other given expressions using minimum number of ICs	3hrs	2		
3	**Implement combinational circuits.** a. Design and implement combinational circuit based on the problem given and minimizing using K-maps.	3hrs	3		
4	**Implement code converters.** a. Design and implement Binary – to – Gray code converter. b. Design and implement Gray – to – Binary code converter.Design and implement Binary – to – BCD code converter d. Design and implement Binary – to – XS-3 code converter	3hrs	3		
5	**Implement Adder and Subtractor Arithmetic circuits.** a. Design and implement Half adder and Full adder. b. Design and implement BCD adder. c. Design and implement XS – 3 adder. d. Design and implement binary subtractor. e. Design and implement BCD subtractor. f. Design and implement XS – 3 subtractor.	3hrs	3		

6	**Implement Arithmetic circuits.** a. Design and implement a 2-bit by 2-bit multiplier. b. Design and implement a 2-bit comparator.	3hrs	3		
7	**Implement Encode and Decoder and Multiplexer and Demultiplexers.** a. Design and implement 8:3 encoder. b. Design and implement 3:8 decoder. c. Design and implement 4:1 multiplexer. Study of IC 74153, 74157 d. Design and implement 1:4 demultiplexer. Study of IC 74139 e. Implement the given expression using IC 74151 8:1 multiplexer. f. Implement the given expression using IC 74138 3:8 decoder.	3hrs	4		
8	**Study of flip-flops and counters.** a. Study of IC 7473. b. Study of IC 7474. c. Study of IC 7476. d. Conversion of Flip-flops. e. Design of 3-bit synchronous counter using 7473 and required gates. f. Design of 3-bit ripple counter using IC 7473.	3hrs			

9	**Study of counter ICs and designing Mod-N counters.** a. Study of IC 7490, 7492, 7493 and designing mod-n counters using these. b. Designing mod-n counters using IC 7473 and 7400 (NAND gates)	3hrs			
10	**Design of shift registers and shift register counters.** a. Design serial – in serial – out, serial – in parallel – out, parallel – in serial – out, parallel– in parallel – out and bidirectional shift registers using IC 7474. b. Study of ID 7495. c Implementation of digits using seven segment displays.	3hrs			
11	**Study of Diode ROM Array.**	3hrs			
12	**Study of 555 Timer as an Astable multivibrator.**	3hrs			

References:

1. Digital Electronics and Logic Design, N. G. Palan, Technova
2. Modern Digital Electronics, R. P. Jain, Tata McGraw Hill, 3rd
3. Digital Principles and Applications, Malvino and Leach, Tata McGraw Hill

Course Description: B.Sc.(Information Technology)	
Semester	**I**
Course Name	**Operating Systems Practical**
Course Code	**UIT1OSP**
Eligibility for the Course	
Credit	**2**
Hours	**3Hrs per week**

Course Objectives	To make the learners familiar with the basics of different operating systems.

Course Outcomes	**After completing the course, Student will be able to:**
	1) Build virtual operating system.
	2) Demonstrate linux commands.
	3) Make use of utilities of windows, linux and cloud.
	4) Choose windows commands for file, folder creation.

Module/Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
1.	**Installation of virtual machine software.**	3hrs	1	4	2
2.	**Installation of Linux operating system (RedHat / Ubuntu) on virtual machine.**	3hrs	1		
3.	**Installation of Windows operating system on virtual machine.**	3hrs	1		
4.	**Linux commands: Working with Directories:** a. pwd, cd, absolute and relative paths, ls, mkdir, rmdir, b. file, touch, rm, cp. mv, rename, head, tail, cat, tac, more, less, strings, chmod	3hrs	2		
5.	**Linux commands: Working with files** a. ps, top, kill, pkill, bg, fg, b. grep, locate, find, locate. c. date, cal, uptime, w, whoami, finger, uname, man, df, du, free, whereis, which. d. Compression: tar, gzip.	3hrs	2		

6.	**6. Windows (DOS) Commands – 1** a. Date, time, prompt, md, cd, rd, path. b. Chkdsk, copy, xcopy, format, fidsk, cls, defrag, del, move.	3hrs	3		
7.	**Windows (DOS) Commands – 2** a. Diskcomp, diskcopy, diskpart, doskey, echo b. Edit, fc, find, rename, set, type, ver **Working with different Cloud Platform** a. Google Drive b. Amazon web service	3hrs	3		
8.	**8. Working with Windows Desktop and utilities** a. Notepad b. Wordpad c. Paint d. Taskbar e. Adjusting display resolution f. Using the browsers g. Configuring simple networking h. Creating users and shares	3hrs	4		
9.	**Working with Linux Desktop and utilities** a. The vi editor. b. Graphics c. Terminal d. Adjusting display resolution e. Using the browsers f. Configuring simple networking g. Creating users and shares	3hrs	4		
10.	**Installing utility software on Linux and Windows.** **a) Protection in File System.**	3hrs	4		

References

1. UNIX Concepts and Applications- Sumitabha Das, 4th Edition , Tata McGraw Hill Publishers

Course Description: B.Sc.(Information Technology)	
Semester	**I**
Course Name	**Discrete Mathematics Practical**
Course Code	**UIT1DMP**
Eligibility for the Course	
Credit	**2**
Hours	**3Hrs per week**

Course Objectives	To familiarize the students with the fundamental concepts of scilab and develop programming skill to effectively implement for problems.

Course Outcomes	**After completing the course, Student will be able to:**
	1) Make use of the basic commands of scilab.
	2) Construct a formula for recurrence relation, counting and probability using scilab.
	3) Analyse the concept of properties of integers and operations using scilab.
	4) Examine the properties of graphs, applications of graphs and trees.

Module/ Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
1	**Set Theory** a. Inclusion Exclusion principle. b. Power sets c. Mathematical Induction	3hrs	1	6	2
2	**Functions and Algorithms** a. Recursively defined functions b. Cardinality c. Polynomial evaluations d. Greatest Common Divisor	3hrs	1		
3	**Recurrence Relation** a. Linear homogeneous recurrence relations with constant coefficients b. Solving linear homogeneous recurrence relations with constant coefficients c. Solving general homogeneous linear recurrence relations.	3hrs	2		

4	**Counting :** a. Sum rule principle b. Product rule principle c. Factorial d. Binomial coefficients e. Permutations f. Permutations with repetitions g. Combinations h. Combinations with repetitions i. Ordered partitions j. Unordered partitions	3hrs	2		
5	**Probability Theory:** a. Sample space and events b. Finite probability spaces c. Equiprobable spaces d. Addition Principle e. Conditional Probability f. Multiplication theorem for conditional probability. g. Independent events h. Repeated trials with two outcomes.	3hrs	2		
6	**Graph Theory** a. Paths and connectivity b. Minimum spanning tree c. Isomorphism	3hrs	4		
7	**Direct Graphs** a. Adjacency matrix b. Path matrix	3hrs	4		
8	**Properties of integers** a. Division algorithm b. Primes c. Euclidean algorithm d. Fundamental theorem of arithmetic e. Congruence relation f. Linear congruence equation	3hrs	3		
9	**Algebraic Systems** a. Properties of operations	3hrs	3		
10	**Boolean Algebra** a. Basic definitions in Boolean Algebra b. Boolean algebra as lattices	3hrs	3		

References

1. Scilab textbook companion for discrete mathematics by S. Lipschutz, M. Lipson and V. H. Patil

Course Description B.Sc. (Information Technology)	
Semester	**I**
Course Name	**Communication Skills Practical**
Course Code	**UIT1CSP**
Eligibility for the Course	
Credit	**2**
Hours	**3Hrs per week**

Course Objectives	To understand the basics of Professional as well as Business Communication Skills.

Course Outcomes	**After completing the course, Student will be able to:**
	1) Develop pronunciation skills, listening skills, writing skills
	2) Construct storytelling, advertising, role plays and situational conversations
	3) Take part in interviews and group discussions
	4) Build presentations

Module/ Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
I	**1. Mock Interviews** a. You are in the HR department of an organization and you are supposed to hire a Candidate. Write a telephonic interview between you and the client. b. Write an interview (a face-to-face interview) between Mr Smith and Mr John regarding a Job position in a company. Mr John is the manager whereas Mr Smith is the candidate. c. You are asked to conduct a video interview for hiring a candidate in your company. Write the questions than you can ask and possible answers that can be given by the Candidate.	3hrs	1	3	4
II	**Presentations** a. 3D Glasses b. Apple Talk c. Mobile IP	3hrs	1		

	d. Big Data				
III	**Group Discussions** a. Impact of covid 19 on education b. Gender Equality c. India: The super Powering country d. Social Media: Impact on human behaviour and society	3hrs	3		
IV	**Role Play** a. Assume that you are a Sales person. Write a conversation between the sales person and the customer for selling a laptop. b. Introduce yourself as an electronic gadget c. Assume that you are a king of a kingdom. Write a conversation between you and your ministers regarding the development of your kingdom.	3hrs	2		
v	**Situational Conversion** a. Tell me about a time you proved you're the perfect person for this job. b. What would you do if you made a mistake that no one else noticed? Would you address the error and risk slowing things down or ignore it to keep the project or task moving forward? c. What would you do if you were asked to perform a task you've never done before? d. What would you do if an angry and 12hrs dissatisfied customer confronted you? How would you resolve their concern?	3hrs	2		
VI	**Advertising** a. There is a campaign in you college regarding women's safety in college. Write an advertisement for the same. b. A new product named 'Techno' is introduced by an IT company which helps you locate your personal things like mobile phone, wallet, keys, etc. Write an advertisement to sell this product. Also state its features. c. There is a new TV reality show and you are asked to promote it. How will you write an advertisement for the same?	3hrs	2		

VII	**Story-Telling** a. A middle-aged woman discovers a ghost. b. A group of children discover a dead body c. A long journey is interrupted by a disaster.	3hrs	2		
VIII	**Pronunciation Skills**	3hrs	1		
IX	**Listening Skills**	3hrs	1		
X	**Writing Skills**	3hrs	1		

References:

1. Business Communication, Edited by Meenakshi Raman and Prakash Singh, Second Edition, Oxford University Press,
2. Professional Communication, ArunaKoneru, Tata McGraw Hill
3. Business Communication, Dr.Rishipal and Dr.JyotiSheoran, SPD
4. Strategies for improving your business communication, Prof. M. S. Rao, Shroff publishers and distributors
5. Graphics for Learning: Proven Guidelines for Planning, Designing, and Evaluating Visuals in Training Materials, Ruth C. Clark, Chopeta Lyons, Pfeiffer

Semester II

Course Description: BSc(Information Technology)	
Semester	**II**
Course Name	**Object Oriented Programming**
Course Code	**UIT2OPT**
Eligibility for the Course	
Credit	**2**
Hours	**5Hrs per week**

Course Objectives	To learn advanced features of the C++ programming language as a continuation of the previous course, to learn the characteristics of an object-oriented programming language: data abstraction and information hiding, inheritance, and dynamic binding of the messages to the methods.

Course Outcomes	**After completing the course, Student will be able to:**
	1) Explain characteristics of object oriented programming approach with C++.
	2) Make use of operators in C++.
	3) Evaluate the concept of Template, Strings, Streams
	4) Utilize different file handling features

Module/ Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
I	**Introduction to OOPs:** Need object oriented programming, comparison of procedural and object oriented approach, characteristics of OOPs – object, classes, polymorphism, inheritance, reusability, data hiding and abstraction, applications of OOPs. **Classes and Objects:** Class declaration, constructors, constructor initialization lists, access functions, private member functions, the copy constructor, the class destructor ,constant objects, structures, pointers to objects, static data members,	12hrs	1	7	2

	static function members				
II	**Operator Overloading:**, overloading the assignment operator, the this pointer, overloading arithmetic operators, overloading the arithmetic assignment, operators, overloading the relational operators, overloading the stream operators, conversion operators ,overloading the increment and decrement operators, overloading the subscript operator	12hrs	2		
III	**Composition and Inheritance:** Type of inheritance, protected class members, overriding and dominating inherited members, Function Overloading, private access verses protected access, virtual functions and polymorphism, pure virtual function, virtual destructors, abstract base classes **File Handling:** Classes for file stream operations, opening and closing a file, detecting end of file, file modes, file pointers and their manipulations, sequential input and output operations, random access, file operations error handling, command line argument	12hrs	4		
III	**Strings and Streams:** the string class interface, the constructors and destructor , the copy constructor, the assignment operator, the addition operator , an append operator, access functions , the comparison operators, stream operators, Stream classes, the ios class, ios format flags, ios state, variables, the istream and ostream classes, unformatted input functions, unformatted output functions, stream manipulators. **Exception Handling:** Introduction, Basics of Exception Handling, Exception Handling mechanism, Throwing Mechanism, Catching Mechanism, Specifying Exception	12hrs	3		
V	**Templates and Iterators:** function templates, class templates, container classes, subclass templates, passing	12hrs	3		

	template classes to template parameters, iterator classes **Libraries:** the standard C++ library, proprietary libraries, contents of the standard c headers, string streams, file processing, the standard template library				

References

1) Object Oriented Design by Rumbaugh (Pearson publication)
2) Object-oriented programming in Turbo C++ By Robert Lafore, Galgotia Publication.
3) Object-oriented programming with C++ by E.Balagurusamy, 2nd Edition, TMH.

Course Description :BSc(Information Technology)	
Semester	**II**
Course Name	**Microprocessor Architecture**
Course Code	**UIT2MAT**
Eligibility for the Course	
Credit	**2**
Hours	**5Hrs per week**

Course Objectives	The objective of this course is to introduce the basic structure of 8085 Microprocessor, Assembly Language Programming techniques and its instruction set.

Course Outcomes	**After completing the course, Student will be able to:**
	1) Explain Microprocessor, Microcomputer and Assembly Language.
	2) Elaborate the concepts of Microprocessor Architecture, Interface Devices and Assembly Language.
	3) Make use of counter and time delay, Stack and Subroutines.
	4) Explain 8086 microprocessor, Software Development Systems and Interrupt.

Module/ Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
I	**Microprocessor, microcomputers, and Assembly Language:** Microprocessor, Microprocessor Instruction Set and Computer Languages, From Large Computers to Single-Chip Microcontrollers, Applications. **Microprocessor Architecture and Microcomputer System:** Microprocessor Architecture and its operations, Memory, I/O Devices, Microcomputer System, Logic Devices and Interfacing, Microprocessor-Based System Application. **Introduction to 8085 Assembly Language Programming:** The 8085 Programming Model, Instruction Classification, Instruction, Data and Storage, Writing assembling and Execution of a simple program, Writing and Assembling Program.	12hrs	1	2	3

II	**Introduction to 8085 Instructions:** Overview of 8085 Instruction Set, Data Transfer Operations, Arithmetic Operations, Logic Operation, Branch Operation, Writing Assembly Languages Programs, Debugging a Program **8085 Microprocessor Architecture and Memory Interface:** Introduction, 8085 Microprocessor unit, 8085-Based Microcomputer, Memory Interfacing, Interfacing the 8155 Memory Segment, Illustrative Example: Designing Memory for the MCTS Project, Testing and Troubleshooting Memory Interfacing Circuit, 8085-Based Single-Board microcomputer. **Interfacing of I/O Devices:** Basic Interfacing concepts, Interfacing Output Displays, Interfacing Input Devices, Memory Mapped I/O, Testing and Troubleshooting I/O Interfacing Circuits.	12hrs	2		
III	**Programming Techniques With Additional Instructions:** Programming Techniques: Looping, Counting and Indexing, Additional Data Transfer and 16-Bit Arithmetic Instructions, Arithmetic Instruction Related to Memory, Logic Operations: Rotate, Logics Operations: Compare, Dynamic Debugging. **Counters and Time Delays:** Counters and Time Delays, Illustrative Program: Hexadecimal Counter, Illustrative Program: zero-to-nine (Modulo Ten) Counter, Generating Pulse Waveforms, Debugging Counter and Time-Delay Programs.	12hrs	3		

IV	**Stacks and Sub-Routines:** Stack Subroutine, Restart, Conditional Call, Return Instructions, Advanced Subroutine concepts. **8086 Microprocessor:** Introduction to 8086 Microprocessor, Intel Microprocessor families, 8086 Microprocessor Architecture, Register Organization, Pin Description, Modes of Operation, Difference between 8085 instructions and 8086 instructions.	12hrs	3 4		
V	**Software Development System and Assemblers:** Microprocessors-Based Software Development system, Operating System and Programming Tools, Assemblers and Cross-Assemblers, Writing Program Using Cross Assemblers. **Interrupts:** The 8085 Interrupt, 8085 Vectored Interrupts, Restart as S/W Instructions, Additional I/O Concepts and processes.	12hrs	4		

References

1) Microprocessors Architecture, Programming and Applications with the 8085, Ramesh Gaonkar, Fifth Edition, PENRAM
2) Computer System Architecture, M. Morris Mano, PHI
3) Structured Computer Organization, Andrew C. Tanenbaum, PHI

Course Description: BSc(Information Technology)	
Semester	**II**
Course Name	**Database Management System**
Course Code	**UIT2DMT**
Eligibility for the Course	
Credit	**2**
Hours	**5Hrs per week**

Course Objectives	The objective of this course is to introduce the concept of the DBMS with respect to the relational model, to specify the functional and data requirements for a typical database application and to understand creation, manipulation and querying of data in databases and the basic of PL/SQL

Course Outcomes	**After completing the course, Student will be able to:**
	1) Design E-R model to represent database
	2) Design the database with normalization
	3) Explain the fundamental of RDBMS
	4) Explain the transactions of database and basic of PL/SQL

Module/ Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
I	**Introduction**: What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management, **Data Models** :The importance of data models, Basic building blocks ,Business rules, The evolution of data models, Degrees of data abstraction	12hrs	1	2	3
II	**Database Design, ER-Diagram** Database design and ER Model: overview, ER-Model, Constraints, ER Diagrams,ERD Issues, weak entity sets, Codd's rules, Relational Schemas, Logical view of data, keys, integrity rules. **Relational Algebra and Calculus**: Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison.	12hrs	3		
III	**Constraints, Views and SQL** :What is constraints, types of constrains,Integrity constraints, Views: Introduction to views, data independence,security, updates on views, comparison between tables and views **SQL**:data definition, aggregate function,single row function Null Values, nested sub queries,Joined relations,.	12hrs	4		
IV	**Transaction management and Concurrency control**: Transaction management: ACID properties, serializability and concurrency control,Lock based concurrency control (2PL, Deadlocks),Time stamping methods, optimistic methods, database recovery management.	12hrs	4		

V	**PL-SQL:** Beginning with PL / SQL, Identifiers and Keywords, Operators, Expressions, Sequences, Overview and benefits of PL/SQL, Subprograms, types of PL/SQL blocks, Simple Anonymous Block, Identifiers, types of Identifiers, Declarative Section, variables, Scalar Data Types, The %TYPE Attribute, Executable Statements, PL/SQL Block Syntax, Comment the Code, Convert Data Types, Nested Blocks, Operators. Invoke SELECT Statements in PL/SQL, Save and Discard Transactions. .	12hrs	4		

References

1) "Database System and Concepts",A Silberschatz, H Korth, S Sudarshan, , fifth Edition McGraw-Hill .
2) "Database Systems", Rob, Coronel, Seventh Edition, Cengage Learning

Course Description : B.Sc. (Information Technology)	
Semester	**II**
Course Name	**Numerical Methods**
Course Code	**UIT2NMS**
Eligibility for the Course	
Credit	**2**
Hours	**5Hrs per week**

Course Objectives	The course is designed to have a grasp of important concepts of Numerical Methods in a scientific way. The learner is expected to solve as many examples as possible to get complete clarity and understanding of the topics covered.

Course Outcomes	**After completing the course, Student will be able to:**
	1) Solve algebraic, transcendental and simultaneous systems of equations using numerical methods.
	2) Evaluate the functions and their derivatives using interpolation.
	3) Solve differential equations and integration by using numerical methods.
	4) Apply triangularization method, LU decomposition, cholesky method, power and inverse power method.

Module/ Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
I	**Solutions of Algebraic and Transcendental Equations**: The Bisection Method, The Newton-Raphson Method, The Regula-falsi method, The Secant Method**.** **Solution of simultaneous algebraic equation (linear) using iterative methods:** Gauss Elimination Method, Gauss Jordan Method, Gauss Jacobi Method, Gauss Seidel Method	12hrs	1		
II	**Interpolation:** Forward Difference, Backward Difference, Central Differences, Different Types of Operators, Relation between Operators, Newton's Forward Difference Interpolation, Newton's Backward Difference Interpolation, Divided Differences, Newton's Divided Difference Interpolation, Lagrange's	12hrs	2		

	Interpolation, Spline Interpolation.				
III	**Numerical differentiation:** Numerical differentiation, Methods based on finite Differences: Derivatives using Newton's Forward Difference Interpolation, Newton's Backward Difference Interpolation, Newton's Divided Difference Interpolation & Lagrange's Interpolation. **Numerical solution of 1st and 2nd order differential equations:** Taylor series, Picard's Method, Euler's Method, Modified Euler's Method, Runge-Kutta Method for 1st and 2nd Order Differential Equations.	12hrs	2,3		
IV	**Numerical integration:** Trapezoidal Rule, Simpson's 1/3rd and 3/8th rules, Romberg Method, Gauss Legendre Integration Method, Gauss Chebyshev Integration Method. **Double Integration:** Trapezoidal Method, Simpson's Method	12hrs	3		
V	**Linear System of equations Direct Method:** Triangularization Method, LU Decomposition, Cholesky Method, Partition Method. **Eigen value Problem** : Power Method	12hrs	4		

References:

1) Numerical Methods for Scientific and Engineering Computation, M. K. Jain, S. R. K. Iyengar and R. K. Jain, New age International Publishers, Fourth Edition, 2003
2) Introductory Methods of Numerical Methods , S. S. Shastri , PHI , Vol – 2
3) Numerical Methods for Engineers , Steven C. Chapra, Raymond P. Canale , Tata Mc Graw Hill , 6th Edition , 2010
4) Numerical Analysis , Richard L. Burden, J. Douglas Faires , Cengage Learning , 9th Edition, 2011
5) Numerical and Statistical Technique, QaziShoeb Ahmad, Zubair Khan, Shadad Ahmad Khan, Ane's Student Edition

Course Description:BSc(Information Technology)	
Semester	**II**
Course Name	**Web Programming**
Course Code	**UIT2WPT**
Eligibility for the Course	
Credit	**2**
Hours	**5Hrs per week**

Course Objectives	On completion of this course, a learner will be able to develop a web application using web technologies. Learners will gain the skills and project-based experience needed for entry into web application and development careers. Learners will be able to develop a dynamic webpage by the use of java script , jquery, xml, basic php along with interaction with mysql database.

Course Outcomes	**After completing the course, Student will be able to:**
	1) Illustrate the HTML5 tags used to develop static web pages.
	2) Make use of CSS to improve the look and feel of web pages.
	3) Elaborate the creation of dynamic web pages using server side PHP programming and Database connectivity.
	4) Explain javascript event handling and functions.

Module/ Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
I	**Internet and the World Wide Web:** What is Internet? Introduction to internet and its applications, E-mail, telnet, FTP, e-commerce, video conferencing, e-business. Internet service providers, domain name server, internet address, World Wide Web (WWW): World Wide Web and its evolution, uniform resource locator (URL) **HTML5:** Introduction, Why HTML5? Formatting text by using tags, using lists and backgrounds, Creating hyperlinks and anchors. Style sheets, CSS formatting text using style sheets, formatting paragraphs using style sheets, Creating image map, redirecting to another URL	12hrs	2	2	3
II	**HTML5 Tables, Forms and Media:** Creating tables: creating simple table, specifying the size of the table, specifying the width of the column, merging table cells, Creating user forms: creating basic form, using check boxes and option buttons, creating lists, additional input types in HTML5 **Bootstrap:** Introduction, Why Use Bootstrap?, Create First Web Page With Bootstrap, Bootstrap Grids, Bootstrap Typography Classes, Bootstrap Tables, Bootstrap Images, Bootstrap Alerts, Bootstrap Buttons, Bootstrap Progress Bars, Bootstrap basic Forms	12hrs	1		

III	**Java Script:** Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript Security. **Operators:** Assignment Operators, Comparison Operators, Arithmetic Operators, % (Modulus), ++(Increment), --(Decrement), -(Unary Negation), Logical Operators, Short-Circuit Evaluation, String Operators, Special Operators, ?: (Conditional operator), , (Comma operator), delete, new, this, void **Statements:** Break, comment, continue, delete, do...while, export, for, for...in, function, if...else, import, labelled, return, switch, var, while, with. **Core JavaScript (Properties and Methods of Each):** Array, Boolean, Date, Function, Math, Number, Object, String, regExp **Document and its associated objects:** Document, Link, Area, Anchor, Image, Applet, Layer **Events and Event Handlers:** General Information about Events, Defining Event Handlers, event, onAbort, onBlur, onChange, onClick, onDblClick, onDragDrop, onError, onFocus, onKeyDown, onKeyPress, onKeyUp, onLoad, onMouseDown, onMouseMove, onMouseOut, onMouseOver, onMouseUp, onMove, onReset, onResize, onSelect, onSubmit, onUnload	12hrs	4		

IV	**PHP:** Why PHP and MySQL? Server-side scripting, PHP syntax and variables, comments, types, control structures, branching, looping, termination, functions, passing information with PHP, GET, POST, formatting form variables, superglobal arrays, strings and string functions, regular expressions, arrays, number handling, basic PHP errors/problems. **XML:** Comparing XML with HTML,Advantages and Disadvantages of XML,Structure of an XML Document,XML entity references,DTD,XSLT.	12hrs	3		
V	**Advanced PHP and MySQL:** PHP/MySQL Functions, Integrating web forms and databases, Displaying queries in tables, Building Forms from queries, String and Regular Expressions, Sessions, Cookies and HTTP, E-Mail **Introduction to JQuery:** Fundamentals, Selectors, Methods to access HTML attributes.	12hrs	3		

References

1) "HTML5 Step by Step", FaitheWempen , Microsoft Press
2) "JavaScript 2.0: The Complete Reference ",Thomas Powell and Fritz Schneider , Second Edition, Tata McGraw Hill Publication
3) "PHP 5.1 for Beginners" , Ivan Bayross , Sharanam Shah, SPD Publication
4) "PHP 6 and MySQL Bible ",SteveSuehring, Tim Converse, Joyce Park, Wiley Publication
5) "PHP Project for Beginners ",SharanamShah, Vaishali Shah , SPD Publication
6) "Web Design The Complete Reference " , Thomas Powell , Tata McGraw Hill Publication
7) "Head First HTML 5 programming ",Eric Freeman , O'Reilly Publication

Course Description: BSc(Information Technology)	
Semester	**II**
Course Name	**Spoken English**
Course Code	**USC2CSK**
Eligibility for the Course	
Credit	**2**
Hours	**30Hrs.**

Course Objectives	To enhance communication skills of the students

Course Outcomes	**After completing the course, Student will be able to:**
	1) Develop an understanding of communication skills to face challenges of real and corporate life
	2) Show enhancement in the communication skill
	3) Demonstrate Leadership qualities, team-work, decision making

Module/ Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
I	**Academic Skills :** **1.1 Essentials of Grammar**: Parts of speech, Articles, Modals, Sentences and their types., Punctuation marks **1.2 Employment Communication**: Introduction, Resume, Curriculum Vitae, Scannable Resume, Developing an Impressive Resume, Formats of Resume, Job Application or Cover Letter. Email Writing **1.3 Professional Presentation**: Nature of Oral Presentation, planning a Presentation, Preparing the Presentation, Delivering the Presentation **1.4 Job Interviews**: Introduction, Importance of Resume, Definition of Interview, Background Information, Types of Interviews,	15hrs			

	Preparatory Steps for Job Interviews, Interview Skill Tips, Changes in the Interview Process, FAQ During Interviews **1.5** **Group Discussion**: Introduction, Ambience/Seating Arrangement for Group Discussion, Importance of Group Discussions, Difference between Group Discussion, Panel Discussion and Debate, Traits, Types of Group Discussions, topic based and Case based Group Discussion, Individual Traits				
II	**Soft and Professional Skills:** **2.1** Introduction to Soft Skills and Hard Skills **2.2** **Personality Development**: Knowing Yourself, Positive Thinking, Johari's Window, Communication Skills, Non-verbal Communication, Physical Fitness Definition **2.3** **Etiquette and Mannerism**: Introduction, Professional Etiquette, Technology Etiquette **2.4** **Communication Techniques:** **2.5** **Ethical Values**: Ethics and Society, Theories of Ethics, Correlation, between Values and behaviour, Nurturing Ethics, Importance of Work Ethics, Problems in the Absence of Work Ethics **2.6** **Leadership and Team Building**: Leader and Leadership, Leadership Traits, Culture and Leadership, Leadership Styles and Trends, Team Building, Types of Teams	15hrs	1		

Course Description: BSc(Information Technology)	
Semester	**II**
Course Name	**Object Oriented Programming Practical**
Course Code	**UIT2OPP**
Eligibility for the Course	
Credit	**2**
Hours	**3Hrs per week**
Course Description: BSc(Information Technology)	

Course Objectives	Main objective to teach learners the basic concepts and technique which form the object oriented programming paradigm

Course Outcomes	**After completing the course, Student will be able to:**
	1) Construct program using classes, constructors, inheritance
	2) Design programs using virtual functions and abstract classes
	3) Build program using operator overloading, template, exceptional handling and string handling
	4) Utilize private function, friend function.

Module/ Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
1	**Classes and methods:** a. Design an employee class for reading and displaying the employee information,the getInfo() and displayInfo() methods will be used repectively. Where getInfo() will be private method b. Design the class student containing getData() and displayData() as two of its methods which will be used for reading and displaying the student information respectively. Where getData() will be private method. Design the class Demo which will contain the following methods: readNo(), factorial() for calculating the factorial of a number, reverseNo() will reverse the given number, isPalindrome() will check the given number is palindrome, isArmstrong() which will calculate the given number is armStrong or not.WhereareadNo() will be private method. d. Write a program to demonstrate function definition outside class and accessing class members in function definition.	3hrs	1		
2	**Using friend functions:** a. Write a friend function for adding the two complex numbers, using a single class. b. Write a friend function for adding the two different distances and display its sum, using two classes. c. Write a friend function for adding the two matrix from two different classes and display its sum.	3hrs	4		

3	**Constructors and method overloading:** a. Design a class Complex for adding the two complex numbers and also show the use of constructor. b. Design a class Geometry containing the methods area() and volume() and also overload the area() function . c. Design a class StaticDemo to show the implementation of static variable and static function.	3hrs	1		
4	**Operator Overloading:** a.Overload the operator unary(-) for demonstrating operator overloading. b. Overload the operator + for adding the timings of two clocks,And also pass objects as an argument. c.Overload the + for concatenating the two strings. For e.g “Py” + “thon” = Python.	3hrs	3		
5	**Inheritance:** a.Design a class for single level inheritance using public and private type derivation. b.Design a class for multiple inheritances. c.Implement the hierarchical inheritance d.Design a class for multilevel inheritances.	3hrs	1		

6	**Virtual functions and abstract classes** a.Implement the concept of method overriding. b.Show the use of virtual function c.Show the implementation of abstract class.	3hrs	2		
7	**String handling** a..String operations for string length , string concatenation b.String operations for string reverse, string comparison, c. Console formatting functions	3hrs	3		
8	**Exception handling** a.Show the implementation of exception handling b.Show the implementation for exception handling for strings c.Write a program to demonstrate how we can restrict a function to throw only certain types of exceptions and not all.	3hrs	3		
9	**File handling** a.Design a class FileDemo open a file in read mode and display the total number of words and lines in the file. b. Design a class to handle multiple files and file operations. c. Design a editor for appending and editing the file.	3hrs	3		

10	**Templates** Design the template class library for concatenating two strings b.Design the implementation of template class library for swap function. c.Design the template class library for sorting ascending to descending and vice-versa	3hrs	3		

References

1. Object-oriented programming in Turbo C++ By Robert Lafore, Galgotia Publication.
2. Object-oriented programming with C++ by E.Balagurusamy, 2nd Edition, TMH.

Course Description: BSc(Information Technology)	
Semester	**II**
Course Name	**Microprocessor Architecture Practical**
Course Code	**UIT2MAP**
Eligibility for the Course	
Credit	**2**
Hours	**3Hrs. per week**

Course Objectives	The objective of this course is to create simple assembly language programming and Operations on Memory Locations.

Course Outcomes	**After completing the course, Student will be able to:**
	1) Create simple Assembly Language Programs.
	2) Evaluate operations on memory locations.
	3) Develop packing and unpacking operations.
	4) Make use of register operations.

Module/Unit	**Course Description**	Hrs.	CO No.	PSO No.	PO No.
1	**Perform the following Operations related to memory locations.** a. Store the data byte 32H into memory location 4000H. b. Exchange the contents of memory locations 2000H and 4000H	3hrs	2	2	7
2	**Assembly language programs.** a. Subtract the contents of memory location 4001H from the memory location 2000H and place the result in memory location 4002H.	3hrs	1		

	b. Subtract two 8-bit numbers. c. Add the 16-bit number in memory locations 4000H and 4001H to the 16-bit number in memory locations 4002H and 4003H.The most significant eight bits of the two numbers to be added are in memory locations 4001H and 4003H.Store the result in memory locations 4004H and 4005H with the most significant byte in memory location 4005H. d. Add the contents of memory locations 40001H and 4001H and place the result in the memory locations 4002Hand 4003H. e.Write a program using 8085 Microprocessor for Decimal, Hexadecimal addition and subtraction of two Numbers. f. Find the l's complement of the number stored at memory location 4400H and store the complemented number at memory location 4300H. g. Write a program to convert given Hexadecimal number into its equivalent ASCII number and vice versa using 8085 instruction set.				

3	**Packing and unpacking operations.** a. Pack the two unpacked BCD numbers stored in memory locations 4200H and 4201H and store result in memory location 4300H.Assume the least significant digit is stored at 4200H. b. Two digit BCD number is stored in memory location 4200H. Unpack the BCD number and store the two digits in memory locations 4300H and 4301H such that memory location 4300H will have lower BCD digit.	3hrs	3		
4	**Register Operations.** a. Write a program to shift an eight bit data four bits right. Assume that data is in register C b. Program to shift a 16-bit data 1 bit left. Assume data is in the HL register pair c. Write a set of instructions to alter the contents of flag register in 8085. d. Write a program to count number of l's in the contents of D register and store the count in the B register.	3hrs	4		

5	**Multiple memory locations.** a. Calculate the sum of series of numbers. The length of the series is in memory location 4200H and the series begins from memory location 4201H. a. Consider the sum to be 8 bit number. So, ignore carries. Store the sum at memory location 4300H.Consider the sum to be 16 bit number. Store the sum at memory locations 4300H and 4301H b. Multiply two 8-bit numbers stored in memory locations 2200H and 2201H by repetitive addition and store the result in memory locations 2300H and 2301H. c. Find the largest number in a block of data. The length of the block is in memory location 2200H and the block itself starts from memory location 2201H. Store the maximum number in memory location 2300H. Assume that the numbers in the block are all 8 bit unsigned binary numbers.	3hrs	1		
6	**Calculations with respect to memory locations.** a. Write a program to sort given 10 numbers from memory location 2200H in the ascending order. b. Calculate the sum of series of even numbers from the list of numbers. The length of the list is in memory location 2200H and the series itself begins from memory location 2201H. Assume the sum to be 8 bit number so you can ignore carries and store the sum at	3hrs	1		

	memory location 2Sample problem: c. Calculate the sum of series of odd numbers from the list of numbers. The length of the list is in memory location 2200H and the series itself begins from memory location 2201H. Assume the sum to be 16-bit. Store the sum at memory locations 2300H and 2301H. d. Find the square of the given numbers from memory location 6100H and store the result from memory location 7000H e. Search the given byte in the list of 50 numbers stored in the consecutive memory locations and store the address of memory location in the memory locations 2200H and 2201H. Assume byte is in the C register and starting address of the list is 2000H. If byte is not found store 00 at 2200H and 2201H f. Add 2 arrays having ten 8-bit numbers each and generate a third array of result. It is necessary to add the first element of array 1 with the first element of array-2 and so on. The starting addresses of array l, array2 and array3 are 2200H, 2300H and 2400H, respectively				

7	**Assembly programs on memory locations.** a. Write an assembly language program to separate even numbers from the given list of 50 numbers and store them in the another list starting from 2300H. Assume starting address of 50 number list is 2200H b. Add even parity to a string of 7-bit ASCII characters. The length of the string is in memory location 2040H and the string itself begins in memory location 2041H. Place even parity in the most significant bit of each character. c .A list of 50 numbers is stored in memory, starting at 6000H. Find number of negative, zero and positive numbers from this list and store these results in memory locations 7000H, 7001H, and 7002H respectively d. Write an assembly language program to generate fibonacci number. e. Program to calculate the factorial of a number between 0 to 8.	3hrs	1		

8	**String operations in assembly programs.** a. Write an 8085 assembly language program to insert a string of four characters from the tenth location in the given array of 50 characters b. Write an 8085 assembly language program to delete a string of 4 characters from the tenth location in the given array of 50 characters. c. Multiply the 8-bit unsigned number in memory location 2200H by the 8-bit unsigned number in memory location 2201H. Store the 8 least significant bits of the result in memory location 2300H and the 8 most significant bits in memory location 2301H. d.Divide the 16-bit unsigned number in memory locations 2200H and 2201H (most significant bits in 2201H) by the B-bit unsigned number in memory location 2300H store the quotient in memory location 2400H and remainder in 2401H e. DAA instruction is not present. Write a subroutine which will perform the same task as DAA	3hrs	1	2	

9	**Calculations on memory locations.** a. To test RAM by writing '1' and reading it back and later writing '0' (zero) and reading it back. RAM addresses to be checked are 40FFH to 40FFH. In case of any error, it is indicated by writing 01H at port 10 b. Arrange an array of 8 bit unsigned no in descending order c. Transfer ten bytes of data from one memory to another memory block. Source memory block starts from memory location 2200H whereas destination memory block starts from memory location 2300H d. Write a program to find the Square Root of an 8 bit binary number. The binary number is stored in memory location 4200H and store the square root in 4201H. e. Write a simple program to Split a HEX data into two nibbles and store it in memory	3hrs	2	1	

10	**Operations on BCD numbers.** a. Add two 4 digit BCD numbers in HL and DE register pairs and store result in memory locations, 2300H and 2301H. Ignore carry after 16 bit. b. Subtract the BCD number stored in E register from the number stored in the D register c. Write an assembly language program to multiply 2 BCD numbers .	3hrs	4	3	

References

1) Microprocessors Architecture, Programming and Applications with the 8085, Ramesh Gaonkar, Fifth Edition, PENRAM
2) Computer System Architecture, M. Morris Mano, PHI
3) Structured Computer Organization, Andrew C. Tanenbaum, PHI

Course Description: BSc(Information Technology)	
Semester	**II**
Course Name	**Database Management System Practical**
Course Code	**UIT2DSP**
Eligibility for the Course	
Credit	**2**
Hours	**3Hrs per week**

Course Objectives	To give a good formal foundation on the relational model of data, give an introduction to systematic database design approaches

Course Outcomes	**After completing the course, Student will be able to:**
	1) Build Basic Database
	2) Build SQL statement
	3) Modify E-R model to relational table
	4) Construct integrity constraints

Module/Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
1.	**Draw E-R diagram and convert into relation tables** a. Design E-R diagram b. Convert E-R diagram into relational database	3hrs	3	2	7
2.	**Design a Database and create required tables.** a. Creating College database b. Creating Bank database	3hrs	1		
3.	**Writing Basic SQL SELECT Statements** a. Restricting data b. Sorting Data	3hrs	1		
4.	**Applying the constraints** a. Table Level b. Column Level	3hrs	4		

5.	**Manipulating Data** a. Using INSERT b. Using UPDATE **c.** Using DELETE	3hrs	2		
6.	**Write a SQL statement for Creating and Managing Tables** a. Alter b. Drop	3hrs	2		
7.	**Write a queries using Group Functions and Single-Row Functions** a. SUM ( ) , AVG ( ),MIN ( ), MAX( ),COUNT() b. UPPER, LOWER and INITCAP.	3hrs	2		
8.	**Write the queries to implement the joins** a. Simple Join b. Outer Join	3hrs	2		
9.	**Write the queries to implement the set operators** a. UNION , UNION ALL b. INTERSECT c. MINUS	3hrs	4		
10.	**Write the query to create the database objects** a. Views b. Sequences	3hrs	1		
11.	**PL/SQL Basics** a. Declaring Variables b. Writing Executable Statements c. Interacting with the oracle server	3hrs	4		

References

1) Database Systems A Practical Approach To Design Implementation And Management 4th Edition Thomas Connolly Carolyn Begg,Person

Course Description: BSc(Information Technology)	
Semester	**II**
Course Name	**Numerical Methods Practical**
Course Code	**UIT2NMP**
Eligibility for the Course	
Credit	**2**
Hours	**3Hrs. per week**

Course Objectives	To familiarize the students with the fundamental concepts of scilab and develop programming skill to effectively implement for problems.

Course Outcomes	**After completing the course, Student will be able to:**
	1) Make use of the basic commands of scilab.
	2) Construct a formula for interpolation using scilab.
	3) Determine the differential equation and numerical integration using scilab.
	4) Design the program in scilab for Eigenvalue problems and linear systems of equations.

Module/ Unit	Course Description	Hrs.	CO No.	PSO No.	PO No.
1	**Solution of algebraic and transcendental equations** a. Program to solve algebraic and transcendental equations by bisection method. b. Program to solve algebraic and transcendental equation by false position method. c. Program to solve algebraic and transcendental equation by Secant method. d. Program to solve algebraic and transcendental equation by Newton Raphson method	3hrs	1	6	2
2.	**Solving linear system of equations by iterative methods** a. Program for solving linear systems of equations using Gauss Jordan method. b. Program for solving linear system of equations using Gauss Seidel method.	3hrs	1		

3.	**Interpolation I** a. Program for Newton's forward interpolation. b. Program for Newton's backward interpolation. c. Program for Newton's Divided Interpolation.	3hrs	2		
4.	**Interpolation II:** a. Program for Lagrange's interpolation. b. Program for Spline interpolation.	3hrs	2		
5.	**Numerical Differentiation** a. Programming to obtain derivatives numerically.	3hrs	3		
6.	**Solution of differential equations** a. Program to solve differential equation using Euler's method b. Program to solve differential equations using modified Euler's method. c. Program to solve differential equation using Runge-kutta 2nd order and 4th order methods	3hrs	3		
7.	**Numerical Integration** a. Program for numerical integration using Trapezoidal rule. b. Program for numerical integration using Simpson's 1/3rd rule. c. Program for numerical integration using Simpson's 3/8th rule.	3hrs	3		
8.	**Double Integration:** a. Program for numerical integration using Trapezoidal rule. b. Program for numerical integration using Simpson's rule.	3hrs	3		
9.	**Linear System of Equation:** a. Program for LU Decomposition b. Program for Partition Method	3hrs	4		
10.	**EigenValue Problem:** a. Program for Power Method	3hrs	4		

References:

1. Scilab textbook companion for numerical methods: principles, analysis and algorithms by S.Pal

Course Description: BSc(Information Technology)	
Semester	**II**
Course Name	**Web Programming Practical**
Course Code	**UIT2WPP**
Eligibility for the Course	
Credit	**2**
Hours	**3Hrs per week**

Course Objectives	To familiarize the students with basic web development concepts required to develop static web pages as well as advanced web concepts required for development of dynamic web pages.

Course Outcomes	**After completing the course, Student will be able to:**
	1) Create static web pages using HTML5 and CSS.
	2) Design a responsive website using HTML5 and CSS.
	3) Construct interactive web pages using javascript as client side scripting language.
	4) Develop dynamic web pages using PHP as server side scripting language.

Module/ Unit	**Course Description**	Hrs.	CO No.	PSO No.	PO No.
1.	**Use of Basic Tags** a. Design a web page using different text formatting tags. b. Design a web page with links to different pages and allow navigation between web pages. c. Design a web page demonstrating all Style sheet types	3hrs	1	2	7

2	**Image maps, Tables, Forms and Media** a. Design a web page with Image maps. b. Design a web page with different tables. c. Design a webpages using table so that the content appears well placed. d. Design a web page with a form that uses all types of controls. e. Design a web page using bootstrapping	3hrs	2		
3	**Java Script** a. 1. Using JavaScript design, a web page that prints factorial of a number. (Use prompts.) 2. Using JavaScript design, a web page that prints factorial of a number. (Use HTML form)3. Using JavaScript design, a web page that accepts number of terms from the user and displays Fibonacci series. (Use HTML form) b. Design a form and validate all the controls placed on the form using Java Script. c. Write a JavaScript program to accept a number from the user and display the sum of its digits. d. Write a JavaScript program to accept a number from the user and display whether it is prime or not. e. Write a program in JavaScript to accept a sentence from the user and	3hrs	3		

	display the number of words in it. (Do not use split () function). f. Write a java script program to design simple calculator.				
4	. **Control and looping statements and Java Script references** a. Design a web page 1. To accept a number from the user and display whether it is odd or even. (If…else). 2. To accept two numbers and operator from the user and perform the operation entered by user. (Use switch case) b. 1. Design a web page to display all the odd numbers from 1 to 50. (use while) 2. Design a web page to display all the numbers from 20 to 1. (use for) 3. Design a web page to demonstrate the use of for in loop on an array. c. Design a web page demonstrating different Core JavaScript references (Array, Date, Math, and String).	3hrs	3		
5	**Basic PHP I** a. Write a PHP Program to accept a number from the user and print it factorial. b. Write a PHP program to accept a number from the user and print whether it is prime or not.	3hrs	4		

<table>
<tr><td>6</td><td>Basic PHP II

a. Write a PHP code to find the greater of 2 numbers. Accept the no. from the user.

b. Write a PHP program to display the following Binary Pyramid:

<table><tr><td>1</td><td></td><td colspan="3"></td></tr><tr><td>0</td><td>1</td><td></td><td colspan="2"></td></tr><tr><td>1</td><td>0</td><td>1</td><td></td><td></td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td><td></td></tr></table></td><td>3hrs</td><td>4</td><td></td><td></td></tr>
<tr><td>7</td><td>String Functions and arrays

a. Write a PHP program to demonstrate different string functions.

b. Write a PHP program to create one dimensional array.</td><td>3hrs</td><td>4</td><td></td><td></td></tr>
<tr><td>8</td><td>PHP and Database

a. Write a PHP code to create:

● Create a database College

● Create a table Department (Dname, Dno, Number_Of_faculty)

b. Write a PHP program to create a database named “College”. Create a table named “Student” with following fields (sno, sname, percentage).

Insert 3 records of your choice. Display the names of the students whose percentage is between 35 to 75 in a tabular</td><td>3hrs</td><td>4</td><td></td><td></td></tr>
</table>

	format. c. Design a PHP page for authenticating a user.				
9	**Create a XML file with Internal/External DTD and display it using XSL**	3hrs			
10	**Sessions and Cookies** a. Write a program to demonstrate use of sessions and cookies.	3hrs	4		

References:

1) "HTML5 Step by Step", FaitheWempen , Microsoft Press
2) "JavaScript 2.0: The Complete Reference ", Thomas Powell and Fritz Schneider , Second Edition, Tata McGraw Hill Publication
3) "PHP 5.1 for Beginners", Ivan Bayross, Sharanam Shah, SPD Publication

॥ विद्या विनयेन शोभते ॥

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR

ARTS, COMMERCE AND SCIENCE COLLEGE, NEW PANVEL (AUTONOMOUS)

Re-accredited 'A+' Grade by NAAC
'College with Potential for Excellence' Status Awarded by UGC
'Best College Award' by University of Mumbai

Program: M. A.

Revised Syllabus of M.A. English Literature
Semester I and II
Under Choice Based Credit System (60:40)
w.e.f. Academic Year 2022-2023

Preamble of the Syllabus:

English plays paramount role the life of every student because it is an international language. Sound knowledge of English literature is regarded as one of the most significant facets of one's personality. There is passionate desire in the mind of students to learn different disciplines of English literature in order to accomplish global identity in today's competitive and digital world.

Literature is a reflection of universal truths and there is an inevitable relationship between literature and society. Poets, dramatists and novelists are blessed with keen observations, perceptions, creative and imaginative skills in the process of creation of literary masterpieces. The study of English literature has two commendable functions of providing delight and inculcation of moral and social values amongst the learners. It also reforms and transforms the critical understanding and appreciation of the world classics belonging to Greek, Roman, British, American and Indian literature by the stakeholders. Therefore, the realm of English literature is intensively appealing as well as extensively stirring to the budding students.

The learners have tremendous sense of curiosity to delve, understand, visualize and appreciate various eras of English literature and attain aesthetic delights. The learners experience sense of astonishment, suspense, venture, adventure, bravery, catharsis, towards the protagonist and antagonist reflected in the poems, stories, plays and novels. The protagonist depicted in English literature is an epitome of virtuousness and unrighteousness with an indelible impact on the readers. Imitation is fundamental principle in all the literary works. Therefore, everybody experiences the phenomenon of procrastination leading into the realm of Hamlet in one's life.

It is through the study of English literature, the leaners are endowed with universal truths, human values, insights and develop healthy relationship with regards to people and nature. The syllabus aims at empowering the students with in depth understanding of critical theories, stylistic and linguistic analysis of the texts and appreciation of world classics. The learning of English literature unfolds new horizons and creates renaissance in academic and professional world.

Master of Arts (M.A.) in English is a post graduate course of department of English, Changu Kana Thakur Arts, Commerce & Science College, New Panvel (Autonomous) The Choice Based Credit and Grading System to be implemented through this curriculum would

enable the students to explore new insights, dimensions and its applications in English literature. The learners pursuing this course of English literature can achieve knowledge and skills necessary for better employability and professionalism in 21st century.

Sr. No.	Heading	Particulars
1	Title of Course	Literary Theory and Criticism
2	Eligibility for Admission	B.A./B.Com./B.Sc. Degree from recognised University
3	Passing marks	40%
4	Ordinances/Regulations (if any)	
5	No. of Semesters	Two
6	Level	P.G.
7	Pattern	Semester (60:40)
8	Status	Revised
9	To be implemented from Academic year	2022-2023

Objectives of the Course:

- To introduce the learners to a wide range of critical methods and literary theories.
- To enable them to use the various critical approaches and advanced literary theories.
- To enhance their analytical skills.
- To enable them to mobilize various theoretical parameters in the analysis of literary and cultural texts.
- To familiarize the learners with the trends and cross-disciplinary nature of literary theories.
- To develop insights in the process of application of critical theories.

Course Outcome: By the end of the course, a student should develop the Ability:

- To interpret classical critical theories and its reflection in literature
- To apply Romantic critical theories and its relevancein literary texts.
- To examine nature and features of Indian classicaldrama

- To recognise the relationship between literature andliterary theories
- To evaluate the formation of ecocriticism and itsessence in literature as well as in real life

M. A. English Literature Semester I and II

For the subject of English there shall be two papers for 60 lectures each comprising of four units of 15 Lectures each.

Semester-I	Semester-II
1. Paper-I Unit-I will be on Classical Theories 2. Paper-I Unit-II will be on Romantic Theories 3. Paper- I Unit-III will be on Indian Theories 4. Paper- I Unit-IV will be on Formalism	1. Paper-I Unit-I will be on Structuralism 2. Paper-I Unit-II will be on Marxism and Feminism 3. Paper-I Unit-III will be on Reader Response 4. Paper- I Unit-IV will be on Formalism

M.A. English Literature Syllabus
Under Choice Based Credit System (CBCS)
To be implemented from the Academic year 2022-23
SEMESTER I

Course Code	Unit	Topics	Credits	Lectures
PAR1ENG1	**I**	**Classical/Neoclassical Theories:** • Aristotle – *Theory of Mimesis and Catharsis* • Samuel Johnson –" Preface to Shakespeare" (from *English Critical Texts*	**06**	**15**
	II	**Romantic Theories:** • William Wordsworth's Preface to Lyrical Ballads Themes and Diction • Matthew Arnold– "The Study of Poetry"		**15**
	III	**Indian Aesthetics/Literary** • S. N. Dasgupta – "The Theory of Rasa" • G. N. Devy – "Anandvardhana: Dhvani Structure of Poetic Meaning" (From Ganesh Devi's Indian Literary Criticism, New Delhi Orient Black Swan)		**15**
	IV	**Formalism and New Criticism** • T. S. Eliot – "Tradition and Individual Talent" • Victor Shklosky "Art as a Technique"		**15**

M.A. English Literature Syllabus
Under Choice Based Credit System (CBCS)
To be implemented from the Academic year 2022-23
SEMESTER II

Course Code	Unit	Topics	Credits	Lectures
PAR2ENG2	**I**	**Structuralism, Poststructuralism and Deconstruction**: • Roland Barthes – "The Death of the Author" • Jacques Derrida – "Structure, Sign and Play"	**06**	**15**
	II	**Feminism and Psychology** • Carl Jung – "Psychology and Literature" • Juliet Mitchell – "Femininity , Narrative and Psychoanalysis"		**15**
	III	**Reader Response and New Historicism** • Wolfgang Iser – "Reading Process: A Phenomenological Approach" (From *Modern Criticism and Theory: A Reader*) • Stephen Greenblatt – "Resonance and Wonder" (From *Learning to Curse*)		**15**
	IV	**Postcolonialism, Diaspora and Ecocriticism** • Kerstin W. Shands – Neither East nor West: From Orientalism to Postcoloniality (From *Theorizing Diaspora*) • Cheryll Glotfelty – "Literary Studies in an age of Environmental Crisis" (From *The Ecocriticism Reader*)	**06**	**15**

Sources of the prescribed texts

1. Braziel, Jana Evans and Anita Mannur (Ed.) *Theorizing Diaspora.* London: Blackwell, 2003.
2. Enright, D.J. and Chickera, Ernst de. (Ed.) *English Critical Texts*. Delhi: Oxford University Press, 1962.
3. Glotfelty, Cheryll and Harold Fromm (Ed.) *The Ecocriticism Reader: Landmarks in Literary Ecology*. Athens: The University of Georgia Press, 1996.
4. Lodge, David and Nigel Wood (Ed.) *Modern Criticism and Theory: A Reader*
5. Raghavan V. and Nagendra (Ed.) *An Introduction to Indian Poetics.* Madras: MacMillan, 1970.

Reference Books:

1. Adams, Hazard. *Critical Theory Since Plato*. New York, Harcourt Brace Jovanovich, 1971. Abrams, M. H. *A Glossary of Literary Terms*. (8th Edition) New Delhi: Akash Press, 2007. Baldick, Chris. *The Oxford Dictionary of Literary Terms*. Oxford: Oxford University Press, 2001.
2. Barry, Peter. *Beginning Theory: An Introduction to Literary and Cultural Theory*. New Delhi: Viva Books, 2008.
3. Drabble, Margaret and Stringer, Jenny. *The Concise Oxford Companion to English Literature*.
4. Oxford: Oxford University Press, 2007.
5. Fowler, Roger. Ed. A Dictionary of Modern Critical Terms. Rev. ed. London: Routledge & Kegan Paul, 1987.
6. Habib, M. A. R. A History of Literary Criticism: From Plato to the Present. London: Blackwell, 2005.
7. Harmon, William; Holman, C. Hugh. A Handbook to Literature. 7th ed. Upper Saddle River, N.J. : Prentice-Hall, 1996.
8. Hall, Donald E. Literary and Cultural Theory: From Basic Principles to Advanced Application. Boston: Houghton, 2001.

9. Hudson, William Henry. An Introduction to the Study of Literature. New Delhi: Atlantic, 2007. Jefferson, Anne. and D. Robey, eds. Modern Literary Theory: A Comparative Introduction. London: Batsford, 1986.
10. Keesey, Donald. Contexts for Criticism. 4th Ed. Boston: McGraw Hill, 2003. Latimer, Dan. Contemporary Critical Theory. San Diego: Harcourt, 1989.
11. Lentriccia, Frank. After the New Criticism. Chicago: Chicago UP, 1980.
12. Lodge, David (Ed.) Twentieth Century Literary Criticism. London: Longman, 1972.
13. Murfin, Ross and Ray, Supryia M. The Bedford Glossary of Critical and Literary Terms. Boston: Bedford/St.Martin's, 2003.
14. Nagarajan M. S. English Literary Criticism and Theory: An Introductory History. Hyderabad: Orient Black Swan, 2006.
15. Natoli, Joseph, ed. Tracing Literary Theory. Chicago: U of Illinois P, 1987.
16. Ramamurthi, Lalitha.An Introduction to Literary Theory. Chennai: University of Madras, 2006.
17. Selden, Raman and Peter Widdowson. A Reader's Guide to Contemporary Literary Theory. 3rd Ed. Lexington: U of Kentucky P, 1993.
18. Tyson, Lois. Critical Theory Today: A User-Friendly Guide. New York: Garland Publishing, 1999.
19. Wolfreys, Julian. ed. Introducing Literary Theories: A Guide and Glossary . Edinburgh: Edinburgh University Press, 2003.

Scheme of Examination for Each Semester:

Internal Evaluation: 40

- **Scheme of Examination**

The performance of the learners shall be evaluated into two parts. The learner's performance shall be assessed by Internal Assessment with 40% marks in the first part and by conducting the

Semester End Examinations with 60% marks in the second part. The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below-

A) Internal Assessment: 40 % 40 Marks

Sr.No.	Particular	Marks
01	One periodical class test/online examination to be conducted in the given semester	20 Marks
02	Any two tools out of these (10 Marks each) 1. Group/individual Survey Project 2. Presentation and write up on the selected topics of the subjects 3. Case studies/Test based on tutorials 4. Book Review/Poetry Appreciation/ Open Book Test 5. Quiz	20 Marks

Semester End Examination: 60 Marks will be as follows -:

Theory		Marks
Each theory paper shall be of two hours duration.		
All questions are compulsory and will have internal options. All questions carry equal marks		
Q-1	From Unit I - Essay on the theories 1 out of 2	15 Marks
Q-2	From Unit II - Essay on the theories 1 out of 2	15 Marks
Q-3	From Unit III - Essay on the theories 1 out of 2	15 Marks
Q-4	From Unit IV - Essay on the theories 1 out of 2	15 Marks

Sr. No.	Heading	Particulars
1	Title of Course	Linguistics and Stylistic Analysis of Text
2	Eligibility for Admission	B.A./B.Com./B.Sc. Degree from recognised University
3	Passing marks	40%
4	Ordinances/Regulations (if any)	
5	No. of Semesters	Two
6	Level	P.G.
7	Pattern	Semester (60:40)
8	Status	Revised
9	To be implemented from Academic year	2022-23

Objectives of the Course:

- To understand the concept of style in literature.
- To understand the linguistic basis of literary criticism (stylistics as an input to literary criticism).
- To communicate the concept of discourse and the principles of discourse analysis.
- To inform the use of stylistic approach in teaching literature.
- To understand the impact of stylistic analysis on academic writing.
- To familiarize with the concepts in narratology to the students.

Course Outcome: By the end of the course, a student should develop the Ability

- To Classify figurative devices and linguistic patterns demonstrated in language
- To Analyse the usage of cohesion and coherence inEnglish language
- To Elaborate stylistic and linguistic approach to thestudy of literature
- To Illustrate the sound system of English language
- To Inspect salient traits in narratology and itsapplication

M. A. English Literature Semester I and II

For the subject of English there shall be two papers for 60 lectures each comprising of four units of 15 Lectures each.

Semester-I	Semester-II
1. Paper-I Unit-I will be on Concept of style in literature 2. Paper-I Unit-II will be on Lexis and Syntax 3. Paper- I Unit-III will be on Discourse Analysis 4. Paper- I Unit-IV will be on application of the stylistic and linguistic approach to the study of literature	1. Paper-I Unit-I will be on Phonology 2. Paper-I Unit-II will be on Narratology 3. Paper-I Unit-III will be on application of the principles of discourse analysis to academic writings on literary topics

M.A. English Literature Syllabus
Under Choice Based Credit System (CBCS)
To be implemented from the Academic year 2022-2023
SEMESTER I

Course Code	Unit	Topics	Credits	Lectures
PAR1ENG1	**I**	**Concept of style in literature** Foregrounding : variation from the norm , through : a) Linguistic patterning : phonological , grammatical and lexical patterns (e.g. structural repetition like parallelism , the rhetorical effect of antithesis , climax) b) Deviation from the code (e.g. neologisms , archaisms , deviant collocations) c) Figurative language (e.g. metaphor, symbolism, imagery, irony, paradox, tautology)	**06**	**15**
	II	**Lexis and syntax** • Lexis : types of words (e.g. stative & dynamic verbs); type of vocabulary (e.g. simple/ complex , formal colloquial) • Syntax: Syntagmatic and paradigmatic relations; sentence types; sentence complexity; types of clauses ; types of phrases		**15**
	III	**Discourse analysis** • **A)Cohesion:** a. Logical and other links between sentences (Subordinating and coordinating conjunctions and linking adverbilas b. Cross- referencing by pronouns c. Ellipsis d. Lexical cohesion: reiteration and collocation **e.** Literary cohesion through reported speech, authorial comments in fiction		**15**

		B) Coherence: sequence, segmentation , salience **a.** The structure of written discourse **b.** The structure of conversation, including speech acts. Given and new information. Presupposition. The cooperative principle.		
PAR1ENG1	**IV**	• Application of the stylistic and linguistic approach to the study of (teaching) of literature	**06**	**15**

M.A. English Literature Syllabus
Under Choice Based Credit System (CBCS)
To be implemented from the Academic year 2022-2023
SEMESTER II

Course Code	Unit	Topics	Credits	Lectures
PAR2ENG2	**I**	**Phonology** • The sound system of English vowels and consonants, transcription, description according to their place, type and manner of articulation • Phonological patterns of rhyme metre, alliteration, assonance, clustering of vowel and consonant sounds • Varieties of English	**06**	**15**

	II	**Narratology** • Narrators and narration: addresser – addressee relationships. Use of authorial comment, dialogue, free indirect discourse, stream of consciousness, soliloquy • Histoire, discourse / story, discourse / story , text, narration • Text and time • Character • Setting • Point of view. Authorial commentary on the events : implicit ; overt		**15**
	III	**Application of the principles of discourse analysis to academic writing on literary topics**	**06**	**15**

Sample topics : for Projects

1. Poetry recitation and transcription
2. Comparative study of styles (2 poems by the same poet/ 2 poets of the same school , etc.)
3. Comparative study of styles (2 novels by the same author.)
4. Creative writing (fiction) by using different types of narrators / treating the time in different ways/ different modes of characterisation

Recommended Reading

1. Bhelande , Anjali. *Lord of the Flies: A Stylistic Analysis*. Calcutta: Writers Workshop.1996 (for basic introduction to stylistic theory)
2. Bradford ,Richard. *Stylistics* . London and New York : Routledge, 1997
3. Burton D. *Dialogue and Discourse : A Sociolinguistic Approach to Modern Drama Dialogue and Naturally Occurring Conversation* . London : Routledge and Kegan Paul

.1982

4. Carter , Ronald (ed) . *Language and Literature* . London: Allen and Unwin, 1982 (useful analysis of literary works.
5. Cummings, M. , Simons, R.. *The Language of Literature : A stylistic introduction to the study of literature*. London : Pergamon,1983
6. Fowler ,Roger. *Style and Structure in Literature* . Oxford : Blackwell, 1975
7. Gimson,A.D. *Introduction to the Pronunciation of English*, U.K. : Edward Arnold, 1964 (2nd ed) , London : ELBS, 1974
8. Leech .G.N., Deuchar, M. and Hoogenraad, R. *English Grammar for Today: A new introduction*. London : Macmillan, 1973 (This grammatical framework will be followed)
9. Leech G.N. *A Linguistic Guide to English Poetry* . London: Longman, 1969
10. Leech G.N. and Short ,M.H. *Style in Fiction* . London: Longman, 1981
11. Lodge ,David. *Language of Fiction: Essays in Criticism and Verbal Analysis of the English Novel*. London: Routledge, 1966
12. Narayan , Meenakshi (ed) . *Functional Stylisitcs : An analysis of Three Canadian Novels*. Bombay: SNDT, 1994
13. O'Connor, J. D. *Better English Pronunciation*. Cambridge: Cambridge University Press, 1967.
14. Page Norman . *Speech in the English Novel*. London: Longman, 1973
15. Quirk, R. and Greenbaum, S. *A University Grammar of English* . London: Longman, 1973.
16. Short , M.H. and Culpeper , J. Exploring the Language of Drama : From Text to Context, London : Routledge ,1998
17. Thorat , Ashok . *A Discourse Analysis of Five Indian Novels* . New Delhi: Macmillan India Ltd.2002
18. Trudgill, Peter. *Sociolinguistics,* U.K. Penguin , 1972
19. Verdonk , Peter. *Stylistics* .Oxford : Oxford University Press, 2002
20. Widdowson H.G. *Stylistics and the Teaching of Literature*. London: Longman , 1973
21. Yule, George and Brown , Gillan. *Discourse Analysis*. Cambridge: Cambridge University Press, 1983

Scheme of Examination for Each Semester:

A) Internal Assessment: 40 % **40 Marks**

Sr.No.	Particular	Marks
01	One periodical class test/online examination to be conducted in the given semester	20 Marks
02	Any two tools out of these (10 Marks each) 1. Group/individual Survey Project 2. Presentation and write up on the selected topics of the subjects 3. Case studies/Test based on tutorials 4. Book Review/Poetry Appreciation/ Open Book Test 5. Quiz	20 Marks

Semester End Examination: 60 Marks will be as follows -:

Theory		**Marks**
Each theory paper shall be of two hours duration.		
All questions are compulsory and will have internal options. All questions carry equal marks		
Q-1	From Unit I - Essay on the theories 1 out of 2	15 Marks
Q-2	From Unit II - Essay on the theories 1 out of 2	15 Marks
Q-3	From Unit III - Essay on the theories 1 out of 2	15 Marks
Q-4	From Unit IV - Essay on the theories 1 out of 2	15 Marks

Sr. No.	Heading	Particulars
1	Title of Course	Fiction
2	Eligibility for Admission	B.A./B.Com./B.Sc. Degree from recognised University
3	Passing marks	40%
4	Ordinances/Regulations (if any)	
5	No. of Semesters	Two
6	Level	P.G.
7	Pattern	Semester (60:40)
8	Status	Revised
9	To be implemented from Academic year	2022-2023

Objectives of the Course:

- To familiarize learners with different genres in fiction.
- To familiarize them with different types of fictional narratives.
- To provide the learners with an idea of the growth of fiction over the period of the last three centuries.
- To make the learners aware of the social, cultural and psychological implications of fiction

Course Outcome: By the end of the course, a student should develop theAbility:

- To Interpret significant types of novels with suitableexamples
- To Identify satirical elements reflected in the noveland its corelation with socio-political condition
- To Analyse distinctiveness of Victorian novelist andtheir depiction of multiple themes
- To Perceive the causes of tragedy in literature as wellas in real life
- Adapt social, ethical values percolated in theliterary texts

M. A. English Literature Semester I and II

For the subject of English there shall be two papers for 60 lectures each comprising of four units of 15 Lectures each.

Semester-I	Semester-II
1. Paper-I Unit-I will be on Terms	1. Paper-I Unit-I will be on Terms
2. Paper-I Unit-II will be on Novel	2. Paper-I Unit-II will be on Novel
3. Paper- I Unit-III will be on Fiction	3. Paper-I Unit-III will be on Fiction
4. Paper- I Unit-IV will be on Novel	4. Paper- I Unit-IV will be on Novel

M.A. English Literature Syllabus
Under Choice Based Credit System (CBCS)
To be implemented from the Academic year 2022-2023
SEMESTER I

Course Code	Unit	Topics	Credits	Lectures
PAR1ENG1	**I**	**Terms for study** 1. Picaresque 2. Epistolary Novel 3. Sentimental Novel 4. Bildungsroman / Künstlerroman 5. Historical Novel 6. Gothic Novel 7. Romantic Novel 8. Sociological Novel 9. Realistic Novel 10. Satirical Novel	**06**	**15**
	II	• Henry Fielding: Robinson Crusoe • Jonathan Swift: Gulliver's Travels		**15**
	III	• Mary Shelley: Frankenstein • George Eliot: The Mill on the Floss		**15**
	IV	• Thomas Hardy: The Mayor of Casterbridge • Annabhau Sathe: Fakira		**15**

M.A. English Literature Syllabus
Under Choice Based Credit System (CBCS)
To be implemented from the Academic year 2022-2023
SEMESTER II

Course Code	Unit	Topics	Credits	Lectures
PAR2ENG2	**I**	1. Modern Novel 2. Stream of Consciousness Novel 3. Magic Realism Novel 4. Psychological Novel 5. Postmodern Novel 6. Science Fiction 7. Postcolonial Novel 8. Spy Fiction 9. Campus Novel 10. Protest Novel	**06**	**15**
	II	• D. H. Lawrence: Sons and Lovers • William Golding: Lord of the Flies		**15**
	III	• Chinua Achebe: Things Fall Apart • J. M. Coetzee: The Life and Times of Michael K		**15**
	IV	• Toni Morrison: "The Bluest Eye" • Baby Kamble: "Prison we Broke"		**15**

Secondary Reading

1. Virginia Woolf: *To the Lighthouse*
2. E. M. Forster: *Passage to India*
3. D. H. Lawrence: *The Rainbow*
4. Joseph Conrad: *Victory*
5. Julian Barnes: Flaubert's Parrot
6. David Lloyd Jones: Mr Pip
7. Salman Rushdie: Midnight's Children
8. Ray Bradbury: Fahrenheit *451*

References

1. Watt, I (1957) *Rise of the Novel*
2. Walter Allen*: The English Novel*
3. Welleck, R. and A. Warren (1942) *Theory of Literature*
4. Doody, M.A.(1996) *True Story of the Novel*
5. Dunlop, J. (1814) *History of Fiction*
6. James, H. (1934) *Art of the Novel.* Ed. R.P. Blackmur
7. Booth, W. (1961) *Rhetoric of Fiction*
8. Lubbock, Percy *Craft of Fiction*
9. Humphrey, Robert (1962) *Stream of Consciousness in the Modern Novel*
10. Lodge, David (2006) *The Year of Henry James: The Story of a Novel*
11. Ryan, Judith (2012) *The Novel After Theory*
12. Krieger, M. (1989) *Reopening of Closure*
13. Bowers, Maggie Ann (2004) *Magic(al) Realism: The New Critical Idiom*
14. Eysteinsson, Astradur (1992) *The Concept of Modernism*
15. Nicholls, Peter *Modernism: A Literary Guide*
16. Lewis, Pericles (2001) *The Cambridge Introduction to Modernism*
17. Chatman, Seymour (1978) *Story and Discourse: Narrative Structure in Fiction and Film*
18. Mc Cabe, Allyssa and Carole Peterson (1991) *Developing Narrative Structure*
19. Holloway, John (1979) *Narrative and Structure*

20. Mattingly, Cheryl (1998) *Healing Dramas and Clinical Plots: The Narrative Structure*
21. Carr, David (1991) *Time, Narrative and History.*
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24. Plottel, Jeanine Parisier and Hanna Kurz Charney (1978) *Intertextuality: New Perspectives in Criticism*
25. Sieber, Harry (1977) *The Picaresque*
26. Cawelti, J.G. (1976) *Adventure, Mystery and Romance*
27. Rzepka, C. J (2005) *Detective Fiction*
28. Cohn, D (1999) *Distinction of Fiction*
29. Fludernik, M. (1996) *Towards a "Natural" Narratology*
30. Palmer, A. (2004) *Fictional Minds*
31. Bornstein, G. ed. (1991) *Representing Modernist Texts.*
32. Barthes, R.(1957) *Mythologies.* Trans. A. Lavers
33. Campbell, J. (1949) *Hero With A Thousand Faces*
34. Chase, R. (1949) *Quest for Myth*
35. Jung, C.G. (1969) *Four Archetypes,* trans. R.F.C. Hull
36. Palencia-Roth, M. (1987) *Myth and the Modern Novel*
37. White, J.J. *Mythology in the Modern Novel*
38. Genett, G. (1980) *Narrative Discourse.* trans. J. Lewin
39. Lehan, R. (2005) *Realism and Naturalism*
40. Margaret Drabble: The Oxford Companion to English Literature
41. Knight, Charles A (2004) *Literature of Satire*
42. Hodgart, Matthew (2010) *Satire: Origins and Principles*

Scheme of Examination for Each Semester:

A) Internal Assessment: 40 % **40 Marks**

Sr.No.	Particular	Marks
01	One periodical class test/online examination to be conducted in the given semester	20 Marks
02	Any two tools out of these (10 Marks each) 6. Group/individual Survey Project 7. Presentation and write up on the selected topics of the subjects 8. Case studies/Test based on tutorials 9. Book Review/Poetry Appreciation/ Open Book Test 10. Quiz	20 Marks

Semester End Examination: 60 Marks will be as follows -:

Theory		**Marks**
Each theory paper shall be of two hours duration.		
All questions are compulsory and will have internal options. All questions carry equal marks		
Q-1	From Unit I - Essay on the theories 1 out of 2	15 Marks
Q-2	From Unit II - Essay on the theories 1 out of 2	15 Marks
Q-3	From Unit III - Essay on the theories 1 out of 2	15 Marks
Q-4	From Unit IV - Essay on the theories 1 out of 2	15 Marks

Sr. No.	Heading	Particulars
1	Title of Course	Drama
2	Eligibility for Admission	B.A./B.Com./B.Sc. Degree from recognised University
3	Passing marks	40%
4	Ordinances/Regulations (if any)	
5	No. of Semesters	Two
6	Level	P.G.
7	Pattern	Semester (60:40)
8	Status	Revised
9	To be implemented from Academic year	2022-2023

Objectives of the Course:

- To introduce the learners to a wide range of theatrical practices around the world.

- To introduce the learners to various theories of drama
- To enable them to understand the elements of drama and theatre
- To introduce them to the conventions of research papers

Course Outcome: By the end of the course, a student should develop the Ability:

- To Demonstrate origin and development of dramaand its theatrical features
- To Identify tenets of Natyashastra and its reflection inSanskrit drama
- To Examine the need for emancipation of women andrevolt against patriarchy
- To Classify different types of drama and itsdistinctiveness in modern and postmodern era
- To Estimate various paradigms of relationship andproblems of working class depicted in the plays

M. A. English Literature Semester I and II

For the subject of English there shall be two papers for 60 lectures each comprising of four units of 15 Lectures each.

Semester-I	Semester-II
1. Paper-I Unit-I will be on Terms	1. Paper-I Unit-I will be on Terms
2. Paper-I Unit-II will be on Drama	2. Paper-I Unit-II will be on Drama
3. Paper- I Unit-III will be on Drama	3. Paper-I Unit-III will be on Drama
4. Paper- I Unit-IV will be on Drama	4. Paper- I Unit-IV will be on Drama

M.A. English Literature Syllabus
Under Choice Based Credit System (CBCS)
To be implemented from the Academic year 2022-2023
SEMESTER I

Course Code	Unit	Topics	Credits	Lectures
PAR1ENG1	**I**	**Terms for study** **Ancient Drama:** • Elements of Theatre • Greek Theatre • Indian Classical Theatre • Folk element • Indian Theatre, • Black theatre, • Realistic theatre • Comedy of Manners • 20th century poetic drama, • One-act play	**06**	**15**
	II	• Sophocles: Oedipus Rex • Kalidas: Shakuntala		**15**
	III	• Henrik Ibsen: A Doll's House • Christopher Marlow: Dr. Faustus		**15**
	IV	• William Congreve: The Way of the World • Amiri Baraka: Home on the Range		**15**

M.A. English Literature Syllabus
Under Choice Based Credit System (CBCS)
To be implemented from the Academic year 2022-2023
SEMESTER II

Course Code	Unit	Topics	Credits	Lectures
PAR2ENG2	**I**	• Theatre of Absurd, • Epic theatre • Method theatre • Theatre of Cruelty • Poor Theatre • Off Broadway theatre • Kitchen-sink drama • Meta theatre • Expressionism • Irish theatre • Protest Theatre	**06**	**15**
	II	• Pirandello: Six Characters in Search of the Author • J.M. Singe: Riders to the Sea		**15**
	III	• Samuel Becket: Waiting for Godot • John Osborne : Look Back in Anger		**15**
	IV	• Datta Bhagat: Routes and Escape Routes • Eugene Ionesco: Amedee or How to get Rid of it	**06**	**15**

Scheme of Examination for Each Semester:

A) Internal Assessment: 40 % **40 Marks**

Sr.No.	Particular	Marks
01	One periodical class test/online examination to be conducted in the given semester	20 Marks
02	Any two tools out of these (10 Marks each) 11. Group/individual Survey Project 12. Presentation and write up on the selected topics of the subjects 13. Case studies/Test based on tutorials 14. Book Review/Poetry Appreciation/ Open Book Test 15. Quiz	20 Marks

Semester End Examination: 60 Marks will be as follows -:

Theory		**Marks**
Each theory paper shall be of two hours duration.		
All questions are compulsory and will have internal options. All questions carry equal marks		
Q-1	From Unit I - Essay on the theories 1 out of 2	15 Marks
Q-2	From Unit II - Essay on the theories 1 out of 2	15 Marks
Q-3	From Unit III - Essay on the theories 1 out of 2	15 Marks
Q-4	From Unit IV - Essay on the theories 1 out of 2	15 Marks

References

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2. Bennett, Susan. Theatre Audiences: A Theory of Production and Reception. London ; New York: Routledge, 1990.[PN1590.A9 B48 1990].
3. Bentley, Eric. The Theory of the Modern Stage: An Introduction to Modern Theatre and Drama. Harmondsworth,: Penguin, 1968
4. Birringer, Johannes H. Theatre, Theory, Postmodernism. Drama and Performance Studies. Bloomington: Indiana University Press, 1991
5. Bratton, J. S. New Readings in Theatre History. Theatre and Performance Theory. Cambridge: Cambridge University Press, 2003
6. Brockett, Oscar. The Essential Theatre. New York: Wadsworth Publishing, 2007
7. Burwick, Frederick. Illusion and the Drama : Critical Theory of the Enlightenment and Romantic Era. University Park, PA: Pennsylvania State University Press, 1991
8. Carlson, Marvin A. The Haunted Stage : The Theatre as Memory Machine. Theater-Theory/Text/Performance. Ann Arbor: University of Michigan Press, 2002
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10. Case, Sue-Ellen. Performing Feminisms : Feminist Critical Theory and Theatre. Baltimore: Johns Hopkins University Press, 1990
11. Chaudhuri, Una. Staging Place : The Geography of Modern Drama. Theater--Theory/Text/Performance. Ann Arbor: University of Michigan Press, 1995
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13. Courtney, Richard. Drama and Feeling : An Aesthetic Theory. Montréal: McGill-Queen's University Press, 1995
14. Dukore, Bernard Frank. Dramatic Theory and Criticism : Greeks to Grotowski. New York,: Holt Rinehart and Winston, 1974
15. Fortier, Mark. Theory/Theatre : An Introduction. 2nd ed. London ; New York: Routledge, 2002 Frank, Marcie. Gender, Theatre, and the Origins of Criticism : From Dryden to Manley.
16. Cambridge: Cambridge University Press, 2003
17. Fuchs, Elinor, and Una Chaudhuri. Land/Scape/Theater. Theater--Theory/Text/Performance. Ann Arbor: University of Michigan Press, 2002
18. Keyssar, Helene. Feminist Theatre and Theory. New Casebooks. Houndmills: Macmillan Press Ltd., 1996
19. Kobialka, Michal. Of Borders and Thresholds : Theatre History, Practice, and Theory. Minneapolis: University of Minnesota Press, 1999
20. Levine, Ira A. Left-Wing Dramatic Theory in the American Theatre. Theater and

Dramatic Studies ; No.024. Ann Arbor, Mich.: UMI Research Press, 1985
21. Malekin, Peter, and Ralph Yarrow. Consciousness, Literature, and Theatre : Theory and Beyond. New York: St. Martin's, 1997
22. Malkin, Jeanette R. Memory : Theater and Postmodern Drama. Theater-Theory/Text/Performance. Ann Arbor: University of Michigan Press, 1999
23. McAuley, Gay. Space in Performance: Making Meaning in the Theatre.
24. Theater-- Theory/Text/Performance. Ann Arbor: University of Michigan Press, 1999 Nicoll, Allardyce. The Theatre and Dramatic Theory. London,: Harrap, 1962
25. The Theory of Drama. New York,: B. Blom, 1966
26. Quinn, Michael L. The Semiotic Stage : Prague School Theatre Theory. Pittsburgh Studies in Theatre and Culture ; Vol. 1. New York: P. Lang, 1995
27. Rai, Rama Nand. Theory of Drama : A Comparative Study of Aristotle and Bharata. New Delhi: Classical Pub. Co., 1992
28. Schmid, Herta, and Aloysius van Kesteren. Semiotics of Drama and Theatre : New Perspectives in the Theory of Drama and Theatre. Linguistic & Literary Studies in Eastern Europe. V. 010. Amsterdam ; Philadelphia: J. Benjamins, 1984
29. Styan, J. L. Modern Drama in Theory and Practice. New York: Cambridge University Press, 1980
30. University of Kansas. Division of Communication and Theatre., and Joyce and Elizabeth Hall Center for the Humanities. "Journal of Dramatic Theory and Criticism." Lawrence, Kan.: University of Kansas, 1986. v.
31. Whitaker, Thomas R. Mirrors of Our Playing: Paradigms and Presences in Modern Drama. Theater--Theory/Text/Performance. Ann Arbor: University of Michigan Press, 1999

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR

ARTS, COMMERCE & SCIENCE COLLEGE, NEW PANVEL (AUTONOMOUS)

Re-accredited 'A+' Grade by NAAC

'College with Potential for Excellence' Status Awarded by UGC

'Best College Award' by University of Mumbai

Program: M.A.

Revised Syllabus of M.A.-I Economics

Choice Based Credit & Grading System (60:40)

w.e.f. Academic Year 2022-23

Sr. No.	Heading	Particulars
1	Title of Course	Economics
2	Eligibility for Admission	T.Y.B.A. in Economics / Any Graduate
3	Passing marks	**External -24** **Internal -16**
4	Ordinances/Regulations (if any)	
5	No. of Semesters	Four
6	Level	P.G.
7	Pattern	**Semester (60:40)**
8	Status	Revised
9	To be implemented from Academic year	2022-2023

Revised Syllabus of Courses of M.A.-I Programme at Semester I & II with Effect from the Academic Year 2022-23

Preamble

The Paper aims at introducing concepts, theories and policies regarding Economics. The student should be able to use these concepts to understand the relevance of economics to the real world. The student should be able to build on these concepts in the future to develop deeper understanding of the Economy as well as the revised syllabus is framed to understand the economic theory and its relevance in decision making.

COURSE CONTENT

SN	Modules	No. of Lectures
1	**Module - I**	15
2	**Module - II**	15
3	**Module - III**	15
4	**Module - IV**	15
	Total	**60**

Revised Scheme of Examination

Faculty of Arts

(Post-Graduate Programmes)

Choice Based Credit System (CBCS)

❖ **Revised Scheme of Examination**

The performance of the learners shall be evaluated into two parts. The learner's performance shall be assessed by Internal Assessment with 40% marks in the first part and by conducting the Semester End Examinations with 60% marks in the second part. The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below-

A) Internal Assessment: 40 % 40 Marks

Sr. No.	Particular	Marks
01	One periodical class test / online examination to be conducted in the given semester	20 Marks
02	Any two tools out of these (10 Marks each) **1. Group/ Individual Survey Project** **2. Presentation and write up on the selected topics of the subjects** 3. Case studies / Test based on tutorials 4. Book Review /Poetry Appreciation/ Open Book Test 5. Quiz	20 Marks

Question Paper Pattern

(Periodical Class Test/ online examination for the Courses at Post Graduate Programmes)

Maximum Marks: 20 Duration: 30 Minutes

Particular	Marks
Match the Column / Fill in the Blanks / Multiple Choice Questions/ True/False/Answer in One or Two Lines (Concept based Questions) (1 Marks each)	20 Marks

B) Semester End Examination: 60 % 60 Marks

- Duration: The examination shall be of 2 hours duration.

Question Paper Pattern

Theory question paper pattern
1. There shall be four questions each of 15 marks. 2. All questions shall be compulsory with internal options. 3. Question may be subdivided into sub-questions a, b, c… and the allocation of marks depends on the weightage of the unit.

❖ **Passing Standard**

The learners shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment and Semester End Examination. The learners shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 24 Out of 60) separately, to pass the course and minimum of grade D in each project wherever applicable to pass a particular semester.

❖ Guidelines and Evaluation pattern for project work (100 Marks)

Introduction

Inclusion of project work in the course curriculum of the M.A. programme is one of the ambitious aspect in the programme structure. The main objective of inclusion of project work is to inculcate the element of research work challenging the potential of learner as regards to his/ her eager to enquire and ability to interpret particular aspect of the study in his/ her own words. It is expected that the guiding teacher should undertake the counseling sessions and make the awareness among the learners about the methodology of formulation, preparation and evaluation pattern of the project work.

- There are two modes of preparation of project work
  1. Project work based on research methodology in the study area
  2. Project work based on internship in the study area

Guidelines for preparation of Project Work

Work Load

Work load for Project Work is 01 (one) hour per batch of 15-20 learners per week for the teacher. The learner (of that batch) shall do field work and library work in the remaining 03 (three) hours per week.

1. General guidelines for preparation of project work based on research methodology

- The project topic may be undertaken in any area of Elective Courses.
- Each of the learner has to undertake a Project individually under the supervision of a teacher-guide.
- The learner shall decide the topic and title which should be specific, clear and with definite scope in consultation with the teacher-guide concerned.
- University/college shall allot a guiding teacher for guidance to the students based on her / his specialization.
- The project report shall be prepared as per the broad guidelines given below:
  - Font type: Times New Roman
  - Font size: 12-For content, 14-for Title
  - Line Space : 1.5-for content and 1-for in table work
  - Paper Size: A4
  - Margin : in Left-1.5, Up-Down-Right-1
  - The Project Report shall be bounded.
  - The project report should be 80 to 100 pages

A) External Assessment

Question Paper Pattern

Maximum Marks: 60

Questions to be set: 04

Duration: 2 Hrs.

All Questions are Compulsory Carrying 15 Marks each.

Question No	Particular	Marks
Q-1	Attempt Any 2 out of 3 A. Full Length Question B. Full Length Question C. Full Length Question	15 Marks
Q-2	Attempt Any 2 out of 3 A. Full Length Question B. Full Length Question C. Full Length Question	15 Marks
Q-3	Attempt Any 2 out of 3 A. Full Length Question B. Full Length Question C. Full Length Question	15 Marks
Q-4	Attempt Any 2 out of 3 A. Full Length Question B. Full Length Question C. Full Length Question	15 Marks

Programme outcomes (POs) for

M. A.

Sr. No.	Attributes	Programme Outcomes
PO1.	Disciplinary Knowledge	Amalgamations of theoretical and practical understanding generated from the chosen programme and develop the students with academic perspective.
PO2.	Communication Skills	Demonstrate effective communication skills pertaining to different domains of the courses.
PO3.	Critical Thinking	Application of analytical thoughts, arguments, evidences and relevant assumptions for development of scientific approach.
PO4.	Problem Solving	Solving of different kinds of non-familiar problems and apply ones learning to real life situations.
PO5.	Analytical reasoning	Identification of relevance along with logical flaws in the arguments for synthesis of the data of variety of sources.
PO6.	Research-related skills	Development of sense of enquiry and research capabilities and acumen related problems of research.
PO7.	Reflective thinking	Critical sensibility about live experiences with self-awareness and its reflection in self and society.
PO8.	Moral and ethical awareness	Demonstration of moral and ethical values in one's life.
PO9.	Leadership qualities	Capability for building a team to achieve desired goals and objectives.
PO10.	Lifelong learning	Acquisition of knowledge and skills for participating in learning activities throughout the life.

Programme outcomes (PSOs) for

M. A. Economics

Name of the Programme B.A. Economics	Programme Coordinator Dr. B. S. Patil	Head of the Department Dr. B. S. Patil
After completing the programme in Economics, students will able to:		
PSO1	Demonstrate advanced knowledge of Research Methodology, Agricultural Economics, Public Finance, Environmental Policies, Industrial Relations, and Statistical and Mathematical methods.	
PSO2	Develop Research skills like- methods of data collection, sampling methods, interpretation, Report writing, by applying both quantitative and qualitative knowledge.	
PSO3	Develop proficiency of research analysts, industrial consultancy, environment policy applications, own business at the same time ability to engage in competitive exams like MPSC, UPSC, IES, ISS, Labour Officers, Research analyst's, Bank POs and other courses.	

M.A – I (ECONOMICS)
SEMESTER - I and II
Academic Year - 2022 – 23

SEMESTER - I

Sr. No	PAPER NO	COURSE CODE	NAME OF THE SUBJECT	CREDITS	MARKS
1	I	PAR1MIE	MICRO ECONOMICS	6	100
2	II	PAR1MAE	MACROECONOMICS	6	100
3	III	PAR1EOD	ECONOMICS OF DEVELOPMENT	6	100
4	IV	PAR1MTE	MATHEMATICAL TECHNIQUES FOR ECONOMICS	6	100
SEMESTER :- II					
5	I	PAR2MEC	MICRO ECONOMICS	6	100
6	II	PAR2MAE	MACRO ECONOMICS	6	100
7	III	PAR2PUE	PUBLIC ECONOMICS	6	100
8	IV	PAR2SEM	STATISTICAL AND ECONOMETRIC METHODS	6	100

Microeconomics – I, SEM - I

COURSE CODE	PAPER TITLE	CREDITS	MARKS
PAR1MIE	MICRO ECONOMICS	06	100

Course Outcomes

Cos	After completing the course, student will able to:	Course Attributes
CO1	Relate the utility with consumer behavior.	Remember
CO2	Explain production, cost and supply function.	Understand
CO3	Make use of price and output determination under perfect competition.	Apply
CO4	Examine the monopoly and its aspects.	Analyse

SYLLABUS

Module –I: Consumer Behavior (lectures 15)

Utility function, Cardinal Approach – Marshall, Ordinal Approach - Indifference Curve, Slutsky equation :- Uses of Slutsky equation, Income, Price and Substitution effects, Comprehended Demand Curve, Revealed preference approach to consumer choice, consumer's optimization problem, Giffen goods.

Module –II: Production, Cost (lectures 15)

Production Function – CES Production function Properties and Importance, Returns to scale , Law of Variable proportions, production function (Cobb-Douglas), Cost Minimization, Relationship between production function and cost function, Production possibility curve,

Module –III: Price and Output determination under perfect competition (lectures 15)

Features of perfect competitions, price and output determination in the long and short run, Equilibrium of the firm and the industry, practical applications of perfect competitions, General equilibrium- Meaning, existence and stability of General equilibrium in a pure consumption economy, first and second fundamental theorems of welfare economics, market failures and theory of the second best, Profit Maximization in perfect competition.

Module –IV: Monopoly (lectures 15)

Monopoly: Its features, measures market power, price and output determination in a monopoly, Price Discrimination- First, Second and Third degree under monopoly, bilateral monopoly, regulation of monopolies. Profit Maximization under monopoly.

Reference Books

Micro Economics - Paper I
1. Gravelle H. and Ress R. (2004) : Microeconomics., 3rd Edition, Pearson edition Ltd, New Delhi.
2. Varian H. (2000) : Intermediate microeconomics : A Modern Approach, 8th Edition, W. W. Norton and company.

Microeconomics –I, Sem - II

COURSE CODE	PAPER TITLE	CREDITS	MARKS
PAR2MEC	MICRO ECONOMICS	06	100

Course Outcomes

	After completing the course, student will able to:	Course Attributes
CO1	Outline the game theory in detail.	Understand
CO2	Create an understanding of strategic behaviour under oligopoly and monopoly market.	Create
CO3	Simplify the information economics for their practical life.	Analyse
CO4	Define various alternative theories of the firms.	Remember

SYLLABUS

Module –I: Introduction to Game Theory (lectures 15)

Introduction to Game theory, Types of Games :- Types of Strategies, normal form games and extensive form games, dominant strategy equilibrium, Prisoner's dilemma, Nash equilibrium in Pure and Mixed strategies, sub game perfection, measures of Risk Aversion.

Module –II: Oligopoly Market (lectures 15)

Oligopoly and its features, Cournot Model, Collusion Model, Bertrand Model, Stackelberg Model, Edgeworth Model, Sales and Revenue maximization model of oligopoly, , limit pricing, Nudge Theory

Module –III: Asymmetric information based analysis (lectures 15)

Moral hazard and adverse selection, market for lemons, principle – agent models, optimal contracts under symmetric information, contracts under asymmetric information, screening and signaling applications.

Module –IV: Alternative Theories of the firms (lectures 15)

Alternative theories of the firm: Morris model of managerial enterprise, Williamson's model of managerial discretion, behavioral theories of the firm, Full cost pricing Principle, Baomol Model

Reference Books

Micro Economics - Paper I

1. Gravelle H. and Ress R. (2004) : Microeconomics., 3rd Edition, Pearson edition Ltd, New Delhi,

2. Varian H. (2000) : Intermediate microeconomics : A Modern Approach, 8th Edition, W. W. Norton and company.

3. Gibbons R. A. Primer in Game Theory, Harvester – Wheatsheaf, 1992

Macroeconomics –II, Semester – I

COURSE CODE	PAPER TITLE	CREDITS	MARKS
PAR1MAE	MACROECONOMICS	06	100

Course Outcomes

Cos	After completing the course, student will able to:	Course Attributes
CO1	Relate economic mechanism with their regular life.	Remember
CO2	Illustrate the concept of national income.	Understand
CO3	Identify the mechanism of the open economy.	Apply
CO4	Assess the functions of the money and capital market.	Evaluation

SYLLABUS

Module –I: Introduction to Macroeconomics (lectures 15)

Macroeconomics- Meaning, Scope, Importance and Limitations, Stocks and Flows; Concepts of National Income- GDP, GNP, NDP, Gross Value Added (GVA), Personal Income, Disposable Income, Per Capita Income, GDP Deflator; Methods and limitations of measuring National Income.

Module –II: Micro foundations of Macroeconomics (lectures 15)

Consumption Function- Keynes's Theory of Consumption and Keynes's Psychological Law of Consumption, Types of Investment, irreversibility and investment, Autonomous and Induced Investment, Accelerator Theory of Investment, Theory of Multiplier.

Module –III: Determination of National Income and the Price Level (lectures 15)

The Demand for Money and Supply of Money, The Keynesian Model: IS-LM Analysis, Fiscal and Monetary Policy, The role of expectations: The AS-AD Model; Inflation and Unemployment.

Module –IV: The Open Economy (lectures 15)

Balance of Payments: - Meaning-Structure-Disequilibrium-Corrective Measures, Trade Barriers- Tariffs and Import Quotas- Effects of Tariff, Effects of Quotas, Floating/Flexible Exchange Rates and Managed Float/Managed Flexible exchange rate, The IS-LM-BP model

Reference Books

Macro Economics - Paper II
1. Carlin, wendy and David Soskice, 2007, Macroeconomics, Oxford University Press.
2. D'Souza, Errol, Macroeconomics, 2012, Dorling Kindersley (India) Pvt Ltd.
3. Michl, Thomas, 2009, Macroeconomic Theory, PHI Learning.
4. H.L. Ahuja, 2020, Macroeconomics- Theories and Policies, S. Chand.

Macroeconomics –II, Semester – II

COURSE CODE	PAPER TITLE	CREDITS	MARKS
PAR2MAE	MACRO ECONOMICS	06	100

Course Outcomes

	After completing the course, student will able to:	Course Attributes
CO1	Examine the price setting mechanism in an economy.	Analyse
CO2	Understand the importance of Neo-Classical economics.	Evaluation
CO3	Elaborate the Keynesian economics in detail.	Create
CO4	Summarise Macroeconomic policies.	Understand

SYLLABUS

Module –I: Money and Pricing (lectures 15)

Money- Meaning, History and origin, Functions of Money, Importance of Money, Measures of money supply in India- M1, M2, M3, M4, Fisher's Equation of Money, Cambridge cash balance approach, Credit creation, Menu costs.

Module –II: Neo Classical Economics (lectures 15)

New Classical Economics, Credit Control methods by RBI- Quantitative and Qualitative Methods, Wealth Effects and the Government Budget Constraint; money/bond finance, the government budget deficit; Ricardian Equivalence.

Module –III: Keynesian theory (lectures 15)

New Keynesian Economics and disequilibrium, Theories of Consumption- Relative Income Theory of Consumption- Life Cycle Theory of Consumption - Permanent Income Theory of Consumption, The NK model of inflation.

Module –IV: Macroeconomic Policy (lectures 15)

Government in Macroeconomic Policy- Types of Public Expenditure, Direct and Indirect Taxes, Inflation Targeting and Exchange Rate policies, Union Budget, Finance Commission and FRBM Act, 2003, Recent Macroeconomic policies.

Reference Books

Macro Economics - Paper II

1. Heijdra, Ben J. and Frederick Van Der Ploeg, 2002, Foundations of Modern Macroeconomics, Oxford University Press, Oxford.
2. Romer, David, 2012, Advanced Macroeconomics, McGraw-Hill, Fourth Edition
3. Wickens, Michael, 2011, macroeconomic Theory and the Dynamic General Equilibrium Approach, Princeton University Press.
4. H.L. Ahuja, 2020, Macroeconomics- Theories and Policies, S. Chand.

Economics of Development –III, Semester – I

COURSE CODE	PAPER TITLE	CREDITS	MARKS
PAR1EOD	ECONOMICS OF DEVELOPMENT	06	100

Course Outcomes

Cos	After completing the course, student will able to:	Course Attributes
CO1	Demonstrate the role of social and economic indices of growth and development.	Understand
CO2	Judge various modern theories of growth and distribution.	Evaluate
CO3	Define various market concepts.	Remember
CO4	Examine the various aspects of Foreign trade.	Analyse

SYLLABUS

Module –I: Concepts and measures of Growth and Development (lectures 15)

Concept of Growth and Developments, Economic growth and structural change- capabilities, entitlements and deprivation- inequality and growth – Measurement of inequality and poverty- Vicious circle of poverty, Measurement of Development-HDI,GDI.

Module –II: Theories of Economic Growth and Development (lectures 15)

Harrod- Domar Model of growth - Solow model of growth, - Endogenous Growth models of Romer – Big push theory - Balanced growth (Nurkse), Unbalanced growth (Hirschman)

Module –III: Microeconomics of Development (lectures 15)

Rural Land market- Labour market- Capital market- Credit market-Microfinance- Market interlink-ages-Households sector –The household model of fertility decisions- institutions and development.

Module –IV: Interlinkeges between environment and Development (lectures 15)

Environment and development- Population environment linkage - Natural resources-Environmental problems in Economic Development- Environment and sustainable Development- Environmental Acts - Trade and Development- Trade and foreign exchange- Role of International financial and trade institutions- Structural adjustment and stabilization.

Reference Books

Economics of Development - Paper III
1. Basu, Kaushik (1998), Analytical Development Economics, OUP, New Delhi.
2. Ray, Debraj (2004), Development Economics, OUP, New Delhi.

Public Economics –III, Semester – II

COURSE CODE	PAPER TITLE	CREDITS	MARKS
PAR2PUE	PUBLIC ECONOMICS	06	100

Course Outcomes

Cos	After completing the course, student will able to:	Blooms Taxonomy
CO1	Define mechanism of taxation in India	Remember
CO2	Illustrate local, state and central government expenditure.	Understand
CO3	Evaluate tax regulation, distribution, implication and tax evasion.	Evaluation
CO4	Examine India's federal structure, Decentralization and Government reforms.	Analysing

SYLLABUS

Module –I: Introduction to Welfare economics (lectures 15)

Concept of Welfare economics, Pigou's approach view on welfare, The Social welfare function, Market failure and Externalities, Theorems of welfare economics: Pigou, Pareto Optimality, Compensation principle, Arrow Impossibility Theorem, The Principle of Maximum Social advantage

Module –II: Taxation (lectures 15)

Tax:- Classification, Direct vs. indirect Taxes, VAT, GST, Lump sum taxes , Cess, Corporate Tax, , Cannon of Taxation - Ability to pay, Benefit Principle of Taxation, Imapact and Incidence Tax, Shifting of Tax, Incidence and Burden Tax, Tax Evasion: basic Model, Auditing and punishment.

Module –III: Public Expenditure: Rationale and Evaluation (lectures 15)

Public Goods, Private Goods, Club Goods, Merit Goods, private provision of public Goods, Optimal Provision, Lindahl's Voluntary Exchange Approach, Government Expenditure, - Evaluation of Government Expenditure: Elements of Cost-Benefit analysis.

Module –IV: Fiscal Federalism (lectures 15)

Concept of Fiscal Federalism, India's Federal Structure, Working of Indian fiscal federation, Decentralization: Need Decentralization Theorem, expenditure responsibilities, Intergovernmental Transfers, Fourteenth and Fifteenth finance commission in India.

Reference Books

Public Economics - Paper III
1. Atkinson A.B. and J.E. Stieglitz: Lectures on public Economics, New York: McGraw-Hill,1980 2. Cullis J. and P. Jones: Public Finance and Public Choice, OUP,1998 3. Hindricks J. and Gareth D. Myles: Intermediate public Economics, MIT Press, 2006. 4. Myles G.: public Economics , Cambridge University Press,1995 5. Oates W.: Fiscal Federalism, Harcourt, Brace Jovanovich, 1972 6. Purohit M.: Value Added Tax, Gayatri Publications. 7. Tesch R.: Public Finance: A Normative Theory, Academic Press, 1995

Mathematical Techniques for Economics –IV, Semester – I

COURSE CODE	PAPER TITLE	CREDITS	MARKS
PAR1MTE	MATHEMATICAL TECHNIQUES FOR ECONOMICS	06	100

Course Outcomes

Cos	After completing the course, student will able to:	Blooms Taxonomy
CO1	Construct the economic functions.	Construct
CO2	Apply derivatives in economics and Understand Unconstrained optimization techniques in economics	Apply
CO3	Understand constrained optimization techniques in economics	Understand
CO4	Apply matrix in economics.	Apply

SYLLABUS

Module –I The concept of Sets and types of Function: (lectures 15)

A set and its elements, Operations on sets, De Morgan's laws, slope and intercept of a straight line, higher order functions, logarithmic and exponential functions, rules of logarithms and exponentiation, Economic applications of Equation (Supply and Demand Analysis, Income determination)

Module –II Derivatives and its applications: (lectures 15)

limits, Derivative of a function, rules of differentiation, uses of derivatives in economics, Unconstrained optimization in economics, partial derivatives and their applications in Economics, introduction to integration and its applications in Economics.

Module –III Optimization techniques: (lectures 15)

Constrained optimization in Economics, Lagrange multipliers and equality constraints, constrained optimization with inequality constraints, applications in economics.

Module –IV Matrix algebra: (lectures 15)

Introduction to matrices, matrix operations (upto 3 X 3), matrix addition and multiplication, transpose and inverse of a matrix, Adjoin of a matrix, solving simultaneous equations with matrices, Determinant-minors and cofactors – cramer's Rule, Application in Economics

Reference Books

Mathematical Techniques for Economics - Paper IV
1. Chiang, A.C., Fundamental Methods of Mathematical Economics, McGraw-Hill, 2005
2. K. Sydsaeter and P. Hammond, Mathematics for Economic Analysis, Pearson Educational Asia: Delhi, 2002.
3. Dowling Edward T : Introduction to Mathematical Economics, Schaum Outline Series in Economics, Tata McGraw -Hill, New Delhi,2004

Statistical and Econometric Methods – IV, Semester – II

COURSE CODE	PAPER TITLE	CREDITS	MARKS
PAR2SEM	Statistical and Econometric Methods	06	100

Course Outcomes

Cos	After completing the course, student will able to:	Blooms Taxonomy
CO1	Understand the basic statistics concepts.	Understand
CO2	Construct the hypothesis and select suitable test for data analysis.	Construct
CO3	Estimate and Interpret the regression coefficient.	Estimate and Interpret
CO4	Understand the problems of heteroscedasticity, autocorrelation and multicollinearity in regression model.	Understand

SYLLABUS

Module –I introduction of statistics and Probability (lectures 15)

Measures of Central tendency and dispersion, Random variables mean and variance of a random variable, basic laws of probability, Discreet random variables (Geometric, Binomial and Poisson), Continuous distributions (The Normal Distribution), Covariance and Correlation (Pearson's and spearman's coefficients), the law of large numbers (without proof),

Module –II Tests of Hypothesis : (lectures 15)

Tests of Hypothesis: Tests of hypothesis, null and alternative hypothesis, one tailed and two tailed tests, the standard normal distribution and its applications, the Chi-square distribution and its applications, the T distribution and its application, the F distribution and its application the central Limit Theorem.

Module –III Fundamentals of Regression Analysis : (lectures 15)

The linear regression model: Estimation and hypothesis testing, properties of least square estimators, the Coefficient of determination and adjusted R square, the F test in regression, interpreting regression coefficients, Multiple Regression Analysis.

Module –IV Relaxing the Assumptions of the Classical Model: (lectures 15)

Problems in simple Linear Regression model: Heteroscedasticity and consequences of using OLS in the presence of Heteroscedasticity, Detection of Heteroscedasticity, autocorrelation and its consequences, Detection of Autocorrelation, multicollinearity and its consequences, Detection of Multicollinearity.

Reference Books

Statistical Methods in Economics - Paper IV
1. Hatekar Neeraj R: Principles of Econometrics : an introduction Using R, SAGE publications, 2010
2. Kennedy P.: A Guide to Econometrics, Sixth Edition, Wiley Blackwell edition, 2008
3. Gujarati D. N. and Porter D.C., Basic Econometrics, McGraw Hill, 5th edition, International Edition,1 July, 2017
4. Wooldridge, J., Introductory Econometrics: A Modern Approach, Cengage Learning, 2009
5. Stock J. H. and Watson M. W., Introduction to Econometrics, Third Edition, Pearson, 2018

|| विद्या विनयेन शोभते||

Janardan Bhagat Shikshan Prasarak Sanstha's

Changu Kana Thakur

Arts, Commerce and Science College, New Panvel

Autonomous

Scheme of Evaluation for Continuous Assessments and Semester End Examinations for Post-graduate Programmes under Faculty of Arts

Under Autonomous status with Credit Based Semester and Grading System

(To be implemented from Academic Year 2022-

2023)

II ivaVa ivanayaona SaMBat II

Janardan Bhagat Shikshan Prasarak Sanstha's

Changu Kana Thakur

Arts, Commerce and Science College, New Panvel

Autonomous

Affiliated to University of Mumbai

DEPARTMENT OF HINDI

Master of Arts (M.A. Part -I) Revised Syllabus
For

M.A. Hindi Part-I

Choice Based Credit Grading and Semester System (CBCGS) (60:40)
With effect from the Academic Year 2022-23

जनार्दन भगत शिक्षण प्रसारक संस्था का

चांगू काना ठाकूर कला वाणिज्य और विज्ञान

महाविद्यालय नवीन पनवेल (स्वायत्त)

हिंदी विभाग

एम - ए - स्नातकोत्तर हिन्दी

पाठ्यक्रम

शैक्षणिक वर्ष 2022-2023

हिन्दी अध्ययन मंडल

अनु.क्र	अध्यापक का नाम	पद	अधिष्ठान
1	डॉ.भंडारे उद्धव तुकाराम	प्राध्यापक, अध्यक्ष, हिंदी विभाग	अध्यक्ष
2	डॉ. गीतांजली एस.तांबे	सहायक प्राध्यापिका	सदस्य
3	डॉ. बीसेन जोगेंद्रसिंग मोतीसिंह	प्राध्यापक	सदस्य
4	डॉ. बनाथ गोरखनाथ पाण्डेय	सहयोगी प्राध्यापक	सदस्य
5	डॉ. बालकवि सुरवंजे	सहयोगी प्राध्यापक	सदस्य
6	डॉ. घरत अजुबुद्दु जानू	पिएचडी प्राध्यापक	सदस्य
7	डॉ. सुनीता साखरे	सहयोगी प्राध्यापिका	सदस्य
8	श्री. डी. एन. एकंबे	अध्यक्ष, रोटरी क्लब, न्यू पनवेल	सदस्य
9	कविता शर्मा	पिएचडी स्नातकोत्तर विद्यार्थी	सदस्य

CHANGU KANA THAKUR
ARTS, COMMERCE & SCIENCE COLLEGE, NEW PANVEL
(AUTONOMOUS)

Affiliated to University of Mumbai

Re-accredited 'A+' Grade by NAAC
'College with Potential for Excellence' Status Awarded by UGC
'Best College Award' by University of Mumbai

Choice Based Credit Grading and Semester System (CBCGS) (60:40)
With effect from the Academic Year 2022-23

Faculty of Humanities

Semester I & Semester II

Guidelines

Syllabus Structure:

1. In M.A. Hindi Part-I (CBCGS) in Semester I and Semester II the Core Courses will be Core Courses 1 to 8

Scheme of Examination
Faculty of Arts
(Post-graduate Programmes)

Credit Based Evaluation System

- **Scheme of Examination**

The performance of the learners shall be evaluated into two parts. The learner's performance shall be assessed by Internal Assessment with 40% marks in the first part and by conducting the Semester End Examinations with 60% marks in the second part. The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below-

A) Internal Assessment: 40 % 40 Marks

Sr. No.	Particular		Marks
01	One periodical class test / online examination to be conducted in the given semester		20 Marks
02	One case study / project with presentation based on curriculum to be assessed by the teacher concerned		15 Marks
	Presentation	10 Marks	
	Written Document	05 Marks	
03	Active participation in routine class instructional deliveries and overall conduct as a responsible learner, mannerism and articulation and exhibit of leadership qualities in organizing related academic activities		05 Marks

Question Paper Pattern

(Periodical Class Test for the Courses at Under Graduate Programmes)

Maximum Marks: 20 Duration: 40 Minutes
Questions to be set: 02
All Questions are Compulsory

Question No.	Particular	Marks
Q-1	Match the Column / Fill in the Blanks / Multiple Choice Questions/ Answer in One or Two Lines (Concept based Questions) (1 Marks / 2 Marks each)	10 Marks
Q-2	Answer in Brief (Attempt any Two of the Three) (5 Marks each)	10 Marks

B) Semester End Examination: 60 % 60 Marks

- Duration: The examination shall be of 2 hours duration.

Question Paper Pattern

Theory question paper pattern

1. There shall be four questions each of 15 marks.
2. All questions shall be compulsory with internal options.
3. Question may be subdivided into sub-questions a, b, c… and the allocation of

   marks depends on the weightage of the unit.

❖ **Passing Standard**

The learners shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment and Semester End Examination. The learners shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 24 Out of 60) separately, to pass the course and minimum of grade D in each project wherever applicable to pass a particular semester.

Note: All other rules regarding Standard of Passing, ATKT, etc, will be as per those decided by the Faculty of Humanities passed by the Academic Council from time to time

❖ Guidelines and Evaluation pattern for project work (100 Marks)

Introduction

Inclusion of project work in the course curriculum of the M.A. programme is one of the ambitious aspect in the programme structure. The main objective of inclusion of project work is to inculcate the element of research work challenging the potential of learner as regards to his/ her eager to enquire and ability to interpret particular aspect of the study in his/ her own words. It is expected that the guiding teacher should undertake the counselling sessions and make the awareness among the learners about the methodology of formulation, preparation and evaluation pattern of the project work.

- There are two modes of preparation of project work
  1. Project work based on research methodology in the study area
  2. Project work based on internship in the study area

Guidelines for preparation of Project Work

Work Load

Work load for Project Work is 01 (one) hour per batch of 15-20 learners per week for the teacher. The learner (of that batch) shall do field work and library work in the remaining 03 (three) hours per week.

1. General guidelines for preparation of project work based on research methodology

- The project topic may be undertaken in any area of Elective Courses.
- Each of the learner has to undertake a Project individually under the supervision of a teacher-guide.
- The learner shall decide the topic and title which should be specific, clear and with definite scope in consultation with the teacher-guide concerned.
- University/college shall allot a guiding teacher for guidance to the students based on her / his specialization.
- The project report shall be prepared as per the broad guidelines given below:
  - Font type: Times New Roman
  - Font size: 12-For content, 14-for Title
  - Line Space : 1.5-for content and 1-for in table work
  - Paper Size: A4
  - Margin : in Left-1.5, Up-Down-Right-1
  - The Project Report shall be bounded.
  - The project report should be 80 to 100 pages

Format

1st page (Main Page)

Title of the problem of the

A Project Submitted to

University of Mumbai for partial completion of the degree

of Master in Arts

Under the Faculty of Arts

By

Name of the Learner

Under the Guidance of

Name of the Guiding Teacher

Name and address of the College

Month and Year

2nd Page

This page to be repeated on 2nd page (i.e. inside after main page)

On separate page

Index

List of tables, if any, with page numbers. List of Graphs, if any, with page numbers. List of Appendix, if any, with page numbers.

Abbreviations used:

Structure to be followed to maintain the uniformity in formulation and presentation of Project Work

(Model Structure of the Project Work)

- **Chapter No. 1: Introduction**
  In this chapter Selection and relevance of the problem, historical background of the problem, brief profile of the study area, definition/s of related aspects, characteristics, different concepts pertaining to the problem etc can be incorporated by the learner.

- **Chapter No. 2: Research Methodology**
  This chapter will include Objectives, Hypothesis, Scope of the study, limitations of the study, significance of the study, Selection of the problem, Sample size, Data collection, Tabulation of data, Techniques and tools to be used, etc can be incorporated by the learner.

- **Chapter No. 3: Literature Review**
  This chapter will provide information about studies done on the respective issue. This would specify how the study undertaken is relevant and contribute for value addition in information/ knowledge/ application of study area which ultimately helps the learner to undertake further study on same issue.

- **Chapter No. 4: Data Analysis, Interpretation and Presentation**
  This chapter is the core part of the study. The analysis pertaining to collected data will be done by the learner. The application of selected tools or techniques will be used to arrive at findings. In this, table of information's, presentation of graphs etc. can be provided with interpretation by the learner.

- **Chapter No. 5: Conclusions and Suggestions**
  In this chapter of project work, findings of work will be covered and suggestion will be enlisted to validate the objectives and hypotheses.

Note: If required more chapters of data analysis can be added.

- **Bibliography**
- **Appendix**

On separate page

Name and address of the college

Certificate

This is to certify that Ms/Mr has worked and duly completed her/his Project Work for the degree of Master in Arts under the Faculty of Arts in the subject of

_____and her/his project is entitled, "_____

_____ *Title of the Project* " under my supervision.

I further certify that the entire work has been done by the learner under my guidance and that no part of it has been submitted previously for any Degree or Diploma of any University.

It is her/ his own work and facts reported by her/his personal findings and investigations.

Seal of the College

Name and Signature of
Guiding Teacher

Date of submission:

On separate page

Declaration by learner

I the undersigned Miss / Mr. *Name of the learner* here by, declare that the work embodied in this project work titled "*Title of the Project*", forms my own contribution to the research work carried out under the guidance of *Name of the guiding teacher* is a result of my own research work and has not been previously submitted to any other University for any other Degree/ Diploma to this or any other University.

Wherever reference has been made to previous works of others, it has been clearly indicated as such and included in the bibliography.

I, here by further declare that all information of this document has been obtained and presented in accordance with academic rules and ethical conduct.

Name and Signature of the learner

Certified by

Name and signature of the Guiding Teacher

On separate page

Acknowledgment

(Model structure of the acknowledgement)

To list who all have helped me is difficult because they are so numerous and the depth is so enormous.

I would like to acknowledge the following as being idealistic channels and fresh dimensions in the completion of this project.

I take this opportunity to thank the **University of Mumbai** for giving me chance to do this project.

I would like to thank my **Principal,_____**for providing the necessary facilities required for completion of this project.

I take this opportunity to thank our **Head_____**, for her moral support and guidance.

I would also like to express my sincere gratitude towards my project guide _____whose guidance and care made the project successful.

I would like to thank my **College Library**, for having provided various reference books and magazines related to my project.

Lastly, I would like to thank each and every person who directly or indirectly helped me in the completion of the project especially **my Parents and Peers** who supported me throughout my project.

2. Guidelines for Internship based project work

- Minimum 20 days/ 100 hours of Internship with an Organisation/ NGO/ Charitable Organisation/ Private firm.
- The theme of the internship should be based on any study area of the elective courses
- Project Report should be of minimum 50 pages
- Experience Certificate is Mandatory
- A project report has to be brief in content and must include the following aspects:
  - **Executive Summary:**
    A bird's eye view of your entire presentation has to be precisely offered under this category.
  - **Introduction on the Company:**
    A Concise representation of company/ organization defining its scope, products/ services and its SWOT analysis.
  - **Statement and Objectives:**
    The mission and vision of the organization need to be stated enshrining its broad strategies.
  - **Your Role in the Organisation during the internship:**
    The key aspects handled, the department under which you were deployed and brief summary report duly acknowledged by the reporting head.
  - **Challenges:**
    The challenges confronted while churning out theoretical knowledge into world.
  - **Conclusion:**
    A brief overview of your experience and suggestions to bridge the gap between theory and practice.
- The project report based on internship shall be prepared as per the broad guidelines given below:
  - Font type: Times New Roman
  - Font size: 12-For content, 14-for Title
  - Line Space : 1.5-for content and 1-for in table work
  - Paper Size: A4
  - Margin : in Left-1.5, Up-Down-Right-1
  - The Project Report shall be bounded.

Evaluation pattern of the project work

The Project Report shall be evaluated in two stages viz.	
• **Evaluation of Project Report (Bound Copy)**	**60 Marks**
▪ Introduction and other areas covered	20 Marks
▪ Research Methodology, Presentation, Analysis and interpretation of data	30 Marks
▪ Conclusion & Recommendations	10 Marks
• **Conduct of Viva-voce**	**40 Marks**
▪ In the course of Viva-voce, the questions may be asked such as importance / relevance of the study, objective of the study, methodology of the study/ mode of Enquiry (question responses)	10 Marks
▪ Ability to explain the analysis, findings, concluding observations, recommendation, limitations of the Study	20 Marks
▪ Overall Impression (including Communication Skill)	10 Marks

Note:

- ***The guiding teacher along with the external evaluator appointed by the University/ College for the evaluation of project shall conduct the viva-voce examination as per the evaluation pattern***
- ***The plagiarism should be maintained as per the UGC guidelines.***

Passing Standard

- Minimum of Grade D in the project component.
- In case of failing in the project work, the same project can be revised for ATKT examination.
- Absence of student for viva voce: If any student fails to appear for the viva voce on the date and time fixed by the department such student shall appear for the viva voce on the date and time fixed by the Department, such student shall appear for the viva voce only along with students of the next batch.

II ivaVa ivanayaona SaMBat II

Janardan Bhagat Shikshan Prasarak Sanstha's

Changu Kana Thakur

Arts, Commerce and Science College, New Panvel

Autonomous

CONTENT

Programme- Master of Arts (M.A.)

Sr.No.	Class	Course Name of the Paper	Paper No.	Paper Code	Credits
1.	M.A.I	ह न्दी साह त्य का इततास	1	PAR1HN1	06
2.	M.A. I	आ ि ुतनक गद्य	3	PAR1HN3	06
3.	M.A. I	भाषा विज्ञान एिं ह दीभाषा	5	PAR1HN5	06
4.	M.A. I	प्ाचीन एिं मध्यकालीन काव्य	7	PAR1HN7	06
5.	M.A. I	ह न्दी साह त्य का इततास	2	PAR2HN2	06
6.	M.A. I	आ ि ुतनक गद्य	4	PAR2HN4	06
7.	M.A. I	भाषा विज्ञान एिं ह दीभाषा	6	PAR2HN6	06
8.	M.A. I	प्ाचीन एिं मध्यकालीन काव्य	8	PAR2HN8	06

CHANGU KANA THAKUR
ARTS, COMMERCE & SCIENCE COLLEGE, NEW PANVEL
(AUTONOMOUS)

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Syllabus

Question Paper Pattern (60:40)

Choice Based Credit Grading and Semester System (CBCGS)
With effect from the Academic Year 2022-23

Program M.A. Part-I

Semester I & Semester II

M.A. Syllabus According to Choice Based Credit Grading and Semester System (CBCGS)

Course: Hindi

Course Code : PAR1HN1 & PAR2HN2

प्रश्नपत्र : 1 एवं 2

हहन्दीसाहहत्य का इततहास

Semester I & II
M.A. Hindi Part-I

प्रश्नपत्र : 1 एवं 2

हहन्द्रीसाहहत्य का इततहास

Name of the Programme	***: M.A.***
Name of the Course	***: Hindi***
Course Code	***: PAR1HN1 & PAR2HN2***
Total Lectures	***: 60 + 60***
Total credit	***: 06 + 06***

पाठ्यक्रम के उद्देश्य:

1. ह न्दी की आह्दकालीन तथा भक्तकालीन एवं रीततकालीन काव्य प्रवृत्तियों की जानकारी देना
2. छात्रों को प्राचीन तथा मध्यकालीन काव्य¹प्रवृत्तियों की जानकारी देना
3. प्राचीन तथा मध्यकालीन कवियों की काव्य कला से छात्रों को अिगत कराना
4. छात्रों को ह न्दी की प्राचीन तथा मध्यकालीन काव्य परंपरा से पररधचतकराना
5. छात्रों को प्राचीन तथा मध्यकालीन ह न्दी भाषा से अिगत कराना
6. छात्रों में प्राचीन तथा मध्यकालीन काव्य अध्ययन के माध्यम से समीक्षात्मक दृष्टि विकसित करना
7. गद्य की प्रमुख विधाओं के तात्विक स्वरूप का पररचय देना
8. प्रामुख गद्य विधाओं के क्रमिक विकासक्रम की जानकारी देना
9. रचना के आस्वादन एवं समीक्षण की क्षमता विकसित करना

अध्ययन पद्ितत:

1. व्याख्यान तथा विश्लेषण
2. संगोष्ठ, स्ि्रध्याय तथा गुटचचा
3. दक्ृ -श्राव्य माध्यमोंसाि्नोंका प्योग
4. पाि्र पॉइंटप्जेन्टेशन (PPT) भाषा प्योगशाला का प्योग
5. अततधथ विशेषज्ञों के व्याख्यान
6. अध्ययन यात्रा का आयोजन करना

Semester I
M.A., Hindi
Part-I

प्रश्नपत्र : 1

Course Code : PAR1HN1

हिन्दी साहित्य का इतिहास

इकाई -1 व्याख्यान -20

1.1. इतिहास दृष्टि एवं साहित्येतिहास लेखन

1.2. हिन्दी साहित्य के इतिहास लेखन की परंपरा एवं पुनर्लेखन की समस्याएँ

1.3. हिन्दी साहित्य का इतिहास : काल विभाजन एवं नामकरण

1.4. आदिकाल : परिदृश्य एवं पृष्ठभूमि

1.4.1. : सिद्ध साहित्य

1.4.2. : नाथ साहित्य

1.4.3. : रासो साहित्य

1.4.4. : अमीर खुसरो

1.4.5. : विद्यापति

इकाई -2 व्याख्यान -10

5.1. भक्तिकाल : परिदृश्य

5.1.1. : भक्ति आन्दोलन का विकास

5.1.2. संत काव्य : परंपरा एवं प्रतिनिधि कवि

5.1.3. सूफी काव्य : परंपरा एवं प्रतिनिधि कवि

इकाइ -3 व्याख्यान -15

5.1.4 रामभक्त काव्यिारा : परंपरा एवं प्रवृत्तयाँ

5.1.5 कृष्णभक्त काव्यधारा : परंपरा एवं प्रवृत्तयाँ

5.1.6 भक्तकाव्य की प्रासंधगकता

इकाइ -4 व्याख्यान -15

6.1 रीततकाल : रीततकालीन पररिश

6.1.1. : रीततबद्ध काव्य की प्रवृत्तयाँ

6.1.2. : रीततसद्ध काव्य की प्रवृत्तयाँ

6.1.3 : रीततमुक्त काव्य की प्रवृत्तयाँ

Semester II
M.A. Hindi Part-I

प्रश्नपत्र : 2

Course Code : PAR2HN2

हिन्दी साहित्य का इतिहास

इकाइ -1 व्याख्यान -10

1.1. आधुनिकता की अवधारणा तथा आधुनिक काल की परिवेश :-

1.2 आधुनिक हिंदी कविता का प्रवृत्तिगत अध्ययन :-

1.2.1. : भारतेन्दु युग

1.2.2. : द्विवेदी युग

1.2.3. : छायावाद

1.2.4. : प्रगतिवाद

1.2.5. : प्रयोगवाद

इकाइ -2 व्याख्यान -10

2.1. : हालावाद

2.2. : नइ कविता

2.3. : नवगीत

2.4. : साठोत्तरी कविता

2.5. : समकालीन कविता

2.6. : इक्कीसिी सदी की कविता

इकाइ -3 व्याख्यान -10

3.1. ह न्दी गद्य साह त्य:¹ ह न्दी साह त्य की प्मुख गद्य विधाओं का क्रसमक विकास

3.1.1. : उपन्यास

3.1.2. : क ानी

3.1.3. : नाटक

3.1.4. : तनबंि

इकाइ -4 व्याख्यान -10

4.1. : आलोचना

4.2. : यात्रा विवृतांत

4.3. : ररपोताुज

4.4. : पत्र

4.5. : जीिनी

4.6. : आत्मकथा

4.7. : रेखाधचत्र

4.8. : संस्मरण

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संर्भद ग्रंथ स ी :

ह्मप्रश्नपत्र-1 और-2

अनु क्र	ककताब का नाम	लेखक का नाम
1.	अमीर खुसरो	: डॉ. रदे ि बा री
2.	ख ुसर ो की ह न्दी कव ि ता	: ब्रजरत्न दास
3.	ज ायसी के पद्म ाि ित का मल्ू य ाकंन	: प्ा ो. रे ंद्प्त ाप ससन् ा
4.	म ाकव ि जायसी और उनक ा क ाव्य	: डॉ. इकबाल अ मद
5.	मसलक मु म्मद ज ायसी और उनक ा क ाव्य	: डॉ. ससिस ाय पाठक
6.	जायसी पद्म ाि ित काव्य और दशन्ु	: डॉ. ग ोव ि न्द ं ुत्तरग ुन ायत
7.	पद्म ात म ें काव्य, स ंस्कृतत और दशन्ु	: डॉ. द ि ाररकाप्साद सक्सेना
8.	पदमाि ित का काव्य सौंदयु	: डॉ. च ंद्रबली पाण्डेय
9.	ह न्दी के ससततनधि कव ि	: डॉ. स ुरे श अग ि ाल
10.	ह न्दी साह त्य का इतत ास	: आच ायु र ामच ंद्र श ुक्ल
11.	ह न्दी साक्त्य का इतत ास	: संपादक- डॉ. नग ेन्द्र
12.	ह न्दी साह त्य क ा ि ैज ातनक इतत ास	: डॉ. गणपततच ंद्र ग ुप्त
13.	ह न्दी साह त्य का इतत ास	: डॉ. र ाममल्ू त ु ुत्तरपाठी
14.	ह न्दी साह त्य का इतत ास	: डॉ. लक्ष्मीसागए ि ाष्प्र्णेय
15.	ह न्दी साह त्य का इतत ास	: डॉ. श्य ामचन ्द्र कपरू
16.	ह न्दी स ाह त्य क ा दस्ू र ा इतत ास	: डॉ. बच्चन ह ं
17.	ह न्दी स ाह त्य और उसकी प्र ि ृवत्तय ा^	: डॉ. गोविन्दराम शमा ु
18.	ह न्दी स ाह त्य की प्र ि ृक्त्तय ा^	: डॉ. जयककशन प्साद खंडेलिाल
19.	आ ि ुतनक स ाह त्य क ा इतत ास	: डॉ. बच्चन ह ं
20.	ह न्दी स ाह त्य क ा स ुब ो ि इतत ास	: बाबू गुलाबराय
21.	ह न्दी स ाह त्य की भस्ू मक ा	: डॉ. जारीप्सादद्वि ेदी
22.	ह न्दी साह त्य का आलोचनात्मक इतत ास	: डॉ. र ामक ुम ार ि म ाु

23.	ह न्दी गद्य: उद्भि और विकास	: डॉ. उमेश शास्त्री
24.	ह न्दी साह त्य का एकपररचय	: डॉ. ात्रभु ि न ह ं
25.	ह न्दी साह त्य और संि ेदना का इतत ास	: डॉ. रामस् ि रूप चतु ि ेदी
26.	ह न्दी साह त्य का इततास	: डॉ. भंडारे उद् ि ि तुकाराम

27.	ह न्दी रीतत साह त्य का इतत ास	: डॉ. भगीरथ समश्र
28.	रीततयुगीन कावव्य	: डॉ. कृष्णचनद्र
29.	रीततकावव्य की भमूकका	: डॉ. नगेन्द्र
30.	आधुतनक ह न्दी साह त्य का आहदकाल	: श्री नारायण चतुवेदी
31.	ह न्दी साह त्य : युग और प्रवृत्तत्तया^	: डॉ. प्रशवकुमार शमाु
32.	ह न्दी साह त्य का प्रवृततगत इतत ास	: डॉ. सभापतत समश्र
33.	ह न्दी साह त्य का इततास	: डॉ. माधिसोनटक्के
34.	ह न्दी साह त्य का अयतन इततास	: डॉ. मो न अिस्थी
35.	ह न्दी साह त्य का स ी इततास	: डॉ.चंद्रभाणु सोनवणे, डॉ.सयू नु ारायण रणसुभे
36.	ह न्दी साह त्य का अिाइतत ास	: डॉ. सुमन राजे
37.	ह न्दी साह त्य की नवीन विधाए^	: डॉ. कैलाशचंद भाहटया
38.	आधुतनक ह ंदी कविता मंे काव्य धचंतन	: डॉ. करूणाशंकर उपाध्याय
39.	साह त्य औृ संस्कृतत के सरोकार	: डॉ. करूणाशंकर उपाध्याय
40.	आधुतनक ह न्दी साह त्य: वाद, प्रवृत्तयाा एवं विमशु	: डॉ. दत्तात्रय मुरूमकर
41.	ह न्दी साह त्य का इतत ास: नए विचार नइु हदशाए^	: डॉ. सुरेशकु मारजैन
42.	ह न्दी साह त्य का इततास	: डॉ. सज्जनराम केनी
43.	ह न्दी साह त्य	: डा. धमवीर भारती

Janardan Bhagat Shikshan Prasarak Sanstha's

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Question Paper Pattern (60:40)

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With effect from the Academic Year 2022-23

Program M.A. Part-I

Semester I & Semester II

M.A. Syllabus According to Choice Based Credit Grading and Semester System (CBCGS)

Course: Hindi

Course Code : PAR1HN3 & PAR2HN4

प्रश्नपत्र : 3 & 4

आधुनिक गद्य

Semester I & II
M.A. Hindi Part-I

प्रश्नपत्र : 3 & 4

आधुनिक गद्य

Name of the Programme : M.A.

Name of the Course Á Hindi

Course Code : PAR1HN3 & PAR2HN4

Total Lectures : 60 + 60

Total credit : 06 + 06

पाठ्यक्रम के उद्देश्य:

1. गद्य की प्रमुख विधाओं के तात्त्विक स्वरुप का परिचय देना
2. प्रमुख गद्य विधाओं के क्रमिक विकासक्रम की जानकारी देना
3. रचना के आस्वादन एवं समीक्षा की क्षमता को विकसित करना
4. हिन्दी तिब्बी कारकों के व्यक्तित्व और कृतित्व को समझना
5. हिन्दी तिब्बी लोगों के माध्यम से भारतीय संस्कृति से अवगत होना
6. हिन्दी उपन्यासकार के जीवन का परिचय प्राप्त करना
7. उपन्यास तथा नाटकों का तकनिक विश्लेषण कराना

8. ह दं ी सा ह त्यकारो ं को व्यक्तत्ि एिं कृततत्ि से परररचत ोना

9. ह दी नाटकों के माध्यम से समाज और पररिेश के प्रत जागरूक ोना

अध्ययन पद्ितत:

1. व्याख्यान तथा विश्लेषण
2. संगोष्ठ, स्िाध्याय तथा गुटचचाु
3. दकृ् -श्राव्य माध्यमोंसाििनों का प्रयोग
4. पािर पॉइंटप्जेन्टेशन (PPT) भाषा प्योगशाला का प्योग
5. अततधथ विशेषज्ञों के व्याख्यान
6. अध्ययन यात्रा का आयोजन करना

Semester I
M.A., Hindi Part-I

प्रश्ननपत्र : 3

Course Code : PAR1HN3

आधुनिक गद्य

List of New Textbooks:

1. गोदान - मंुशी प्ेमचंद(उपन्यास)
   िाणीप्काशन, *21-A,* नईहदलली

2. आठिां सगु -
   सुरेंद्र िमाु(नाटक)
   राधाकृष्ण
   प्कासन, नई हदलली

3. अध्यापक पुरस को तनबंध - अध्यापक पुरस (तनबंध)

इकाइु- 1 एिं2 व्याख्यान -20

गोदान - मुंशी प्ेमचंद(उपन्यास)

इकाइु- 3 व्याख्यान -20

आठिां सगु - सुरेंद्र िमाु(नाटक)

इकाइु- 4 व्याख्यान -20

अध्यापक पणू ुसिं को तनबंध - अध्यापक पणू ुसिं (तनबंध)

4.1. सच्ची िीरता

4.2. कन्यादान

4.3. पवित्रता

4.4. आचरण की सभ्यता

4.5 मजदरू ी और प्रेम

Semester II
M.A., Hindi Part-I

प्रश्नपत्र : 4

Course Code : PAR2HN4

आधुनिक गद्य

List of New Textbooks:

1. दो रा असभशाप - कौशलया बैसंत्री (आत्मकथा) परमेश्वर प्काशन, नईहदलली

2. घुमक्कड़ शास्त्र - रा ुल सांस्कृ ात) त्यायन (यात्रा ित्त ककताब म ल, नईहदलली

3. क ानी संग्र (समकालीन ह दी कह याँ)

इकाइ- 1 एिं 2 व्याख्यान -20

दो रा असभशाप - कौशलया बैसंत्री (आत्मकथा)

इकाइ- 3 व्याख्यान -20

घुमक्कड़ शास्त्र - रा ुल सांस्कृत्यायन (यात्रा ित्र ृ ात्तं)

3.1. अथा तो घुमक्कड़ ज्ञासा

3.2. जंगल तोड़ो

3.3. वपछड़ी जाततयों में

3.4. घुमक्कड़ जाततयो ं मे ं

3.5. स्त्री घुमक्कड़

इकाइ- 4 व्याख्यान -20

क ानी संग्र (समकालीन ह दं ी कह याँ)

4.2. सद्गतत - प्ेमचंद

4.3. आकाशदीप - जयशंकर प्साद

4.4. सलाम - ओम प्काश
ि ालमीकक

4.5 नो बार - जयप्काश कदुम

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संर्भद ग्रंथ स ी :

प्रश्नपत्र-3 और-4

अनु क्र	ककताब का नाम	लेखक का नाम
1.	ह दंी गद्य का इततास	:डॉ. रामचंद्र ततिारी
2.	ह दंी गद्य का इततास	: डॉ. बच्चन ससं
3.	न्दी साह त्य का इतत ास	: आचायु रामचंद्र शुक्ल्
4.	ह न्दी उपन्यास का इतत ास्	: डाॅंगोपाल राय
5.	ह न्दी उपन्यास क्स्थतत और गतत	: डॉ. चंद्रकांत बांहदडेक
6.	क ानीकार प्ेमचंदउ रचना दक्ृष्ट	: डॉ. शशिकुमार समश्र्
7.	प्ेमचंद: व्यक्क्तत्ि और रचना दक्ृष्ट	: डॉ. दयानंद पाण्डेय
8.	प्ेमचंद	: नंददलु ारे िाजपेयी
9.	प्ेमचंद और उनका युग	: डॉ. रामविलास शमा
10.	क ानीकार प्ेमचंद रचना दक्ृष्ट	: डॉ. शशिकुमार समश्र
11.	प्ेमचंद: व्यक्क्तत्ि और रचना दक्ृ ष्ट	: डॉ. दयानंद पाण्डेय
12.	नाटकालोचन के ससद्धांत	: ससद्धनाथ कु मार
13.	ह न्दी नाटक और रंगमंच: प चान एिंपरख	: डॉ. इन्द्रनाथ मदान्
14.	नाटक और रंग पररकलपना	: डॉ. धगररश रस्तोगी
15.	स्ितांत्रयोतर ह न्दी नाटक	: डॉ. रामजन्म शमा
16.	उत्तर आधुतनकता साह त्य ववमशु	: सुधीश पचौरी
17.	सुरेंद्र िमाु की नाट्य समीक्षा	: डॉ. ससम्मी ससं
18.	सुरेंद्र िमाु के साह त्य मेंं संघषु चेतना	: डॉ मंजुला चव् ाण
19.	सुरेंद्र िमाु के नाटकोंं का अनुशीलन	: डॉ जयश्री ससं
20.	प्ाततनधि तनबंधकार	: डॉ. वभिभुराम समश्र
21.	ह न्दी तनबंधकार	: जयनाथ नसलन
22.	ह द्दं ी साह त्य मेंं दसलत चेतना	:डॉ. जासलद्धं र इंगले
23.	मुक्क्त का प्श्न और दसलत साह त्य	:हदनेश राम

24.	ह दंी का दसलत आत्मकथा साह त्य	: डॉ. सजंय मुनेश्वर
25.	मुख्यधारा और दलित साहित्य	: ओम प्रकाश वाल्मीकि
26.	ह दंी दसलत आत्मकथा	: डॉ संजय निर्मले
27.	ह दंी दलित आत्म कथाएं एक अनुशीलन	: डॉ अभय परमार

28.	ह दंी का यात्रा साह त्य	: विश्ि मो न ततिारी
29.	हदंीयात्रासाहत्यऔरस्त्रीयात्रासाहत्यकार	: डॉक्टर बीआर थापसे
30.	यात्रा साह त्य का उद्भि और वि्किास	: सुरेंद्र माथुर
31.	ह दंी यात्रा साह त्य	: शसश शेखर ततिारी
32.	ह द्दं ी यात्रा साह त्य की सास्ं कृतिक पष्ृ ठभमू ि	:डॉ. संध्या शमाु
33.	समकालीन क ानी नया पररप्ेक्ष्य	:पुष्पपाल ससं
34.	ह द्दं ी क ानी को नए प्रतिमान	: डॉ अभय कु मारखैरनार
35.	समकालीन ह दंी क ानी: अंतरंगपररचय	: सी. एम. योन्नान
36.	क ानी समकालीन चुनौतियां	: शंभू गुप्त

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M.A. Syllabus According to Choice Based Credit Grading and Semester System (CBCGS)

Course: Hindi

Course Code : PAR1HN5 & PAR2HN6

प्रश्नपत्र : 5 और 6

भारत विज्ञान एवं हिन्दी भारत

Semester I & II

M.A. Hindi Part-I

प्रश्नपत्र : 5 & 6

भाषा विज्ञान एवं हिन्दी भाषा

Name of the	***:***
Name of the	***:***
Course	***: PAR1HN5 &***
Total	***: 60 +***
Total	***: 06 +***

पाठ्यक्रम के उद्देश्य:	
1.	हिन्दी भाषा की व्युत्पत्ति स्थान और उसके विविध रूप की जानकारी देना
2.	भाषा की व्याख्या तथा भाषा विज्ञान के अध्ययन क्षेत्रकी जानकारी देना
3.	भाषा विज्ञान के माध्यमसे विभागयन तथा उसके कार्यो से अवगत कराना
4.	हिन्दी भाषा के उद्भव एवं विकास की परंपरा को समझाना
5.	प्राचीन तथा मध्यकालीन आर्य भाषाओं से अवगत कराना
6.	देवनागरी लिपि के उद्भव एवं विकास से अवगत कराना
7.	भाषा के मूल तत्व की जानकारी देना
8.	भाषा के रूप, अर्थ, वाक्य, उसकी रूप रचना की जानकारीदेना

अध्ययन पद्ितत:	
1.	व्याख्यान तथा विश्लेषण
2.	संगोष्ठ, स्िाध्याय तथा गुटचचाु
3.	दकृ ्-श्राव्य माध्यमोंसािनों का प्योग
4.	पािर पॉइंटप्जेन्टेशन (PPT) भाषा प्योगशाला का प्योग
5.	अततधथ विशेषज्ञों के व्याख्यान
6.	अध्ययन यात्रा का आयोजन करना

Semester I
M.A., Hindi
Part-I

प्रश्नपत्र : 5

Course Code : PAR1HN5

भाषा विज्ञान एवं हिंदी भाषा

इकाइ- 1. व्याख्यान -15

खण्ड -क

1. भाषा :-
   - : भाषा की परिभाषा
   - : असिभलक्षण
   - : भाषा व्यिस्था और भाषा व्यि ार
   - : भाषा संरचना और भावषक प्कायु
2. भाषा विज्ञान :-
   - : भाषा विज्ञान का नामकरण
   - : परिभाषा
   - : स्िरूप और व्याक्स

इकाइ- 2. व्याख्यान 15

3. स्िन विज्ञान :-
   - : परिभाषा
   - : स्िरूप
   - : िाग अियि औरउनके कायु
   - : स्ितनम की विशेषताएँ
   - : स्ितनम के भेद:-
   - : खण्डेय स्ितनम
   - : खण्डयेतर स्ितनम
   - : स्िन परिितब्दु की हदशाएाँ
   - : स्िन परिितब्दु के कारण
   - : हिन्दी स्िरों तथा व्यजनों का िगीकरण

इकाइ- 3. व्याख्यान -20

खण्ड -ख

1. ह न्दी की ऐतत ासक पष्ृ ठभ ूम:-

: प्ाचीन भारतीय आयु भाषाएँ-

: ैदक तथा लौककक स ंस्कृत और उसकी विशेषताएँ

: मध्यकालीन भारतीय आयु भाषाएँ-

: पाली

: प्ाकृत

: अपभ्रश और उसकी विशेषताएँ

इकाइ- 4. व्याख्यान -20

आ ुतनक भ ारती य भ ाष ाओ ं क ा स ामान्य पररचय:-

: मराठी

: गुजराती

: राजस्थानी

: पंजाबी

: तेलगु

: कन्नड,

: तसमल

: मलयालम

Semester II
M.A., Hindi
Part-I

प्श्नपत्र : 6

Course Code : PAR2HN6

भार्ा ववज्ञान एवं हहर्ी भार्ा

इकाडु- 1. व्याख्यान -20

खण्ड -क

1. रूप विज्ञान :-

: रूप विज्ञान का स्िरूप

: शब्द और रूप

: अथतत्ि और सबंधि तत्ि को प्कार

: रूप परिितन्ु की हदशाएाँ एिं कारण

: रूवपम और संरूप

: रूवपम के भेद

2. ाक्य विज्ञान :-

: परभाषा

: असभह तान्ियिाद और अक्न्तासभिानिाद

: ाक्य परिितन्ु की हदशाएँ और कारण

: पद एिं पदक्रम

: ाक्य के भेद

इकाडु- 2. व्याख्यान 10

3. अथु विज्ञान :-

: अिारणा

: शब्द और अथु का संबि

: अथु परिितन्ु की हदशाएाँ

: अथु परिितन्ु के कारण

इकाइ -3. व्याख्यान -20

खण्ड -ख

1. ह न्दी की रूप रचना:-

1.1. : ह न्दी की शब्द रचना

: ि◌ातु

: उपसगु

: स्यय

: समास

1.2. : सलगं , ि◌चन, कारक को संदभु मंे ह न्दी को संज्ञा

: स◌िब्दु ाम

: विशेषण और क्रिया का रूपांतरण

इकाइ -4. व्याख्यान 10

2. दे◌िनागरी सलवप:-

: नामकरण

: उद्भि और विकास

: विशेषताएँ

: मानक रूप ए◌िं त्रुटयाँ

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संर्भद ग्रंथ स ी :

प्रश्नपत्र-5 और-6

अनु क्र	ककताब का नाम		लेखक का नाम
1	भाषा विज्ञान	:	डॉ. भोलानाथ ततिारी
2	भाषा विज्ञान एिं भाषाशास्त्र	:	डॉ. कवपलदेि द्विवेदी
3	ह न्दी भाषा का उद्भि औरविकास	:	डॉ. उदयनारायण ततिारी
4	ह न्दी भाषा	:	डॉ. भोलानाथ ततिारी
5	सरल भाषा विज्ञान	:	डॉ. अशोक के|शा
6	भावषकी, ह न्दी भाषा तथा भाषा सशक्षण	:	डॉ. अंबादास देशमुख
7	भाषा विज्ञान के अनुशीलन आयाम	:	डॉ. अंबादास देशमुख
8	सामान्या भाषा विज्ञान सैद्धांतिक विवेचन	:	डॉ. विद्यासागर दयाल
9	िण्ु विज्ञान	:	श्री. प्भात रज्जनसरकार
10	अकाद्समक ह न्दी व्याकरण	:	डॉ. भंडारे उद्धव तुकाराम
11	भाषाशास्त्र तथा ह न्दी भाषा कीरूपरेखा	:	डॉ. देवेंद्र कुमार शास्त्री
12	ह न्दी व्याकरण प्काश	:	डॉ. म ेंद्र कुमारराना
13	भाषा विज्ञान की रूपरेखा	:	द्िारका प्साद सक्सेना
14	नागरी सलवप: रूप और सुधार	:	मो न ब्रज
15	ह न्दी उद्भि विकास और रूप	:	रदे बा री

16	भाषा और भावषका	:	डॉ. देिीशंकर द्विेदी
17	सामान्य भाषा विज्ञान	:	डॉ. बाबुराि सक्सेना
18	ह न्दी भाषा एिं भाषाविज्ञान	:	डॉ. म ाि ीरसरन जैन
19	आिुतनक भाषा विज्ञान के ससद्िांत	:	डॉ. रामककशोर शमाु

20	भाषा	:	संपादक. राजकमल बोरा
21	भाषा विज्ञान और ह न्दी भाषा स्िरूपका विकास	:	डॉ. दे□े□ेंद्र ससं
22	भाषा विज्ञान	:	रमेश रा□ित
23	भ□ाष□ा और सच्चू न□ा प्रौद्य□ोधगकी	:	डॉ. अमर ससं □ि□ि□ा न
24	भ□ाष□ा और सच्चू न□ा प्रौद्य□ोधगकी एि□ं भ□ाष□ा प्बंि□न	:	रामगोपाल शमा□ु
25	ह न्दी भाषा: कल और आज	:	पर्ू नचंद टंडन
26	ह न्दी भाषा, व्याकरण और रचना	:	डॉ. अज□ुब्तु□ारी
27	भारतीय भाषा विज्ञान	:	आचायु ककशोरीदास □ाजपेयी
28	आ□ुतनक भ□ाष□ा वि□ज्ञ□ान	:	राजमणण शमा□ु
29	भाषा और प्रौद्योधगकी	:	डॉ. विनोद प्साद
30	भाष□ा श्शक्षण	:	रींद्रनाथ श्र□ी□ास्त□ि
31	ह न्दी भाषा का इतत ास	:	डॉ. भोलानाथ ततिारी
32	ह न्दी भाषा की संरचना	:	डॉ. भोलानाथ ततिारी
33	राजभाषा ह न्दी	:	कै□ाश चंद्र भ□ाहट्या
34	भाषा की उत्पवत्त, रचना औरविकास	:	विनोद हदिाकर
35	ह न्दी व्याकरण	:	कामताप्साद गुरू
36	ह न्दी □ितनी क□ा वि□कास	:	अतनत□ा ग□ुप्त□ा
37	ह न्दी क□ा वि□श्ि सं□दभ□ु	:	डॉ. करूणाशंकर उपाध्याय
38	ह न्दी भाषा: इतत ास औरस्िरूप	:	राजमणण शमा□ु

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR
ARTS, COMMERCE & SCIENCE COLLEGE, NEW PANVEL
(AUTONOMOUS)

Affiliated to University of Mumbai

Syllabus

Question Paper Pattern (60:40)

Choice Based Credit Grading and Semester System (CBCGS)
With effect from the Academic Year 2022-23

Program M.A. Part-I

Semester I & Semester II

M.A. Syllabus According to Choice Based Credit Grading and Semester System (CBCGS)

Course: Hindi

Course Code : **PAR1HN7 & PAR2HN8**

प्रश्नपत्र : 7 & 8

प्राचीन एवं मध्यकालीन काव्य

Semester I & II

M.A. Hindi Part-I

प्रश्नपत्र : 7 & 8

प्राचीन एवं मध्यकालीन काव्य

Name of the Programme	***: M.A.***
Name of the Course	***: Hindi***
Course Code	***: PAR1HN7 & PAR2HN8***
Total Lectures	***: 60 + 60***
Total credit	***: 06 + 06***

पाठ्यक्रम के उद्देश्य:

1. ह न्दी सा ह त्य की आ दिकालीन तथा भ क्तिकालीन काव्य प्र वृत्तियों की जानकारी देना

2. छात्रों को प्राचीन तथा मध्ययुगीन काव्य कृतियों का परिचय कराना

3. प्राचीन तथा मध्ययुगीन कवियों की काव्य कला से छात्रों को अवगत कराना

4. छात्रों को ह न्दी की प्राचीन तथा मध्ययुगीन काव्य परंपरा से परिचित कराना

5. छात्रों को प्राचीन तथा मध्ययुगीन ह न्दी भाषा से अवगत कराना

6. छात्रों में प्राचीन तथा मध्ययुगीन काव्य अध्ययन के माध्यम से समीक्षात्मक दृष्टि विकसित करना

अध्ययन पद्धति:

1. व्याख्यान तथा विश्लेषण

2. संगोष्ठ, स्ािाध्याय तथा गुटचचाु

3. दकृ ्-श्राव्य माध्यमोंसािनोों का प्याोग

4. पािर पॉइंटप्जेन्टेशन (PPT) भाषा प्योगशाला का प्योग

5. अततधथ विशेषज्ञों के व्याख्यान

6. अध्ययन यात्रा का आयोजन करना

Semester I
M.A., Hindi
Part-I

प्रश्नपत्र : 7

Course Code : PAR1HN7

<u>प्राचीन एवं मध्यकालीन काव्य</u>

इकाइ-1 व्याख्यान - 20

संतकबीरदास-संपादक-आचायु जारीप्साद

द्विवेदी पकाशक --मुंबई

विश्वविद्यालय मुंबई

व्याख्या ेतु पद-

१ -गुरु को अंग ३,१,६,२७,२८,३४ **कुल ६**

२-विराट को अंग – १, ५, ६, २२, ४०, ४५ **कुल ६**

३- परचा को अंग-४,८,२३,२७,३८,४८ **कुल ६**

पद-१,३,६७,९७,१३४,१६२,१६३,१६८,१७५,१७६,१७७,१९९,२००,२०२,२१७,२२०,२२४,२३४,२४१,२५४ **कुल २०**

इकाइ-2 व्याख्यान - 20

पदमावत- मसलक मो

मद जायसी संपादक- आचायु

रामचंद्र शुकल

व्याख्या ेतु खंड--

१-सस ल खंड

दीप

वण

२ नागमती वियोग खंड

इकाइ 3 और 4 व्याख्यान - 20

३-सुंदरकांड --गोस्वामी तुलसीदास गीता पेस गोरखपुर

Semester II

M.A., Hindi Part-I

प्रश्नपत्र २ : ४

Course Code : PAR2HN8

प्राचीन एवं मध्यकालीन काव्य

इकाइ- 1और 2 व्याख्यान -25

१ भ्रमरगीत सार संपादक आचार्य
रामचंद्र शुक्ल व्याख्या हेतु पद
१,५,७,९,११,१६,२६,३८,४२,५१,५७,६४,९०,१०५,११५,१३१,१३८,१४३,१५७,१७७,१९६,२००,२७९,
३१६,३६६ **कुल २५**

इकाइ- 3 व्याख्यान -15

त्रबारी रत्नाकर संपादन जगन्नाथदास रत्नाकर
व्याख्या हेतु पद
१,१६,२५,३२,३८,३९,४६,६०,६२,७३,९४१२१,१६१,१९२,२०१,२०७,२२
८,२६२,३०१,३२७,३३१,४१७,४७२६०१,६७७ **कुल २५**

इकाइ- 4 व्याख्यान -20

घनानंद कवित्त-विश्वनाथ
प्रसाद समग्र व्याख्या हेतु पद १- २०
कुल २०

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संर्भद ग्रंथ स ी :

प्रश्नपत्र-5 और-6

अनु क्र	ककताब का नाम	लेखक का नाम
1.	जायसी को पद्मावत का मूल्यांकन	: प्रो. रेंद्र प्रसाद सिन्हा
2.	म लिक मुहम्मद जायसी और उनका काव्य	: डॉ. इकबाल अहमद
3.	मलिक मुहम्मद जायसी और उनका काव्य	: डॉ. सिसिस राय पाठक
4.	जायसी पद्मावत काव्य और दर्शन	: डॉ. गोविन्द त्रिगुणायत
5.	पद्मावत में काव्य, संस्कृति और दर्शन	: डॉ. द्वारकाप्रसाद सक्सेना
6.	पदमावत का काव्य सौंदर्य	: डॉ. चंद्रबली पाण्डेय
7.	हिन्दी के प्रतिनिधि कवि	: डॉ. सुरेश अग्रवाल
8.	मूलपाठ जायसी ग्रंथावली पद्मावत	: संपादक. श्री राकेशएम.ए.
9.	कबीर	: जारीप्रसाद द्विवेदी
10.	भक्ति ग्रंथावली	: आचार्य विश्वनाथप्रसाद मिश्र
11.	सूफी तत्त्वज्ञान: स्वरूप एवं विकास	: डॉ. मुहम्मद आजम
12.	कबीर की विचारिरा	: डॉ. गोविन्द त्रिगुणायत
13.	कबीर रहस्यवाद	: डॉ. रामकुमार वर्मा
14.	कबीर साहित्य की परख	: आचार्य परशुराम चतुर्वेदी
15.	जायसी एवं उनकाकाव्य	: डॉ. ससिस राय पाठक
16.	जायसी	डॉ. विजयदेव नारायन साह

17.	तुलसीदास: आधुनिक विचारायन से	:	डॉ. रमेश कुंतल 'मेघ'
18.	जायसी का काव्य शिल्प	:	डॉ. दशनलाल सेठी
19.	तुलसीदास और उनका युग	:	डॉ. राजमतत दीक्षित
20.	रामचररतमानस में अलंकार योजना	:	डॉ. विचनदेव कुमार

21.	कबीर और तुकाराम को काव्य में अभिव्यक्त सांस्कृतिक चेतना का तुलनात्मक अनुशीलन	:	डॉ. बालकृष्ण सुरंजे
22.	मध्यकालीन कृष्ण और कृष्णिता	:	डॉ. रतनकुमार पाण्डेय
23.	कालजयी संत तुलसीदास	:	डॉ. उमापति दीक्षित
24.	मध्यकालीन काव्य: धचत्रं न और संिेदना	:	डॉ. करूणाशंकर उपाध्याय
25.	रीतिकालीन काव्य परंपरा में पद्माित	:	डॉ. द्िाररकानाथ रा.
26.	देि और उनकी कविता	:	डॉ. नगेन्द्र
27.	मध्ययुगीन हिन्दी साहित्य में नारी भावना	:	डॉ. उषा पाण्डेय
28.	रीतिपरं,परा के प्मुख आचायु	:	डॉ. सयदेि चतुिेदी
29.	हिन्दी काव्य में श्रृंगार परंपरा और ताज बारी	:	डॉ. गणपतिचंद्र गुप्त
30.	हिन्दीरीतिकालीनकाव्यपरसंस्कृतकाव्यका प्भाि	:	डॉ. दयानंद शमाु
31.	मीरा और मीरा	:	म ादेिी िमाु
32.	भक्तिमति मीराबाइ: जीिन और काव्य	:	लालब ादरू ससंचौ ान
33.	भक्ति साहित्य में विश्िबिंुत की भावना	:	संपादक डॉ. अतनल ससं
34.	िालमीकि एिं तुलसी को नारी पात्र	:	डॉ. संतोष मोटिानी

II ivaVa ivanayaona SaMBat II

Janardan Bhagat Shikshan Prasarak Sanstha's

Changu Kana Thakur

Arts, Commerce and Science College, New Panvel

Autonomous

Affiliated to University of Mumbai

DEPARTMENT OF HINDI

Master of Arts (M.A. Part -I) Revised Syllabus

For

M.A. Hindi Part-I

Choice Based Credit Grading and Semester

System (CBCGS) (60:40)

With effect from the Academic Year 2022-23

EXAMINATION

1. ***External Examination (Semester end Examination)*** — ***Total Marks - 60***
2. ***Internal Examination*** — ***Total Marks - 40***

1.	आंतररक परीक्षा	कु लअंक	20
2.	प्ास्तुतीकरण / रचनात्मक कायु / पुस्तक समीक्षा / प्कलप	कु लअंक	20

एम.ए. प्थम िर्षु सेमेस्टर I एिं II के सलए

प्श्न पत्र का प्ारूप

पेपरक्रमांक:- 1, 2, 5, 6

प्ाश्न क्र 1.	पछू े गए दो हदघोत्तरी प्श्नों में से एक का उत्तर अपेक्षित है -	15 अंक
प्ाश्न क्र 2.	पछू े गए दो हदघोत्तरी प्श्नों में से एक का उत्तर अपेक्षित है -	15 अंक
प्ाश्न क्र 3.	पछू े गए दो हदघोत्तरी प्श्नों में से एक का उत्तर अपेक्षित है -	15 अंक
प्ाश्न क्र 4.	पछू े गए चार हटप्पणणयों में से दो के उत्तर अपेक्षित है -	15 अंक
		60 अंक

पेपरक्रमांक:- 3, 4, 7, 8

प्ाश्न क्र 1	पछू े गए तीन संदभु सहहत व्याख्या में से दो के उत्तर अपेक्षित है -	15 अंक
प्ाश्न क्र 2	पछू े गए दो हदघोत्तरी प्श्नों में से एक का उत्तर अपेक्षित है -	15 अंक
प्ाश्न क्र 3	पछू े गए दो हदघोत्तरी प्श्नों में से एक का उत्तर अपेक्षित है -	15 अंक
प्ाश्न क्र 4	पछू े गए दो हदघोत्तरी प्श्नों में से एक का उत्तर अपेक्षित है -	15 अंक
		60 अंक

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J.B.S.P.Sanstha's

Changu Kana Thakur Arts,Commerce and Science College,

New Panvel (Autonomous)

Masters of Commerce (M.Com) Programme

M.Com. Part - I

Two Semesters

Course Structure

Under Choice Based Credit System

To be implemented from Academic Year- 2022-2023

Department of Accountancy

Master of Commerce (M.Com) Programme

Under Choice Based Credit, Grading and Semester System

Course Structure

M.Com I

(To be implemented from Academic Year- 2022-2023)

No. of Courses	Semester I	Credits	No. of Courses	Semester II	Credits
1	***Core Courses (CC)***		***1***	***Core Courses (CC)***	
1	Cost and Management Accounting	**06**	1	Corporate Finance	**06**
	Total Credits	**06**		**Total Credits**	**06**

Revised Syllabus and Question Paper Pattern of Courses of

Revised Syllabus of Courses of
Master of Commerce (M.Com) Programme at Semester I
(To be implemented from Academic Year- 2022-2023)

Core Courses (CC)

Cost and Management Accounting

Modules at a Glance

SN	Modules	No. of Lectures
1	Cost Accounting Standard [CAS -1 , 16 , 17 and 22]	15
2	Marginal Costing, Absorption Costing and Management Decisions	15
3	Standard Costing	15
4	Budgetary Control	15
	Total	**60**

Course Outcomes [CO's]

Name of the Programme: M.COM-Part-I	Programme Coordinator: Dr. S.B.Yadav	Head of the Department: Dr. S.B.Yadav
	Course: Cost and Management Accounting **Course Code: PCM1AC**	**Course Coordinator: Dr. S.B.Yadav**
	After Completing the course, Student will able to:	Bloom Taxonomy Level (BTL)
CO1	**Solve the** problems based on Cost Accounting Standard.	III. Applying
CO2	**Calculating** the profitability of business using marginal costing techniques	IV Analyzing
CO3	**Assessing** the decision to be made under different alternatives under marginal costing	V Evaluating
CO4	**Gathering** importance of costing techniques and methodology	II understanding

SN	Modules/ Units
1	**Cost Accounting Standard [CAS -1 , 16 , 17 and 22]**
	• CAS-1- Classification of Cost • CAS- 16 - Depreciation and amortization • CAS-17 - Interest and Financial Charges • CAS-22- Manufacturing Cost
2	**Standard Costing**
	• Standard Costing as an Instrument of Cost Control and Cost Reduction - Fixation of Standards - Theory and Problems based on Analysis of Variances of Materials, Labour Overheads and sales including Sub-variances
3	**Budgetary Control**
	• Budget and Budgetary Control - Zero Based Budget - Performance Budgets - Functional Budgets Leading to the Preparation of Master Budgets - Capital Expenditure Budget - Fixed and Flexible Budgets - Preparation of Different Types of Budgets
4	**Marginal Costing, Absorption Costing and Management Decisions**
	• Meaning of Absorption Costing - Distinction between Absorption Costing and Marginal Costing - Problems on Breakeven Analysis - Cost Volume Profit Analysis - Breakeven Charts - Contribution Margin and Various Decision Making Problems • Managerial Decisions through Cost Accounting such as Pricing Accepting Special Offer - Profit Planning - Make or Buy Decisions - Determining Key Factors - Determining Sales Mix - Determining Optimum Activity Level - Performance Evaluation - Alternative Methods of Production, Cost Reduction & Cost Control

Revised Syllabus of Courses of
Master of Commerce (M.Com) Programme at Semester II
(To be implemented from Academic Year- 2022-2023)

Core Courses (CC)

2. Corporate Finance

Modules at a Glance

SN	Modules	No. of Lectures
1	Scope and Objectives of Financial Management	15
2	Time Value of Money	15
3	Capital Budget – include time value of money	15
4	Financial Decisions	15
	Total	**60**

Course Outcomes [CO's]

Semester - II

Name of the Programme: M.COM-Part-I	**Programme Coordinator:** Dr. S.B.Yadav	**Head of the Department:** Dr. S.B.Yadav
Subject : Corporate Finance	**Course: Corporate Finance** **Course Code: PCM2CF**	**Course Coordinator:** **Dr.S.B.Yadav**
	After Completing the course, Student will able to:	Bloom Taxonomy Level (BTL)
CO1	**Explain** the Scope and objectives of Financial Management.	II. Understanding
CO2	**Calculating** the Present Value, Annuity, Techniques of Discounting, Techniques of Compounding, Bond Valuation and YTM	IV Applying
CO3	**Examine** Application of Capital Budgeting.	IV Analyzing
CO4	**Solving** the problems on Cost of Capital, Capital Structure Decisions and Business Risk and Financial Risk	VI Creating

SN	Modules/ Units
1	**Scope and Objectives of Financial Management**
	• Introduction, Meaning, Importance, Scope, Objectives, Profit v/s Value Maximization
2	**Time Value of Money**
	• Concept, Present Value, Annuity, Techniques of Discounting, Techniques of Compounding, Bond Valuation and YTM
3	**Capital Budget – include time value of money**
	• Payback period • Discounted payback period • Net present value • Accounting rate of return • Internal rate of return • Profitability index
4	**Financial Decisions**
	• Cost of Capital - Introduction, Definition of Cost of Capital, Measurement of Cost of Capital, WACC, Marginal Cost of Capital • Capital Structure Decisions - Meaning, Choice of Capital Structure, Importance, Optimal Capital Structure, EBIT-EPS Analysis, Cost of Capital, Capital Structure and Market Price of Share, Capital Structure Theories, Dividend Policy - Pay Out Ratio • Business Risk and Financial Risk - Introduction, Debt v/s Equity Financing, Types of Leverage, Investment Objective/Criteria for Individuals/Non-business Purpose

Revised Syllabus of Courses of
Master of Commerce (M.Com) Programme at Semester I
(To be implemented from Academic Year- 2022-2023)

Reference Books

Cost and Management Accounting and Corporate Finance
• Advanced Cost & Management Accounting by Saxena • Cost & Management Accounting **by Satish Inamdar** • Cost & Management Accounting **by Kishore R. M.** • Text Book Of Management Accounting **by Sanjay Patankar** • Management Accounting: Text, Problems & Cases **by Khan & Jain** • Management Accounting **Reference Book by Rao** • Introduction to Management Accounting – Horngreen and Sundlem • Principles of Management Accounting – Manmohan & Goyal • Management Accounting – Dr. E.B. Khedkar, Dr. D.B. Bharati and Dr. A. B. Kharpas. • Cost and Management Accounting – S.M.Inamdar • Management Accounting – Dr. Mahesh Kulkarni • Double Entry Book Keeping – T.S.Grewal • Principles and Practice of Cost Accounting – Ashish K. Bhattacharya • Management Accounting 3rd Ed. – Khan & Jain • Theory & Problems in Management & Cost Accounting – Khan & Jain • Cost Accounting – Jawaharlal

Question Paper Pattern

(Internal Assessment- 40 Marks)

1. 20 Marks Class Test
2. 10 Marks Assignment (Internal Tool)
3. 10 Marks Quiz (Internal Tool)

1. Maximum Marks: 20 marks [Class Test]

Questions to be set: 20

Duration: 20 Minutes

Question No	Particular	Marks
Q-1	Objective Questions Students to answer all 20 questions *(*Multiple choice/ True or False/ Match the columns/ Fill in the blanks)*	20 arks

2. 10 Marks Case Study (Internal Tool)

Case Study for 10 Marks Time Limit 30 Minutes

3. 10 Marks Quiz (Internal Tool)

Quiz of 10 Marks on Google Form 10 quiz questions of 1 marks each to be asked based on the course work. Time limit 10 Minutes.

Question Paper Pattern

(Practical Courses)

Maximum Marks: 60

Questions to be set: 04

Duration: 2 Hrs.

All Questions are Compulsory Carrying 15 Marks each.

Question No	Particular	Marks
Q-1	Practical Question	15 Marks
	OR	
Q-1	Practical Question	15 Marks
Q-2	Practical Question	15 Marks
	OR	
Q-2	Practical Question	15 Marks
Q-3	Practical Question	15 Marks
	OR	
Q-3	Practical Question	15 Marks
Q-4	Objective Question *(Multiple Choice/ True or False/ Fill in the Blanks/ Match the Columns/ Short Questions.)*	15 Marks
	OR	
Q-4	Short Notes *(Any three out of five)*	15 Marks

Note:

Full length question of 15 marks may be divided into two sub questions of 08 and 07 marks.

Janardan Bhagat Shikshan Prasarak Sanstha's

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Program: M.Com.

Revised Syllabus of M.Com. Part – II Semester- IIIrd and IVth

1. Advanced Cost Accountancy
2. Financial Management

Choice Based Credit Grading and Semester System (CBCGS)
M. Com. Advanced Cost Accountancy Syllabus
To be implemented from the Academic year 2020-2021
SEMESTER III

Course Code	Unit	Topics	Credits	L / Week
UCM3FA3	I	Process Costing	6	15
	II	Cost Allocation and Activity Based Costing Systems		15
	III	Responsibility Accounting		15
	IV	Strategic Cost Management		15

Choice Based Credit Grading and Semester System (CBCGS)
M. Com. Financial Management Syllabus
To be implemented from the Academic year 2020-2021
SEMESTER IV

Course Code	Unit	Topics	Credits	L / Week
UCM3FA4	I	Types of Financing	6	15
	II	Investment Decisions : Capital Budgeting		15
	III	Management of Working Capital		15
	IV	Financial Planning		15

Semester – III Advanced Cost Accountancy

SN	Modules/ Units
1	**Process Costing**
	A) Introduction - Features of process, Concept of Process Loss, Abnormal Loss, Normal Loss, Abnormal Gain. **B)** Computation of Inter Process Profit – Advantages and Disadvantages **C)** Computation of Equivalent Production – Weighted Average and FIFO.
2	**Cost Allocation and Activity Based Costing Systems**
	A) Cost Allocation – Meaning and its Types, Relationship between resources, activities, Cost and Cost drivers, Methods of allocating central costs - cost allocation using Direct Method, Step Down Method and Reciprocal Method. **B)** Activity Based Costing – Introduction, Advantages, Limitations, Identification of cost drivers, Practical Problems on Traditional V/s Activity Based Costing System.
3	**Responsibility Accounting**
	A) Responsibility Accounting – Meaning, Features, Objective, Assumptions, Problems, Responsibility Centre's – Cost, Profit, Revenue and Investment. **B)** Concept of Controllability – Introduction, Measuring Managerial Performance (ROI and Residual Income Approach) **C)** Preparation of Managerial Reports using Segmented Costs and Controllable costs approach.
4	**Strategic Cost Management**
	A) Transfer Pricing – Introduction, Advantages and Disadvantages, Setting Transfer Pricing – Negotiated transfer pricing, Cost Based transfer pricing. **B)** Target Costing – Introduction, Concept, Objectives, Comparison between Target Costing and Cost Plus Pricing. **C)** Inflation Accounting – Meaning, Features, Conversion of Income Statement, Balance Sheet, Stocks and Net Assets Block using Current Purchasing Power Method.

Semester – IV Financial Management

SN	Modules/ Units
1	**Types of Financing**
	Introduction Needs of Finance and Sources: Long Term, Medium Term, Short Term Long Term Sources of Finance Owners Capital / Equity Capital Preference share capital Retained Earning Debentures or Bonds Loans from Financial Institutions / Banks Short Term Sources of Finance Trade Credit Accrued Expenses and Deferred Income Advances From Customers Commercial Papers Bank Advances:Loans, O/D, Clean O/Ds, Cash Credit, Advances against goods, Bills Purchased, Discounted, Advances against documents of title of goods, Advances against supply of bills, Term Loans Inter Corporate Deposits Certificate of Deposits Public Deposits
2	**Investment Decisions : Capital Budgeting**
	• Introduction • Nature of Capital Budgeting • Purpose of Capital Budgeting • Capital Budgeting Process • Types of Capital Investment • Decisions Project Cash Flows and Net profit Approval • Basic Principle of Measuring Project Cash Flows • Increment principle, Long Term Funds Principle, Exclusion of Financial Cost Principle, Post Tax Principle • Probability technique for measurement of cash flow • Capital Budgeting Techniques : Net Return Value; Internal Rate of Return; Profitability Index Methods • A Comparison; Project Selection Under Capital Rationing • (Note: Problems on computation of cash flow, ranking of projects on various techniques, selection and analysis with / without capital rationing. Comparison of IRR with Required rate of return i.e. cut off rate, IRR and mutually exclusive projects with unequal lives, multiple IRR)

Reference Books

Reference Books

- **Advanced Cost accounting by Vashishta and Saxena**
- **Advanced Financial Management by Prasana Chandra**
- **Advanced Financial Management by Khan and Jain**
- **Cost accounting B.K.Bhar**

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Program: M.Com. Part II

Revised Syllabus of M.Com. – Semester - III

1. Advanced Financial Accountancy
2. Corporate Financial Accountancy

Choice Based Credit & Grading System (60:40)
w.e.f. Academic Year 2020-21

Choice Based Credit Grading and Semester System (CBCGS)
M. Com. Advanced Financial Accountancy Syllabus
To be implemented from the Academic year 2020-2021
SEMESTER III

Course Code	Unit	Topics	Credits	L / Week
UCM3FA3	I	Foreign Currency Conversion (As per Applicable Accounting Standards)	6	15
	II	Final Accounts & Statutory Requirements for Banking Companies		15
	III	Accounting & Statutory Requirements of Insurance Companies		15
	IV	Accounting & Statutory Requirements of Co-operative Societies		15

Semester – III Advanced Financial Accountancy

Sr. No.	Modules / Units
1	**Foreign Currency Conversion (As per Applicable Accounting Standards)**
	Requirements as per Accounting Standards Foreign Branches
2	**Final Accounts & Statutory Requirements for Banking Companies**
	Final Accounts of Banking Companies Provisioning of Non- Performing Assets Form & Requirements of Final Accounts
3	**Accounting & Statutory Requirements of Insurance Companies**
	• Accounting Provision for Insurance Act and Insurance Regulation and Development Authorities for 1) Life Insurance Business 2) General Insurance Business • Forms and Requirements of Final Accounts for 1) Life Insurance Business 2) General Insurance Business
4	**Accounting & Statutory Requirements of Co-operative Societies**
	• Accounting Provisions of Maharashtra State Co-operative Societies Act and Rules • Forms and Requirements of Final Accounts

M.Com. Part – II - Sem-IV Corporate Financial Accountancy

For the subject of Corporate Financial Accountancy there shall be one paper for 60 lectures each comprising of four units of 15 Lectures each.

Semester-IV

1. Module-I will be for 15 Lectures
2. Module-II will be for 15Lectures
3. Module-III will be for 15 Lectures
4. Module-IV will be for 15 Lectures

Choice Based Credit Grading and Semester System (CBCGS)
M. Com. Corporate Financial Accountancy Syllabus
To be implemented from the Academic year 2020-2021
SEMESTER IV

Course Code	Unit	Topics	Credits	L / Week
UCM4FA4	I	Corporate Financial Reporting	6	15
	II	International Financial Reporting Standards (IFRS) & Ind – AS		15
	III	Valuation of Business for Amalgamation & Merger		15
	IV	Consolidated Financial Statement		15

Semester – IV Corporate Financial Accountancy

SN	Modules/ Units
1	**Corporate Financial Reporting**
	• Introduction of Financial Reporting • Need for reporting • Contents of Financial Report • Recent trends in Financial reporting
2	**International Financial Reporting Standards (IFRS) & Ind - AS**
	• Accounting Standards (AS) – applicability, interpretation, scope and compliance in India • Introduction to I.F.R.S • Ind – AS • Specific Ind AS:

	Borrowing Costs Operating Segments Earning per share Income Taxes Accounting for fixed assets
3	**Valuation of Business for Amalgamation & Merger**
	Meaning, Need & Approach Methods of valuation
4	**Consolidated Financial Statement**
	Meaning, Stand Alone Financial Statements Consolidated Financial statements – Applicability, Advantages & Disadvantages Procedure of Consolidation of Balance-sheet & Profit & Loss Account (Excluding cross holding, Chain Holding & Foreign Subsidiary)

Reference Books

Reference Books

• Introduction to Accountancy by T. S. Grewal, S. Chand and Company (P) Ltd., New Delhi Advance

Accounts by Shukla & Grewal, S. Chand and Company (P) Ltd., New Delhi

• Advanced Accountancy by R. L Gupta and M Radhaswamy, S. Chand and Company (P) Ltd., New Delhi

• Modern Accountancy by Mukherjee and Hanif, Tata Mc. Grow Hill & Co. Ltd., Mumbai Financial

Accounting by LesileChandwichk, Pentice Hall of India Adin Bakley (P) Ltd.

• Financial Accounting for Management by Dr. Dinesh Harsalekar, Multi-Tech. Publishing Co. Ltd.,

Mumbai.

• Financial Accounting by P. C. Tulsian, Pearson Publications, New Delhi Accounting Principles by

Anthony, R.N. and Reece J.S., Richard Irwin Inc.

• Financial Accounting by Monga, J.R. Ahuja, GirishAhujaandShehgal Ashok, Mayur Paper Back

• Compendium of Statement & Standard of Accounting, ICAI.

• Indian Accounting Standards, Ashish Bhattacharya, Tata Mc. Grow Hill & Co. Ltd., Mumbai Financial

Accounting by Williams , Tata Mc. Grow Hill & Co. Ltd., Mumbai

• Company Accounting Standards by ShrinivasanAnand, Taxman. Financial Accounting by V.

Rajasekaran, Pearson Publications, New Delhi. Introduction to Financial Accounting by Horngren,

Pearson Publications.

• Financial Accounting by M. Mukherjee.M. Hanif. Tata McGraw Hill Education Private Ltd; New Delhi

Janardan Bhagat Shikshan Prasarak Sanstha's

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Revised Syllabus of M.Com. Part – II Semester- IIIrd and IVth

1. Direct Tax
2. Indirect Tax – Introduction to Goods and Service Tax

Choice Based Credit Grading and Semester System (CBCGS)
M. Com. Direct Tax Syllabus
To be implemented from the Academic year 2020-2021
SEMESTER III

Course Code	Unit	Topics	Credits	L / Week
UCM3TA1	I	Definitions and Basis of Charge	6	15
	II	Heads of Income		15
	III	Deductions u/s 80 and Exclusions from the Total Income		15
	IV	Computation of Income and Tax of Individual, Firm and Company (Excluding MAT) and Provisions for Filing Return of Income - Sec 139(1) and Sec 139(5)		15

Choice Based Credit Grading and Semester System (CBCGS)
M. Com. Indirect Tax- Introduction of Goods and Service Tax Syllabus
To be implemented from the Academic year 2020-2021
SEMESTER IV

Course Code	Unit	Topics	Credits	L / Week
UCM4TA2	I	Overview of Goods and Service Tax	6	15
	II	Registration under GST		15
	III	Collection of Tax under Integrated Goods and Services Tax Act, 2017		10
	IV	Place of supply of goods or services or both under Integrated Goods and Services Tax Act, 2017		10
	V	Payment of GST		10

Semester – III - Direct Tax

SN	Modules/ Units
1	**Definitions and Basis of Charge**
	• Definitions: Person, Assessee, Income • Basis of Charge: Previous Year, Assessment Year, Residential Status, Scope of Total Income, Deemed Income
2	**Heads of Income**
	• Income from Salary • Income from House Property • Profits and Gains from Business and Profession • Income from Capital Gains • Income from Other Sources
3	**Deductions u/s 80 and Exclusions from the Total Income**
	• Deductions: 80C, 80CCF, 80D, 80DD, 80DDB, 80E, 80U • Exclusions: Exemptions related to Specific Heads of Income to be Covered with Relevant Provisions, Agricultural Income, Sums Received from HUF by a Member, Share of Profit from Firm, Income from Minor Child, Dividend
4	**Computation of Income and Tax of Individual, Firm and Company (Excluding MAT) and Provisions for Filing Return of Income - Sec 139(1) and Sec 139(5)**
	• Computation of Income & Tax of Individual and Partnership Firm

Note:

1. ***The Syllabus is restricted to study of particular sections, specifically mentioned rules and notifications only***
2. ***All modules/units include computational problems/ Case study***
3. ***The Law in force on 1st April immediately preceding the commencement of Academic year will be applicable for ensuing Examinations***

Semester – IV Indirect Tax- Introduction of Goods and Service Tax

SN	Modules/ Units
1	**Overview of Goods and Service Tax**
	Introduction and Meaning of GST and IGST Scope of GST Present/old Tax Structure v/s GST GST in Other Countries Existing taxes proposed to be subsumed under GST Principles adopted for subsuming the taxes Dual GST Benefits of GST GST Council GST Network (GSTN) and GST regime Integrated Goods and Services Tax Act, 2017: title and definitions, administration.
2	**Registration Under GST**
	Rules and Procedure of registration Special provisions relating to casual taxable person and non-resident taxable person Amendment of registration Cancellation of registration Revocation of cancellation of registration
3	**Collection of Tax under Integrated Goods and Services Tax Act, 2017**
	Sec 5 and Sec 6
4	**Place of supply of goods or services or both under Integrated Goods and Services Tax Act, 2017**
	Sec 10 and Sec 12
5	**Payment of GST**
	• Introduction • Time of GST Payment • How to make payment • Challan Generation & CPIN • TDS & TCS

Reference Books

- Taxmann's Direct Taxes Law & Practice -With special reference to Tax Planning
- Equalisation Levy Commodities Transaction Tax & Securities Transaction...
- Direct Taxes Manual by Taxman
- Income Tax Act by Taxman
- GST Acts with Rules/Forms & Notifications by Taxman
- Taxation (Direct and Indirect): B.Com – by Monica Singhania and Vinod K Singhania
- II Year- B.com – Taxation-English Medium-Osmania University by Vikram editorial board
- Taxation B.Com 2nd year AP Uni. by Gaur V.P., Yadagiri M., Padmalatha N., Krishna Rao
- Taxation with Lab Work B.Com 2nd year Telangana Uni. by Gaur V.P., Narang D.B., Madmalatha M., Kanduri Sush
- Business Taxation B.Com, BBM, BCA & M.Com by Radhakrishnan P

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR ARTS, COMMERCE & SCIENCE COLLEGE, NEW PANVEL (AUTONOMOUS)

Re-accredited 'A+' Grade by NAAC
'College with Potential for Excellence' Status Awarded by UGC
'Best College Award' by University of Mumbai
Program: M.Com.

Revised Syllabus of M.Com. Part – II Semester- IIIrd and IVth
PROJECT WORK

Choice Based Credit & Grading System (60:40)
w.e.f. Academic Year 2020-21

Sr. No.	Heading	Particulars
1	Title of Course	Project Work
2	Eligibility for Admission	M.COM. SEM I AND SEM II PASSED OR APPEARED EXAMINATION
3	Passing marks	40%
4	Ordinances/Regulations (if any)	--
5	No. of Semesters	IIIrd and IVth
6	Level	P.G.
7	Pattern	Semester (60:40)
8	Status	Revised
9	To be implemented from Academic year	2020-2021

Preamble

After successfully completion of undergraduate courses one should be the master of the accountancy. To get the advanced knowledge of most complex subject like Accountancy, Taxation, Financial Management, Costing and Research methodology we introduced various aspects of all these in the syllabus so the student will be trained to tackle the problems arising in the world of accountancy and Taxation.

Objectives

SN	Objectives
1	To enhance the abilities of learners to develop the research and presentation skill.

Outcomes

SN	Objectives
1	Learners will enhance the abilities to develop the research and presentation skill.

M.Com II Project work for Semester III and IV

Work Load:

Work load for Project Work is 1 hour per batch of 15 students per week for the teacher. The student shall do field work and library work in the remaining 3 hours per week.

Credits:

6 Credit for each semester.

Guidelines:

- The project topic may be undertaken in any area of Elective Courses.
- Each of the students has to undertake a Project individually under the supervision of a teacher-guide.

- The student shall decide the topic in consultation with the teacher-guide concerned.

- University/college should allot P G Teacher for guidance to the students based on her / his specialization.

- There shall be double valuation of project by the teacher- guide concerned and an external examiner appointed by the University/College with equal weightage.

- The teacher-guide along with the external examiner appointed by the University/College for the valuation of project shall conduct viva voce examination with equal weightage.

- The date of viva voce shall be intimated to the students by the Department well in advance.

- **The project report shall be prepared as per the broad guidelines given below:**

a. Project Report shall be typed in Times New Roman with one and half line spacing in 12 Font Size and 1.5 spacing.

b. The size of the Project Report shall be with a minimum of 25,000 words and a maximum of 40,000 words.

c. Project Report shall be printed on both sides of the paper. d. The Project Report shall be bounded.

Evaluation:

The Project Report evaluation is for 60 Marks and the Viva –Voce examination is for 40 Marks (without presentation). No marks will be allotted on the Project Report unless a candidate appears at the Viva-Voce Examination. Similarly, no marks will be allotted on Viva-Voce Examination unless a candidate submits his/her Project Report.

Project Report (60 marks):

Introduction and other areas covered – 20 marks

Presentation, Analysis & Findings -- 30 marks

Conclusion & Recommendations -- 10 marks

Viva-Voce (40 marks):

In course of Viva-Voce Examination, the question may be asked in the following areas: Importance / relevance of the Study, Objective of the Study, Methodology of the Study/ Mode of Enquiry -- 10 marks

Ability to explain the analysis, findings, concluding observations, recommendation, limitations of the Study -- 20 marks

Overall Impression (including Communication Skill) -- 10 marks

Passing:

- Minimum of Grade E in the project component
- In case of failing in the project work, the same project can be revised for ATKT examination.
- Absence of student for viva voce:

If any student fails to appear for the viva voce on the date and time fixed by the department such student shall appear for the viva voce on the date and time fixed by the Department, such student shall appear for the viva voce only along with students of the next batch.

Janardan Bhagat Shikshan Prasarak Sanstha's

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'Best College Award' by University of Mumbai

Program: Masters in Science (M. Sc.)

Total Credits:96

SYLLABUS

(Approved in the Academic council meeting held on /07/2022)

M.Sc.-I

Chemistry

Revised as per
Choice Based Credit System (60:40)
w. e. f. Academic Year 2022-23

MASTERS IN SCIENCE (M. Sc.)
Programme Outcomes

After completion of M.Sc. programme students will acquire

S. N.	After completion of M.Sc. program students will acquire	Graduate Attribute
PO1	An ability to identify and describe broadly accepted methodologies of science, and different modes of reasoning.	Disciplinary knowledge
PO2	An ability to demonstrate proficiency in various instrumentation, modern tools, advanced techniques and ICT to meet industrial expectations and research outputs.	Disciplinary knowledge/Digital literacy
PO3	An ability to identify problems, formulates, and proves hypotheses by applying theoretical knowledge and skills relevant to the discipline.	Problem-solving
PO4	An ability to be articulate thoughts, research ideas, information, scientific outcomes in oral and in written presentation to range of audience.	Communication skills
PO5	A capacity for independent, conceptual and creative thinking, analysis and problem solving through the existing methods of enquiry.	Problem solving
PO6	Skills required for cutting edge research, investigations, field study, documentation, networking, and ability to build logical arguments using scholarly evidence.	Research skills
PO7	An ability to portray good interpersonal skills with ability to work collaboratively as part of a team undertaking a range of different team roles	Teamwork
PO8	The ability to understand ethical responsibilities and impact of scientific solutions in global, societal and environmental context and contribute to the sustainable development	Moral and ethical awareness/ multicultural competence
PO9	An ability to demonstrate leadership, to take action and to get others involved.	Leadership
PO10	An openness to and interest in, life-long learning through directed and self-directed study	Self-directed learning
PO11	An ability to translate the knowledge and demonstrate the skills required to be employed and successful professional development.	Life-long learning

Programme: M.Sc. Organic Chemistry

PSOs No.	After completing the programme in M.Sc. Organic Chemistry, Student will able to:	Graduate Attribute
PSO1	Develop analytical thinking and apply the same for understanding principles, proposing mechanism and logical conclusions, understanding of the interdisciplinary nature of Chemistry and emerging trends in Chemistry.	Disciplinary knowledge Problem solving
PSO2	Get research opportunities in academics as well as employment at R & D in synthetic division of chemical, pharmaceutical, dyestuff and food industries	Research skills
PSO3	Competency in design and planning of synthesis and carry out with Good Laboratory Practices, handling instruments and interpretation of spectral data for structure determination of organic compounds	Research skills

Programme: M.Sc. Analytical Chemistry

PSOs No	After completing the programme in M.Sc. Analytical Chemistry, Student will able to:	Graduate Attribute
PSO1	Understand the principles, methodologies of analytical techniques and their applications in industrial, social, and environmental context.	Disciplinary knowledge/ Multicultural competence
PSO2	Integrate and apply the knowledge of the analytical methods, tools, and ICT facilities to the range of scientific problems using critical thinking and communicate results effectively.	Problem solving
PSO3	Demonstrate research skills in the core and allied areas of chemical sciences, professionalism and ethical conduct.	Research skills/ lifelong learning

Masters in Science (Chemistry)
Syllabus for Semester I and II

Preamble:

Master of Science (M.Sc.) in chemistry is a post-graduate course of department of chemistry, Changu Kana Thakur Arts, Commerce & Science College, New Panvel (Autonomous).

There are two P.G. programmes in Chemistry, namely M.Sc. programme in Organic Chemistry and M.Sc. programme in Analytical Chemistry. Both P.G. programmes are equivalent in all respect for employment and higher studies. Each of these two P.G. programmes shall extend over a period of two academic years comprising of four semesters. The syllabi and scheme of examinations of these two programmes are detailed below. The theory and practical's of courses of two Semesters of the two programmes are same. Chemistry is a fundamental science and has contributed immensely to the improvement of the life of human beings by providing many of human requirements and essentialities. Chemistry is important to the world economy as well. The developments in Chemistry during last few decades are phenomenal. It is also seen that these developments are crossing the traditional vertical boundaries of scientific disciplines; the more inclination is seen towards biological sciences. New branches of chemistry are emerging and gaining importance, such as bioorganic chemistry, materials chemistry, computational chemistry, etc.

The practice of Chemistry at industrial scale also is undergoing radical changes and is more or more based on deep understanding the chemical phenomena. The emerging Chemical Technologies are highly science based. The aid of computers has not only accelerated growth in the practice of Chemistry, but revolutionized the entire field. A chemist cannot isolate himself from other disciplines. Thus, after a long span of more and more specialization in graduate and post-graduate syllabi, a symbiotic interdisciplinary approach now seems to be more relevant.

Semester - I (CHEMISTRY)
[Under CBCS Scheme]

Course	Course Type	Course code	Hrs/ week	Internal assessment	Semester-end examination	Total	Credits
Physical chemistry	Core	PSC1PC1	4	40	60	100	4
Inorganic chemistry	Core	PSC1IC1	4	40	60	100	4
Organic chemistry	Core	PSC1OC1	4	40	60	100	4
Analytical chemistry	Core	PSC1AC1	4	40	60	100	4
Practical Physical chemistry	Core	PSC1PCP	4	--	50	50	2
Practical Inorganic chemistry	Core	PSC1ICP	4	--	50	50	2
Practical Organic chemistry	Core	PSC1OCP	4	--	50	50	2
Practical Analytical chemistry	Core	PSC1ACP	4	--	50	50	2

Semester - II (CHEMISTRY)
[Under CBCS Scheme]

Course	Course Type	Course code	Hrs/ week	Internal assessment	Semester-end examination	Total	Credits
Physical chemistry	Core	PSC2PC2	4	40	60	100	4
Inorganic chemistry	Core	PSC2IC2	4	40	60	100	4
Organic chemistry	Core	PSC2OC2	4	40	60	100	4
Analytical chemistry	Core	PSC2AC2	4	40	60	100	4
Practical Physical chemistry	Core	PSC2PCP	4	--	50	50	2
Practical Inorganic chemistry	Core	PSC2ICP	4	--	50	50	2
Practical Organic chemistry	Core	PSC2OCP	4	--	50	50	2
Practical Analytical chemistry	Core	PSC2ACP	4	--	50	50	2

Examination Scheme

Choice Based Credit System (CBCS)

❖ **Revised Scheme of Examination**

The performance of the learners shall be evaluated into two parts. The learner's performance shall be assessed by Internal Assessment with 40% marks in the first part and by conducting the Semester End Examinations with 60% marks in the second part. The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below-

A) Internal Assessment: 40 % 40 Marks

Sr. No.	Particular	Marks
01	One periodical class test / online examination to be conducted in the given semester	20 Marks
02	Any two tools out of these (10 Marks each) 1. Group/ Individual Project 2. Presentation and write up on the selected topics of the subjects / Case studies. 3. Test on Practical Skills 4. Open Book Test 5. Quiz	20 Marks

Question Paper Pattern

(Periodical Class Test for the Courses at Post-Graduate Programmes)

- ❖ Maximum Marks: 20
- ❖ Duration: 30 Minutes

Particular	Marks
Match the Column / Fill in the Blanks / Multiple Choice Questions/ True/False/Answer in One or Two Lines (Concept based Questions) (1 Marks each)	20 Marks

Question Paper Pattern for Semester End Examination

B) Semester End Examination: 60 % 60 Marks

- Duration: The examination shall be of 2 $\frac{1}{2}$ hours duration.

Question Paper Pattern

Theory question paper pattern
1. There shall be five questions each of 12 marks. 2. All questions shall be compulsory with internal options. 3. Question may be subdivided into sub-questions a, b, c… and the allocation of marks depends on the weightage of the unit.

❖ **Passing Standard**

The learners shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment and Semester End Examination. The learners shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 24 Out of 60) separately, to pass the course and minimum of grade D in each project wherever applicable to pass a particular semester.

Semester End Practical Examination (50 Marks)

Laboratory Work 40 Marks

Journal 05 Marks

Viva 05 Marks

The practical examination will be held for two days as described below. The candidates will be examined practically and orally on each day.

Day	Session	Paper-I	Paper-II	Paper-III	Paper-IV
Day 1	Morning	A	B	C	D
	Evening	B	A	D	C
Day 2	Morning	C	D	A	B
	Evening	D	C	B	A

Question Paper Pattern for Continuous Assessment

Marks	**Group Project*/ Individual Project**	**Presentation and write-up**	**Practical Skills**	**Open book test**	**Quiz**
5	Hypothesis/Topic of the project	Presentation skill	Demonstration of skill	High order thinking questions **(HOTS)**	Quiz on application of subject in real life
5	Actual laboratory work/Field work	Knowledge	Viva		
5	Result/output	Quality of ppt	Report		
5	Dissertation/Report	Writing skill	Problem solving ability		

SEMESTER-I

Course Description	
Semester	**I**
Course Name	**Physical Chemistry**
Course Code	**PSC1PC1**
Eligibility for Course	**T.Y.B.Sc. (Chemistry)**
Credit	**4**
Hours	**60**

Course Objectives

1. To develop laboratory competence in relating physical aspects in chemistry
2. To demonstrate the ability to synthesize, separate and characterize compounds using published reactions, protocols, standard laboratory equipment, and modern instrumentation.
3. To provide the students with sound preparation for requirement of modern industry and provide competency in basic academic research as well as a cohesive, clearly structured overview of Chemistry

Course Outcomes

After successful completion of this course students will be able to

Sr. No	Course Outcomes	Bloom Taxonomy Level (BLT)
CO1	Prove Maxwell relations and its significance and applications to ideal gases, Joule Thomson experiment, Joule Thomson coefficient and inversion temperature. Apply Third law of Thermodynamics to find out absolute entropy	Understand
CO2	Make use of quantum mechanics for Particle waves and Schrödinger wave equation, wave functions, properties of wave functions, Normalization of wave functions, orthogonality of wave functions. Particle in a one, two- and three-dimensional box	Apply
CO3	Define, understand basic terms of Chemical Dynamics i.e. rate constant, order of reaction, molecularity of reaction also compare Composite Reactions and Polymerization reactions	Evaluate
CO4	Make use of of Colloids and Surface Phenomena in daily applications	Apply

Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
1.	**Thermodynamics-I**				
	1.1. State function and exact differentials. Maxwell equations, Maxwell thermodynamic Relations; its significance and applications to ideal gases, Joule Thomson experiment, Joule Thomson coefficient, inversion temperature, Joule Thomson coefficient in terms of van der Waals constants. [8L] 1.2. Third law of Thermodynamics, Entropy change for a phase transition, absolute entropies, determination of absolute entropies in terms of heat capacity, standard molar entropies and their dependence on molecular mass and molecular structure, residual entropy. [7L]	15	1	1,2	2, 11
2.	**Quantum Chemistry**				
	2.1. Classical Mechanics, failure of classical mechanics: Need for Quantum Mechanics. 2.2. Particle waves and Schrödinger wave equation, wave functions, properties of wave functions, Normalization of wave functions, orthogonality of wave functions. 2.3. Operators and their algebra, linear and Hermitian operators, operators for the dynamic variables of a system such as, position, linear momentum, angular momentum, total energy, eigen functions, eigen values and eigen value equation, Schrödinger wave equation as the eigen value equation of the Hamiltonian operator, average value and the expectation value of a dynamic variable of the system, Postulates of Quantum Mechanics, Schrodinger‟s Time independent wave equation from Schrodinger‟s time dependent wave equation. **2.4.** Application of quantum mechanics to the following systems: **a)** Free particle, wave function and energy of a free particle. **b)** Particle in a one, two and three dimensional box, separation of variables, Expression for the wave function of the system, expression for the energy of the system, concept of quantization, introduction of	15	2	1	2,8, 11

	quantum number, degeneracy of the energy levels. **c)** Harmonic oscillator, approximate solution of the equation, Hermite polynomials, expression for wave function, expression for energy, use of the recursion formula.				
3.	**Chemical Dynamics-I**				
	3.1. Composite Reactions: Recapitulation: Rate laws, Differential rate equations Consecutive reactions, Steady state Approximation, rate determining steps, Microscopic Reversibility and Detailed Balanced Chain reactions-chain initiation processes. Some inorganic mechanisms: formation and decomposition of phosgene, decomposition of ozone, Reaction between Hydrogen and Bromine and some general examples Organic Decompositions: Decomposition of ethane, decomposition of acetaldehyde Gas phase combustion: Reaction between hydrogen and oxygen, Semenov – Hinshelwood and Thompson mechanism, Explosion limits and factors affecting explosion limits. 3.2. Polymerization reactions: Kinetics of stepwise polymerization, Calculation of degree of polymerization for stepwise reaction. Kinetics of free radical chain polymerization, Kinetic chain length and estimation of average no of monomer units in the polymer produced by chain polymerization. 3.3. Reaction in Gas Phase Unimolecular Reactions: Lindeman-Hinshelwood theory, Rice-Ramsperger-Kasssel (RRK) theory, Rice-Ramsperger-Kassel Marcus (RRKM) theory.	15	3	1	1,2, 6,10
4.	**Colloids and Surface Phenomena**				
	Colloidal Systems-Sols, Lyophilic and lyophobic sols, properties of sols, coagulation. Sols of surface-active reagents, surface tension and surfactants, electrical phenomena at interfaces including electrokinetic effects, micelles, reverse micelles, solubilization. Thermodynamics of micellization, critical micelle concentration, factors affecting critical micelle concentration (cmc), experimental methods of cmc determination, Micellar catalysis. Adsorption, adsorption isotherms, methods for determining	**15**	**4**	1	1,2, 3, 6, 8, 11

	surface structure and composition, BET equation, surface area determination, Gibbs adsorption equation and its verification. Application of photoelectron spectroscopy, ESCA and Auger spectroscopy to the study of surfaces. Numerical Problems				

References

1. Peter Atkins and Julio de Paula, Atkin‟s Physical Chemistry, 7th Edn., Oxford University Press, 2002.

2. K.J. Laidler and J.H. Meiser, Physical Chemistry, 2nd Ed., CBS Publishers and Distributors, New Delhi, 1999.

3. Robert J. Silby and Robert A. Alberty, Physical Chemistry, 3rd Edn., John Wiley and Sons (Asia) Pte.Ltd., 2002.

4. Ira R. Levine, Physical Chemistry, 5th Edn., Tata McGraw-Hill New Delhi, 2002.

5. G.W. Castellan, Physical Chemistry, 3rd Edn., Narosa Publishing House, New Delhi, 1983.

6. S. Glasstone, Text Book of Physical Chemistry, 2nd Edn., McMillan and Co. Ltd., London, 1962

7. B.K. Sen, Quantum Chemistry including Spectroscopy, Kalyani Publishers, 2003.

8. A.K. Chandra, Introductory Quantum Chemistry, Tata McGraw – Hill, 1994.

9. R.K. Prasad, Quantum Chemistry, 2nd Edn., New Age International Publishers, 2000.

10. S. Glasstone, Thermodynamics for Chemists, Affiliated East-West Press, New Delhi, 1964.

11. W.G. Davis, Introduction to Chemical Thermodynamics – A Non – Calculus Approach, Saunders, Philadelphia, 19772.

12. Peter A. Rock, Chemical Thermodynamics, University Science Books, Oxford University Press, 1983.

13. Ira N. Levine, Quantum Chemistry, 5th Edn., Pearson Education (Singapore) Pte.Ltd., Indian Branch, New Delhi, 2000.

14. Thomas Engel and Philip Reid, Physical Chemistry, 3rd Edn., Pearson Education Limited 2013.

15. D.N. Bajpai, Advanced Physical Chemistry, S. Chand 1st Edn., 1992. 16. Bockris, John O'M., Reddy, Amulya K.N., Gamboa-Aldeco, Maria E., Modern Electrochemistry, 2A, Plenum Publishers, 1998.

17. Physical Chemistry by Gurtu and Gurtu

18. A Text book of Physical Chemistry by K L kapoorVol5 , 2nd Edn

Physical Chemistry Practical

Course Description	
Semester	**I**
Course Name	**Physical Chemistry**
Course Code	**PSC1PCP**
Eligibility for Course	**T.Y. B.Sc. (Chemistry)**
Credit	**2**
Hours	**30**

After successful completion of this course students will be able to

Sr. No.	**COs**	**Bloom Taxonomy Level (BLT)**
CO1	Know the principles of different instruments like Potentiometry, Conductometry, pH Metry.	Understand
CO2	Determine the heat of solution of sparingly soluble acid and identify the reaction between acetone and iodine.	Apply

Sr. No.	**Course Description**	Hrs	CO No.	PSO No.	PO No.
1.	To determine the heat of solution (ΔH) of a sparingly soluble acid (benzoic /salicylic acid) from solubility measurement at three different temperature.	4	1	1,2	1,2,3, 8,11
2.	To study the variation of calcium sulphate with ionic strength and hence determine the thermodynamic solubility product of $CaSO_4$ at room temperature.	4	2	1,2	1, 3,4,7,1 1
3.	To investigate the reaction between acetone and iodine. Or Kinetics of reaction between bromate and iodide. (New expt.)	4	2	1,2	1,3,4,7, 10
4.	To study the variation in the solubility of $Ca(OH)_2$ in presence of NaOH and hence to determine the solubility product of $Ca(OH)_2$ at room temperature.	4	1	1,2	1,2,4,7, 11
5.	Graph Plotting of mathematical functions –linear,	4	1	1,2	1,2,4,7,

	exponential and trigonometry and identify whether functions are acceptable or non-acceptable?				11
6.	To determine the mean ionic activity coefficient of an electrolyte by e.m.f. measurement.	4	1	1,2	1,2,3,7, 11
7.	To study the effect of substituent on the dissociation constant of acetic acid conductometrically.	4	1	1,2	1,2,4,7, 11
8.	To determine pKa values of phosphoric acid by potentiometric titration with sodium hydroxide using glass electrode.	4	1	1,2	1,2,4,7, 11
9.	To verify Ostwald‟s dilution law and to determine the dissociation constant of a weak mono-basic acid conductometrically.	4	**1**	1,2	1,2,3,7, 11
10.	Determination of dissociation constant of dibasic acid.		**1**		

References:

1 Practical Physical Chemistry, B. Viswanathan and P.S. Raghavan, Viva Books Private Limited, 2005.

2 Practical Physical Chemistry, A.M. James and F.E. Prichard, 3rd Edn., Longman Group Ltd., 1974.

3 Experimental Physical Chemistry, V.D. Athawale and P. Mathur, New Age International Publishers, 2001.

Course Description	
Semester	**I**
Course Name	**Inorganic Chemistry**
Course Code	**PSC1IC1**
Eligibility for Course	**T.Y.B.Sc.in Chemistry**
Credit	**4**
Hours	**60**

Course Objectives:

1. To apply theories of bonding, hybridization, MOT for Polyatomic species.
2. To understand preparation, proporties and structures of higher boranes, carboranes, metalloboranes and metallocarboranes, metal carbonyls and halide clusters.
3. To understand all elements of symmetry, point group, symmetry classification, symmetry criterion of optical activity, symmetry restrictions on dipole moment.
4. To understand concepts of Groups, Sub-groups, Classes of Symmetry operations, Group Multiplication Tables. Abelian and non-Abelian point groups, Mulliken’s notations for irreducible representations. Reduction of reducible representations using reduction formula.

5. To understand concept of band theory, Fermi level, K-Space and Brillouin Zones, Defects in solids.

6. To explain Preparative methods of inorganic solids & nano materials.

7. To explain Electron Paramagnetic Resonance Spectroscopy and its applications, spectral calculations using Orgel and Tanabe-Sugano diagram.

8. To determine of formation constants of metal complexes.

Course Outcomes

Sr.No.	After completing the course, Student will able to:	Bloom Taxonomy Level (BTL)
CO1	Explain theories of bonding, hybridization, resonance concept, MOT for diatomic species of first transition Series, Polyatomic species and Higher boranes, carboranes, metalloboranes and metallocarboranes, metal carbonyls and halide clusters.	Understand
CO2	Explain The concept of band theory, Fermi level, K-Space and Brillouin Zones. Structures of Compounds of the type: AB, AB2 etc. and Preparative methods of inorganic solids & nano materials.	Understand
CO3	Construct Group Multiplication Tables, Character tables using concept of Molecular Symmetry and Group Theory.	Apply
CO4	Determine electronic parameters such as Δ, B, C, Nephelauxetic ratio, formation constants of metal complexes and Characterize coordination compounds using techniques like thermal studies, Conductivity measurements, electronic spectral and magnetic measurements, IR, NMR and ESR spectroscopic	Evaluate

Unit	**Course Description**	Hrs	CO No.	PSO No.	PO No.
1.	**Chemical Bonding:**	15h	CO1	PSO1	PO3
1.1	Recapitulation of hybridization Derivation of wave functions for sp, sp2, sp3 orbitalhybridization types considering only sigma bonding.				
1.2	Discussion of involvement of d orbitals in various types of hybridizations. Concept ofresonance, resonance energy derivation expected. Formal charge with examples.				
1.3	Molecular Orbital Theory for Polyatomic species considering σ bonding for SF6, CO2,B2H6, I3- molecular species.				
1.4	Higher boranes, carboranes, metalloboranes and metallocarboranes, metal carbonyls and halide clusters,				

	compounds with metal-metal multiple bonds.				
2.	**Molecular Symmetry and Group Theory:**	15h	CO3	PSO1	PO5
2.1	Symmetry criterion of optical activity, symmetry restrictions on dipole moment. Asystematic procedure for symmetry classification of molecules.				
2.2	Concepts of Groups, Sub-groups, Classes of Symmetry operations, Group MultiplicationTables. Abelian and non-Abelian point groups.				
2.3	Representation of Groups: Matrix representation of symmetry operations, reducible and irreducible representations. The Great Orthogonality Theorem and its application in construction of character tables for point groups C2v, C3v and D2h, structure of character tables.				
2.4	**Applications of Group Theory** (a) Symmetry adapted linear combinations (SALC), symmetry aspects of MO theory, sigma bonding in ABn (Ammonia, CH4) molecule. (b) Determination of symmetry species for translations and rotations. (c) Mulliken‟s notations for irreducible representations. (d) Reduction of reducible representations using reduction formula. (e) Group-subgroup relationships. **(f)** Descent and ascent in symmetry correlation diagrams showing relationship between different groups.				
3.	**Materials Chemistry and Nanomaterials:**	15h	CO2	PSO2	PO5
3.1	**Solid State Chemistry**				
3.1.1	Electronic structure of solids and band theory, Fermi level, K Space and Brillouin Zones.				
3.1.2	**Crystal Defects and non-stoichiometry:** Classification of Defects: subatomic,atomic and lattice defects in solids; Thermodynamics of vacancy in metals; Thermodynamics of Schottky defects in ionic solids ; Thermodynamics of Frenkel defects in silver halides; Calculation of number of defects and average energy required for defect.				
3.1.3	Methods of preparation for inorganic solids: sol- gel method (applications in Biosensors), microwave synthesis (discussion on principles, examples, merits and demerits are expected)				
3.2	**Nanomaterials**				
3.2.1	Preparative methods: Chemical methods, Microwave, Langmuir Blodgett(L-B) method, Biological methods: Synthesis using microorganisms				
3.2.2	Applications in the field of semiconductors, solar cells				
4.	**Characterisation of Coordination compounds**	15h	CO4	PSO2	PO5

4.1	Electron Paramagnetic Resonance Spectroscopy (EPR): i) Theory and Instrumentation of EPR in brief. ii) Spin Hamiltonian, Isotropic and anisotropic EPR spectra, Magic Pentagon rule. iii) Applications of EPR spectroscopy: Structural determination of Inorganic complexes				
4.2	Spectral calculations using Orgel and Tanabe-Sugano diagram, calculation of electronic parameters such as Δ, B, C, Nephelauxetic ratio.				
4.3	Determination of formation constants of metal complexes (Overall and Stepwise): Comparative studies of Potentiometric and spectral methods.				

References

Unit I

1. B. R. Puri, L. R. Sharma and K. C. Kalia, Principles of Inorganic Chemistry, Milestone Publishers, 2013-2014.

2. W. W. Porterfield, Inorganic Chemistry-A Unified Approach, 2nd Ed., Academic Press, 1993.

3. B. W. Pfennig, Principles of Inorganic Chemistry, Wiley, 2015.

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6. P. J. Durrant and B. Durrant, Introduction to Advanced Inorganic Chemistry, OxfordUniversity Press, 1967.

7. R. L. Dekock and H.B.Gray, Chemical Structure and Bonding, The Benjamin CummingsPublishing Company, 1989.

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9. R. Sarkar, General and Inorganic Chemistry, Books & Allied (P) Ltd., 2001.

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11. J. N. Murrell, S. F. A. Kettle and J. M. Tedder, The Chemical Bond, Wiley, 1978.

12. G. A. Jeffrey, An Introduction to Hydrogen Bonding, Oxford University Press, Inc., 1997.

Unit II

1. F. A. Cotton, Chemical Applications of Group Theory, 2nd Edition, Wiley Eastern Ltd.,1989.
2. H. H. Jaffe and M. Orchin, Symmetry in Chemistry, John Wiley & Sons, New York, 1996.
3. R. L. Carter, Molecular Symmetry and Group Theory, John Wiley & Sons, New

York,1998.
4. K. V. Reddy. Symmetry and Spectroscopy of Molecules, 2nd Edition, New Age International Publishers, New Delhi, 2009.
5. A. SalahuddinKunju and G. Krishnan, Group Theory and its Applications in Chemistry,PHI Learning, 2012.
6. P. K. Bhattacharya, Group Theory and its Chemical Applications, Himalaya PublishingHouse. 2014.
7. S. Swarnalakshmi, T. Saroja and R. M. Ezhilarasi, A Simple Approach to Group Theory inChemistry, Universities Press, 2008.

Unit III

1. Solid State Chemistry Introduction, Lesley E. Smart, Elaine A. Moore, ISBN 0-203-49635-3, Taylor & Francis Group, LLC.
2. Nanomaterials&Nanochemistry, 2007, Catherine Brechignac, Philippe Houdy, Marcel Lahmani, ISBN 978-3-540-72992-1 Springer Berlin Heidelberg New York.
3. Nanomaterials Chemistry, Recent Developments and New Directions C.N.R. Rao, A. Muller, and A.K. Cheetham, ISBN 978-3-527-31664-9, 2007 WILEY-VCH Verlag GmbH &Co. KGaA, Weinheim.
4. Nano-Surface Chemistry, 2001, Morton Rosoff, ISBN: 0-8247-0254-9, Marcel Dekker Inc.New York.
5. The Chemistry of Nanomaterials, CNR Rao, Muller Cheetham, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, 2004.
6. Semiconductor Nanomaterials, Challa S.S.R. Kumar, ISBN: 978-3-527-32166-7, WILEY- VCH Verlag GmbH & Co. KGaA, Weinheim, 2010.

Unit IV

1. J. E. Huheey, E. A. Keiter and R. L. Keiter; Inorganic Chemistry: Principles of Structureand Reactivity, Pearson Education, 2006.
2. D. Banerjea ,Coordination Chemistry
3. Geary Coordination reviews
4. P.W. Atkins, T. Overton, J. Rourke, M. Weller and F. Armstrong; Shriver & Atkins: Inorganic Chemistry, 4th ed. Oxford University Press, 2006.
5. F. A. Cotton, G. Wilkinson, C. A. Murillo and M. Bochmann; Advanced Inorganic Chemistry, 6th ed. Wiley, 1999,
6. B. Douglas, D. McDaniel and J. Alexander. Concepts and Models of Inorganic Chemistry(3rd edn.), John Wiley & Sons (1994).
7. Physical Methods in Chemistry, R. S. Drago (2nd Edition) (1977).

Course Description	
Semester	**I**
Course Name	**Inorganic Chemistry Practical**
Course Code	**PSC1IC1**

Eligibility for Course	T.Y.B.Sc.in Chemistry
Credit	2
Hours	30

Sr. No.	After completing the course, Students will be able to:	Bloom Taxonomy Level (BTL)
CO1	Prepare various inorganic complexes such as Bis-(tetramethylammonium) tetrachloroCuprate (II) (Me4 N) 2[CuCl4],Tetramminemonocarbanato Cobalt (III) Nitrate, Bis (ethylenediammine) Copper (II) Sulphate, Hydroniumdichlorobis(dimethylglyoximato) etc.	Understand
CO2	Determine the electrolytic nature of inorganic compounds	Apply
CO3	Apply Slope intercept method for determination of equilibrium constants forFe^{+3}/ SCN- system.	Apply
CO4	Analyze the inorganic complex for percentage of metal and ligand.	Analyse

Inorganic Preparations (Synthesis and Characterization)

1) Bis-(tetramethylammonium) tetrachloroCuprate (II) (Me4 N) 2[CuCl4]

2) Tetramminemonocarbanato Cobalt (III) Nitrate [Co(NH3)4CO3]NO3

3) Bis (ethylenediammine) Copper (II) Sulphate [Cu(en)2]SO4

4) Hydronium dichlorobis(dimethylglyoximato) Cobaltate(III) H[Co(dmgH)2Cl2]

Instrumentation

1) Determination of equilibrium constant by Slope intercept method for Fe+3/ SCN- system

2) Determination of Electrolytic nature of inorganic compounds by Conductancemeasurement.

Reference:

1. Advanced experiments in Inorganic Chemistry., G. N. Mukherjee., 1st Edn., 2010., U.N.Dhur& Sons Pvt Ltd

The Synthesis and Characterization of Inorganic Compounds by William L. Jolly 3. Inorganic Chemistry Practical Under UGC Syllabus for M.Sc. in all India Universities By: Dr Deepak Pant

Course Description	
Semester	**I**
Course Name	**Organic Chemistry**
Course Code	**PSC1OC1**
Eligibility for Course	**T.Y.B.Sc (Chemistry)**
Credit	**4**
Hours	**60**

Course Objectives

4. To study the basics of addition reactions and their applications.
5. To study stereochemistry in man detail
6. To study the different reagents in the organic transformation.
7. To understand the role of carbon nucleophiles in organic synthesi

Course Outcomes

After successful completion of this course students will be able to

Sr. No.	CO	Bloom Taxonomy Level (BLT)
CO1	Understand the types of reaction and their applications	Remember
CO2	Summarize the various aspects of aromaticity, aliphatic and aromatic nucleophilic substitution reactions with their mechanism and examples.	Understand
CO3	Apply the concept of Configurational descriptors (R,S nomenclature) to chiral centres in Organic compounds	Apply
CO4	Predict the mechanism, selectivity, importance and applications of oxidizing and reducing agent	Apply

Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
1.	**Addition Reactions:** 1.1 Addition reactions to carbon carbon multiple bonds - Mechanism and Stereochemical aspects of addition reaction Involving electrophile 1.2 Structural Effect and reactivity: Halogenation, Hydrohalogenation, Hydration, Hydroxylation, Hydroboration, Epoxidation, Carbene addition and Ozonolysis. 1.3. Acids and Bases: Factors affecting acidity and	15	1	2	1,2

	basicity: Electronegativity and inductive effect, resonance, bond strength, electrostatic effects, hybridization, aromaticity and solvation. Comparative study of acidity and basicity of organic compounds on the basis of pKa values, Leveling effect and non-aqueous solvents. Acid and base catalysis – general and specific catalysis with examples.				
2.	**Nucleophilic substitution reactions and Aromaticity:** 2.1. Nucleophilic substitution reactions: (9 L) 2.1.1. Aliphatic nucleophilic substitution: SN1, SN2, SNi reactions, mixed SN1 and SN2 and SET mechanisms. SN reactions involving NGP - participation by aryl rings, α-and pi-bonds. Factors affecting these reactions: substrate, nucleophilicity, solvent, steric effect, hard-soft interaction, leaving group. Ambident nucleophiles.SNcA, SN1‟ and SN2‟ reactions.SN at sp2 (vinylic) carbon. 2.1.2. Aromatic nucleophilic substitution: SNAr, SN1, benzyne mechanisms. Ipso, cine, tele and vicarious substitution. 2.1.3. Ester hydrolysis: Classification, nomenclature and study of mechanisms of acid and base catalyzed hydrolysis with suitable examples (Any two). Orientation and Reactivity-Effect of Substrate, Leaving group and attacking nucleophile 2.2. Aromaticity: (6 L) 2.2.1. Structural, thermochemical, and magnetic criteria for aromaticity, including NMR characteristics of aromatic systems. Delocalization and aromaticity. 2.2.2. Application of HMO theory to monocyclic conjugated systems. Frost-Musulin diagrams. Huckel‟s (4n+2) and 4n rules. 2.2.3. Aromatic and antiaromatic compounds up-to 18 carbon atoms. Homoaromatic compounds. Aromaticity of all benzenoid systems, heterocycles, metallocenes, azulenes, annulenes, aromatic ions and Fullerene (C60)	15	2	1	3,4
3.	**Stereochemistry:** 3.1. Concept of Chirality: Recognition of symmetry elements. 3.2. Molecules with two or more chiral centers: Constitutionally unsymmetrical molecules: erythro-threo and syn-anti systems of nomenclature. Interconversion of Fischer, Sawhorse, Newman and Flying wedge projections. Constitutionally symmetrical molecules with odd and even number of chiral centers: enantiomeric and meso forms, concept of stereogenic, chirotopic, and pseudoasymmetric centres. Stereo-descriptors: R, S, for chiral centres in acyclic and cyclic compounds. 3.3. Axial and planar chirality: Principles of axial and planar chirality. Stereochemical features and configurational descriptors (R,S) for the following classes of compounds: Allenes, Alkylidene cycloalkanes,	15	3	4	4,5

	Spirans, Biaryls (buttressing effect) (including BINOLs and BINAPs), Ansa compounds, Cyclophanes, trans-cyclooctenes. 3.4. Prochirality: Chiral and prochiral centres; prochiral axis and prochiral plane. Homotopic, heterotopic (enantiotopic and diastereotopic) ligands and faces. Identification using substitution and symmetry criteria. Nomenclature of stereoheterotopic ligands and faces. Symbols for stereoheterotopic ligands in molecules with i) one or more prochiral centres ii) a chiral as well as a prochiral centre, iii) a prochiral axis iv) a prochiral plane v) propseudoasymmetric centre. Symbols for enantiotopic and diastereotopic faces. E, Z nomenclature Resolution of Racemic mixtures				

4.	**Oxidation and Reduction:** 4.1. Oxidation: General mechanism, selectivity, and important applications of the following: 4.1.1. Dehydrogenation: Dehydrogenation of C-C bonds including aromatization of six membered rings using metal (Pt, Pd, Ni) and organic reagents (chloranil, DDQ). 4.1.2. Oxidation of alcohols to aldehydes and ketones: Chromium reagents such as $K_2Cr_2O_7/H_2SO_4$ (Jones reagent), CrO_3-pyridine (Collin‟s reagent), PCC (Corey‟s reagent) and PDC (Cornforth reagent), hypervalent iodine reagents (IBX, Dess-Martin periodinane). DMSO based reagents (Swern oxidation), Corey-Kim oxidation - advantages over Swern and limitations; and Pfitzner-Moffatt oxidation-DCC and DMSO and Oppenauer oxidation. 4.1.3. Oxidation involving C-C bonds cleavage: Glycols using HIO_4; cycloalkanones using CrO_3; aromatic rings using RuO_4 and $NaIO_4$. 4.1.4. Oxidation involving replacement of hydrogen by oxygen: oxidation of CH_2 to CO by SeO_2, oxidation of arylmethanes by CrO_2Cl_2 (Etard oxidation). 4.1.5. Oxidation of aldehydes and ketones: with H_2O_2 (Dakin reaction), with peroxy acid (Baeyer-Villiger oxidation) 4.2. Reduction: General mechanism, selectivity, and important applications of the following reducing reagents: 4.2.1. Reduction of CO to CH_2 in aldehydes and ketones- Clemmensen reduction, WolffKishner reduction and Huang-Minlon modification. 4.2.2. Metal hydride reduction: Boron reagents ($NaBH_4$, $NaCNBH_3$, diborane, 9-BBN, $Na(OAc)_3BH$, aluminium reagents ($LiAlH_4$, DIBAL-H, Red Al, L and K- selectrides). 4.2.3. NH_2NH_2 (diimide reduction) and other non-metal based agents including organic reducing agents (Hantzschdihydropyridine). 4.2.4. Dissolving metal reductions: using Zn, Li, Na, and Mg under neutral and acidic conditions, Li/Na-liquid NH_3 mediated reduction (Birch reduction) of aromatic compounds and acetylenes.	**15**	**4**	4	7,8

Organic Chemistry Practical

Course Description	
Semester	**I**
Course Name	**Organic Chemistry**
Course Code	**PSC1OCP**
Eligibility for Course	**T.Y.B.Sc (Chemistry)**
Credit	**2**
Hours	**30**

After successful completion of this course students will be able to

Sr. No	COs	Bloom Taxonomy Level (BLT)
CO1	Plan preparation of organic compounds	Apply
CO2	Demonstrate the skill of purification of organic compounds by recrystallization and sublimation methods.	Understand
CO3	Apply the thin layer chromatography technique to check the purity of the synthesized product.	Apply
CO4	Can Sketch the structure of organic compounds using software Chem Biodraw.	Apply

Sr. No.	Course Description	Hrs	CO No.	PSO No.	PO No.
1.	One step preparations	40			
2.	(1.0 g scale) 1. Bromobenzene to p-nitrobromobenzene		1-3	2	7,8
3.	2. Anthracene to anthraquinone		1-3	3	7,8
4.	3. Benzoin to benzil		1-3	4	2,3
5.	4. Anthracene to Anthracene maleic anhydride adduct		1-3	2	1,2
6.	5. 2-Naphthol to BINOL		1-3	3	5,6
7.	6. p-Benzoquinone to 1,2,4-triacetoxybenzene		1-3	4	7,8
8.	7. Ethyl acetoacetate to 3-methyl-1-phenylpyrazol-5-one		1-3	3	7,8
9.	8. Preparation of benzilic acid from benzil		1-3	1	2,3
10	9. Preparation of p-iodonitrobenzene from p-nitroaniline		1-3	2	1,2
11.	11. Use of Computer - Chem Draw-Sketch, ISI – Draw: Draw the structure of simple aliphatic, aromatic, heterocyclic organic compounds with substituents. Get the correct IUPAC name, Get ^{1}HNMR and ^{13}C. Students can able to draw the		4	4	5

	one name reaction and its reaction mechanism.				

1. Organic Chemistry, J. Claydens, N. Greeves, S. Warren and P. Wothers, Oxford UniversityPress.

2. Advanced Organic Chemistry, F.A. Carey and R.J. Sundberg, Part A and B, Plenum Press.

3. Stereochemistry: Conformation and mechamism, P.S. Kalsi, New Age International, NewDelhi.

4. Stereochemistry of carbon compounds, E.L Eliel, S.H Wilen and L.N Manden, Wiley.

5. Stereochemistry of Organic Compounds- Principles and Applications, D. Nasipuri. NewInternational Publishers Ltd.

6. March‟s Advanced Organic Chemistry: Reactions, Mechanisms and Structure, Michael B.Smith, Jerry March, Wiley.

7. Advanced Organic Chemistry: Reactions and mechanism, B. Miller and R. Prasad,Pearson Education.

8. Advanced Organic Chemistry: Reaction mechanisms, R. Bruckner, Academic Press.

9. Understanding Organic Reaction Mechanisms, Adams Jacobs, Cambridge UniversityPress.

10. Writing Reaction Mechanism in organic chemistry, A. Miller, P.H. Solomons, AcademicPress.

11. Principles of Organic Synthesis, R.O.C. Norman and J.M Coxon, Nelson Thornes.

12. Advanced Organic Chemistry: Reactions and mechanism, L.G. Wade, Jr., Maya ShankarSingh, Pearson Education.

13. Mechanism in Organic Chemistry, Peter sykes, 6th edition onwards.

14. Modern Methods of Organic Synthesis, W. Carruthers and Iain Coldham, CambridgeUniversity Press.

15. Organic Synthesis, Jagdamba Singh, L.D.S. Yadav, Pragati

Prakashan.Organic Chemistry Practical

Course Description	
Semester	**I**
Course Name	**Analytical Chemistry**
Course Code	**PSC1AC1**
Eligibility for Course	**T.Y.B.Sc (Chemistry)**
Credit	**4**
Hours	**60**

Course Objectives

1. To develop laboratory competence in relating chemical structure to spectroscopic phenomena.
2. To demonstrate the ability to synthesize, separate and characterize compounds using published reactions, protocols, standard laboratory equipment, and modern instrumentation.
3. To provide the students with sound preparation for requirement of modern industry and provide competency in basic academic research as well as a cohesive, clearly structured overview of Chemistry

Course Outcomes

After successful completion of this course students will be able to

Sr. No	**COs**	**Bloom Taxonomy Level (BLT)**
CO1	Explain the concept of data domain, performance characteristics of an instrument/method, total quality management, quality standards for laboratories, quality audits and quality reviews.	Understand
CO2	Discover the applications of UV-Visible spectroscopy, IR spectroscopy, Differential scanning calorimetry.	Apply
CO3	Identify the need of automation in chemical analysis, safety measures in laboratory, need of accreditation of laboratories and GLP.	Evaluate
CO4	Interpret the data based on calculations and statistical tests.	Evaluate

Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
1.	**1.1 Concepts of Analytical Chemistry: [5L]** 1.1.1 Analytical perspective, Common analytical problems, terms involved in analytical chemistry (analysis, determination, measurement, techniques, methods, procedures and protocol) 1.1.2 An overview of analytical methods, types of instrumental methods, instruments for analysis, data domains, electrical and non-electrical domains, detectors, transducers and sensors, **1.2 Calculations based on Chemical Principles: [5L]** The following topics are to be covered in the form of numerical problems only. a. Concentration of a solution based on volume and mass units. b. Calculations of ppm, ppb and dilution of the solutions, concept of mmol. c. Stoichiometry of chemical reactions, concept of kg mol, limiting reactant, theoretical and practical yield. 1.3 Basic Statistical Tools: [5L] Types of errors – determinate and indeterminate errors, Significant figures and propagation of errors. Confidence limit, Test of significance – the F-test and t-test - One sample t-test. Independent, Paired sample t-test. The statistical Q-test for rejection of a result, statistics for small data sets, Errors in instrumental analysis: Calibration curves, line of regression, errors in slope and intercept.	15	1, 4	1,2	1,2,11
2.	**Quality in Analytical Chemistry:** **2.1 Quality Management System (QMS): [5L]** Quality Management System: Quality management concepts and principles - Traceability, quality control, quality assurance, quality management and quality manual, calibration and test methods TQM in Chemical Industry: Applying Kaizen, Six Sigma approach and 5S to quality in industries. Quality audits and quality reviews, responsibility of laboratory staff for quality and problems.	15	3	1	1,2,8,11

	2.2 Good Laboratory Practices: [4L] GLP Principles, Documentation of laboratory work, Preparation of Standard Operating Procedures (SOPs), Validation of methods, reporting and documentation of results. 2.3. Accreditation of laboratories: [3L] International organization for standardization, National accreditation board for testing and calibration laboratories. Scope of accreditation. 2.4 Safety in Laboratories: [3L] Importance of Safety in Laboratories, classification of Personal Protection Equipment (PPE), Safety and health Standards: Indian Standards & codes for safety & health, OSHA standards, Types of Toxic Hazard (TH), Classification of Chemical Hazards and their control.				
3.	**Optical Methods:** 3.1 Recapitulation of basic concepts, Electromagnetic spectrum, Sources, Detectors, sample containers, Laser as a source of radiation, Fibre optics [3L] 3.2 Molecular Ultraviolet and Visible Spectroscopy [6L] 3.2.1 Derivation of Beer- Lambert's Law and its limitations, factors affecting molecular absorption, types of transitions [emphasis on charge transfer absorption], pH, temperature, solvent and effect of substituents. Applications of Ultraviolet and Visible spectroscopy: 1) On charge transfer absorption 2) Simultaneous spectroscopy 3) Derivative Spectroscopy 3.2.2 Dual spectrometry – Introduction, Principle, Instrumentation and Applications 3.3 Infrared Absorption Spectroscopy [6L] 3.3.1 IR Spectrosopy: Principle, Instrumentation: Sources, Sample handling, Transducers, 3.3.2 FTIR Spectroscopy: Principle, instrumentation & its advantages. 3.3.3 Applications of IR spectroscopy: structure analysis of organic compounds, inorganic Molecules e.g. Sulphato, Carbonato, Nitrato & metal chelates - Acetylacetanato Complexes.	15	2	1	1,2,6,11

	Analysis of petroleum hydrocarbons, oil and grease contents by EPA method, Quantitative analysis of multi-component mixtures. 3.3.4 Introduction and basic principles of diffuse reflectance spectroscopy and its applications.				
4.	**4.1 Thermal Methods:** [5 L] 4.1.1 Introduction, Recapitulation of types of thermal methods, comparison between TGA and DTA. 4.1.2 Differential Scanning Calorimetry-Principle, comparison of DTA and DSC, Instrumentation, Block diagram, Nature of DSC Curve, Factors affecting curves (sample size, sample shape, pressure). 4.1.3 Applications - Heat of reaction, Specific heat, Safety screening, Polymers, liquid crystals, Percentage crystallinity, oxidative stability, Drug analysis, Magnetic transition. e. g. Analysis of Polyethylene for its crystallinity. 4.2 Automation in chemical analysis: [5 L] Need for automation, Objectives of automation, an overview of automated instruments and instrumentation, process control analysis, flow injection analysis, discrete automated systems, automatic analysis based on multi-layered films, gas monitoring equipments, Automatic titrators. 4.3 Environmental Toxicology: [5] Introduction to Environmental Toxicology, Concepts of Toxicology, Toxic substances in the environment, their sources and entry roots, Transport of toxicants by air and water; Transport through food chain-bio-transformation and bio-magnification. Analysis Methods	**15**	**2, 3**	1	1,2,6, 8, 11

References

Unit I

1. Modern Analytical Chemistry by David Harvey, McGraw-Hill Higher Education
2. Principles of Instrumental Analysis - Skoog, Holler and Nieman, 5th Edition, Ch: 1.
3. Fundamentals of Analytical Chemistry, By Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch, 9th Edition, 2004, Ch: 5.

4. Undergraduate Instrumental Analysis, 6th Edition, J W Robinson, Marcel Dekker, Ch:1. 5. ISO 9000 Quality Systems Handbook, Fourth Edition, David Hoyle. (Chapter: 3 & 4) (Free download).

5. 3000 solved problems in chemistry, Schaums Solved problem series, David E. Goldbers, McGraw Hill international Editions, Chapter 11,15,16,21,22

Unit II

1. Quality in the Analytical Laboratory, Elizabeth Pichard, Wiley India, Ch: 5, Ch: 6 &Ch: 7.

2. Quality Management, Donna C S Summers, Prentice-Hall of India, Ch:3.

3. Quality in Totality: A Manager‟s Guide To TQM and ISO 9000, ParagDiwan, Deep & Deep Publications, 1st Edition, 2000.

4. Quality Control and Total Quality Management - P.L. Jain-Tata McGraw-Hill (2006) Total Quality Management - Bester field - Pearson Education, Ch:5.

5. Industrial Hygiene and Chemical Safety, M H Fulekar, Ch:9, Ch:11 & Ch:15.

6. Safety and Hazards Management in Chemical Industries, M N Vyas, Atlantic Publisher, Ch:4, Ch:5 & Ch:19.

7. Staff, World Health Organization (2009) Handbook: Good Laboratory Practice (GLP) 13. OECD Principles of Good Laboratory Practice (as revised in 1997)". OECD Environmental Health and Safety Publications.OECD. 1. 1998.

8. Klimisch, HJ; Andreae, M; Tillmann, U (1997). "A systematic approach for evaluating the quality of experimental toxicological and eco-toxicological data". doi:10.1006/rtph.1996.1076. PMID 9056496.

Unit III

1. D. A. Skoog, F. J. Holler, T. A. Nieman, Principles of Instrumental Analysis, 5th Edition, Harcourt Asia Publisher. Chapter 6, 7.

2. H. H. Willard, L. L. Merritt, J. A. Dean, F. A. Settle, Instrumental Methods of Analysis,6 th Edition, CBS Publisher. Chapter 2.

3. R. D. Braun, Introduction to Instrumental Analysis, McGraw Hill Publisher. Chapter 8.

4. D. A. Skoog, F. J. Holler, T. A. Nieman, Principles of Instrumental Analysis, 5 th Edition, Harcourt Asia Publisher. Chapter 13, 14.

5. H. H. Willard, L. L. Merritt, J. A. Dean, F. A. Settle, Instrumental Methods of Analysis,6 th Edition, CBS Publisher. Chapter 2.

6. R. D. Braun, Introduction to Instrumental Analysis, McGraw Hill Publisher. Chapter 5.

7. G. W. Ewing, Instrumental Methods of Chemical Analysis, 5 th Edition, McGraw Hill Publisher, Chapter 3.

8. M. Ito, The effect of temperature on ultraviolet absorption spectra and its relation to hydrogen bonding, J. Mol. Spectrosc. 4 (1960) 106-124.
9. A. J. Somnessa, The effect of temperature on the visible absorption band of iodine inseveral solvents, Spectrochim. Acta. Part A: Molecular Spectroscopy, 33 (1977) 525-528.
10. D. A. Skoog, F. J. Holler, T. A. Nieman, Principles of Instrumental Analysis, 5 th Edition, Harcourt Asia Publisher. Chapter 16, 17.
11. R. D. Braun, Introduction to Instrumental Analysis, McGraw Hill Publisher. Chapter 12
12. Z. M. Khoshhesab (2012). Infrared Spectroscopy- Materials Science, Engineering and Technology. Prof. TheophanidesTheophile (Ed.). ISBN: 978-953- 51-0537- 4, InTech,(open access)

Unit IV

1. Introduction to instrumental methods of analysis by Robert D. Braun, Mc. Graw Hill (1987): Chapter 27
2. Thermal Analysis-theory and applications by R. T. Sane, Ghadge, Quest Publications
3. Instrumental methods of analysis, 7 th Edition, Willard, Merrit, Dean: Chapter 25
4. Instrumental Analysis, 5 th Edition, Skoog, Holler and Nieman: Chapter 31
5. Quantitative Chemical Analysis, 6 th Edition, Vogel: Chapter 12
6. Analytical Chemistry by Open Learning: Thermal Methods by James W. Dodd & Kenneth H. Tonge
7. Instrumental methods of analysis, 7 th Edition, Willard, Merrit, Dean: Chapter 26
8. Instrumental Analysis, 5th Edition, Skoog, Holler and Nieman: Chapter 33
9. Introduction to instrumental methods of analysis by Robert D. Braun, Mc. GrawHill (1987): Chapter 28
10. Environmental toxicology Kees van Gestel, Vrije Universiteit, Amsterdam
11. Environmental Toxicology III , by V. Popov, Wessex Institute of Technology, UK; C.A. Brebbia, Wessex Institute of Technology, UK

Analytical Chemistry Practical

Course Description	
Semester	**I**
Course Name	**Analytical Chemistry**
Course Code	**PSC1ACP**
Eligibility for Course	**T. Y BSc (Chemistry)**
Credit	**2**
Hours	**30**

After successful completion of this course students will be able to

Sr. No	COs	Bloom Taxonomy Level (BLT)
CO1	Demonstrate the titration skills for the analysis of samples of a diverse variety	Apply
CO2	Apply the statistical methods for data analysis	Apply
CO3	Analyze the measured data based on Chemical principles	Analyse
CO4	Measure the characteristics of ion exchange resins	Evaluate

Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
1.	To carry out assay of the sodium chloride injection by Volhard's method.	4	1	1,2	1,2,4,7,11
2.	a) Statistical method: Application of Q test, t test to the data obtained for calibration of 5 mL pipette. b) Determine mean, deviation, Q value and t value using MS-EXCEL software	4	2	1,2	1,2,4,7,11
3.	To determine (a) the ion exchange capacity (b) exchange efficiency of the given cation exchange resin.	4	1, 4	1,2	1,2,4,7,11
4.	To determine amount of Cr(III) and Fe(II) individually in a mixture of the two by titration with EDTA.	4	1, 3	1,2	1,2,4,7,11
5.	To determine the breakthrough capacity of a cation exchange resin.	4	3, 4	1,2	1,2,4,7,11
6.	To determine the Mg (titrimetrically) and Al (gravimetrically) content of a Magnelium alloy by titration with EDTA.	4	1	1,2	1,2,4,7,11
7.	To determine amount of Cu(II) present in the given solution containing a mixture of Cu(II) and Fe(II).	4	1, 3	1,2	1,2,4,7,11
8.	To determine number of nitro groups in the given compound using $TiCl_3$.	4	1, 3	1,2	1,2,4,7,11
9.	Separation of amino acids in a mixture by TLC using Ninhydrin (Demonstration)	4	**3**	1,2	1,2,4,7,11

References:

1. Quantitative Inorganic Analysis including Elementary Instrumental Analysis by A. I. Vogels, 3rd Ed. ELBS (1964)

2. Vogel's textbook of quantitative chemical analysis, Sixth Ed. Mendham, Denny, Barnes, Thomas, Pearson education

3. Standard methods of chemical analysis, F. J. Welcher

4. Standard Instrumental methods of Chemical Analysis, F. J. Welcher

5. W. W. Scott. "Standard methods of Chemical Analysis", Vol. I, Van Nostr and Company,Inc.,1939.

6. E.B.Sandell and H.Onishi,"Spectrophotometric Determination of Traces of Metals",Part-II,4th Ed.,A Wiley InterscienceePublication,New York,1978.

SEMESTER-II

Course Description	
Semester	**II**
Course Name	**Physical Chemistry**
Course Code	**PSC2PC2**
Eligibility for Course	**T. Y BSc (Chemistry)**
Credit	**4**
Hours	**60**

Course Outcomes

After successful completion of this course students will be able to

Sr. No	COs	Bloom Taxonomy Level (BLT)
CO1	Explain Bioenergetics, Real solutions and Fugacity of real gases also show graphical representations of BET isotherms	Apply
CO2	Prove expressions for the total wave function for 1s,2s, 2p and 3d orbitals of hydrogen and aapplication of the Schrödinger equation to two electron system	Evaluate
CO3	Explain terms involved in Chemical Kinetics and Molecular Reaction Dynamics. Elementary Reactions in Solution, Kinetics of reactions catalysed by enzymes -Michaelis-Menten analysis, Lineweaver-Burk and Eadie Analyses, Inhibition of Enzyme action.	Apply, Evaluate
CO4	Apply Photochemistry to solve NET, SET GATE Problems.	Apply

Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
1.	**Chemical Thermodynamics II**				
	1.1. Fugacity of real gases, Determination of fugacity of real gases using graphical method and from equation of state. Equilibrium constant for real gases in terms of fugacity. Gibbs energy of mixing, entropy and enthalpy of mixing. 1.2. Real solutions: Chemical potential in non ideal solutions excess functions of non ideal solutions calculation of partial molar volume and partial molar enthalpy, Gibbs Duhem	15	1	1	1,2, 6, 11

	Margules equation. 1.3. Thermodynamics of surfaces, Pressure difference across curved surface (Laplace equation), vapour pressure of droplets (Kelvin equation), Gibbs adsorption isotherm, BET isotherm (derivations expected). 1.4. Bioenergetics: standard free energy change in biochemical reactions, exergonic, endergonic. Hydrolysis of ATP, synthesis of ATP from ADP.				
2.	**Quantum Chemistry**				
	2.1. Rigid rotor, spherical coordinates Schrödinger wave equation in spherical coordinates, separation of the variables, the phi equation, wavefunction, quantum number, the theta equation, wave function, quantization of rotational energy, spherical harmonics. 2.2. Hydrogen atom, the two particle problem, separation of the energy as translational and potential, separation of variables, the R the q * and the f equations, solution of the equation, introduction of the four quantum numbers and their interdependence on the basis of the solutions of the three equations, total wave function, expression for the energy, probability density function, distances and energies in atomic units, radial and angular plots., points of maximum probability, expressions for the total wave function for 1s,2s, 2p and 3d orbitals of hydrogen. expression for the energy, probability density function, distances and energies in atomic units, radial and angular plots., points of maximum probability, expressions for the total wave function for 1s,2s, 2p and 3d orbitals of hydrogen. 2.3. Application of the Schrödinger equation to two electron system, limitations of the equation, need for the approximate solutions, methods of obtaining the approximate solution of the Schrödinger wave equation. 2.4. Hückel Molecular Orbitals theory for ethylene, 1,3-butadiene and benzene. (Derivation expected)	15	2	1	1,2, 6,1 1
3.	**Chemical Kinetics and Molecular Reaction Dynamics**				
	3.1. Elementary Reactions in Solution:- Solvent Effects on reaction rates, Reactions between ions- influence of solvent Dielectric constant, influence of ionic strength, Linear free energy relationships Enzyme action **3.2.** Kinetics of reactions catalysed by enzymes -Michaelis-Menten analysis, Lineweaver-Burk and Eadie Analyses. **3.3.** Inhibition of Enzyme action: Competitive, Non competitive and Uncompetitive Inhibition. Effect of pH,	15	3	1	1,2, 6,1 1

	Enzyme activation by metal ions, Regulatory enzymes. **3.4.** Kinetics of reactions in the Solid State:- Factors affecting reactions in solids Rate laws for reactions in solid: The parabolic rate law, The first order rate Law, the contracting sphere rate law, Contracting area rate law, some examples of kinetic studies.				
4.	**Photochemistry**				
	4.1: Absorption of light, laws of photochemistry, electronic structure of molecules, molecular orbital, electronically excited singlet states, designation based on multiplicity rule, construction of Jablonski diagram, electronic transition, Frank Condon principle, selection rules, intensity of absorption bands, nature of electronic spectra and primary process, photo-dissociation, pre-dissociation, **4.2** Photo physical phenomena: physical pathways of excited molecular system (radiative and non-radiative), prompt fluorescence, delayed fluorescence, and phosphorescence, fluorescence quenching: concentration quenching, collisional quenching, quenching by excimer and exciplex emission, fluorescence resonance energy transfer between photo-excited donor and acceptor systems. **4.3**. Stern-Volmer relation, critical energy transfer distances, energy transfer efficiency, examples and applications in chemical analysis. Photochemical reactions, photo-oxidation, photoreduction, photo-dimerization, photoisomerization and photosensitized reactions. Photochemistry of environment: Greenhouse effect.	15	4	1	1,2, 6,1 1

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1. Peter Atkins and Julio de Paula, Atkin‟s Physical Chemistry, 7th Edn., Oxford University Press, 2002.

2. K.J. Laidler and J.H. Meiser, Physical Chemistry, 2nd Ed., CBS Publishers and Distributors, New Delhi, 1999.

3. Robert J. Silby and Robert A. Alberty, Physical Chemistry, 3rd Edn., John Wiley and Sons (Asia) Pte.Ltd., 2002.

4. Ira R. Levine, Physical Chemistry, 5th Edn., Tata McGraw-Hill New Delhi, 2002.

5. G.W. Castellan, Physical Chemistry, 3rd Edn., Narosa Publishing House, New Delhi, 1983.

6. S. Glasstone, Text Book of Physical Chemistry, 2nd Edn., McMillan and Co. Ltd., London, 1962.

7. Principles of Chemical Kinetics, 2nd Ed., James E. House, ELSEVIER, 2007.

8. B.K. Sen, Quantum Chemistry including Spectroscopy, Kalyani Publishers, 2003.

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11. S. Glasstone, Thermodynamics for Chemists, Affiliated East-West Press, New Delhi, 1964.

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13. Peter A. Rock, Chemical Thermodynamics, University Science Books, Oxford University Press, 1983.

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15. Thomas Engel and Philip Reid, Physical Chemistry, 3rd Edn., Pearson Education Limited 2013.

16. D.N. Bajpai, Advanced Physical Chemistry, S. Chand 1st Edn., 1992.

17. Solid State Chemistry [An Introduction], 3rd Ed., Lesley E. Smart & Elaine A. Moore, Taylor & Francis, 2010.

18. The Physics and „Chemistry of Solids, Stephen Elliott, Willey India, 2010

19. Principles of the Solid State, H.V. Keer, New Age International Publishers, 2011.

20. Solid State Chemistry, D.K. Chakrabarty, New Age International Publishers, 1996.

21. Principles of physical Chemistry ,Marrown and Prutton 5th edition

22. Essentials of Physical Chemistry ,ArunBahl, B. S Bahl, G. D.Tulli , S Chand and Co. Ltd , 2012 Edition.

23. Introduction of Solids L.V Azaroff , Tata McGraw Hill .

24. A Text book of physical Chemistry ; Applications of thermodynamics vol III, Mac Millan Publishers India Ltd ,2011

25. New directions in solid state Chemistry, C.N.R. Rao and J Gopalkrishnan , Cambridge University Press.

Physical Chemistry Practical

Course Description	
Semester	**II**
Course Name	**Physical Chemistry Practical**
Course Code	**PSC2PCP**
Eligibility for Course	**T.Y. B. Sc. (Chemistry)**
Credit	**2**
Hours	**30**

After successful completion of this course students will be able to

Sr. No	COs	**Bloom Taxonomy Level (BLT)**
CO1	Know principles of different instruments like Potentiometry, Conductometry, pH Metry and colorimeter	Understand
CO2	Make use of graphical representation to identify Shape of Orbitals.	Apply

Sr. No.	**Course Description**	**Hrs**	**CO No.**	**PSO No.**	**PO No.**
1	Polar plots of atomic orbitals such as 1s, $2p_x$ & $3d_z^2$ orbitals by using angular part of hydrogen atom wave functions.	4	1,2,3,4	2	1,2,4,7,11
2	To study the influence of ionic strength on the base catalysed hydrolysis of ethyl acetate.	4	1,2,3,4	2	1,2,4,7,11
3	To study phase diagram of three component system water – chloroform /toluene - acetic acid.	4	1,2,3,4	2	1,2,4,7,11
4	To determine the rate constant of decomposition reaction of diacetone alcohol by dilatometric method.	4	1,2,3,4	2	1,2,4,7,11
5	Graph Plotting of mathematical functions – linear, exponential and trigonometry and identify whether functions are acceptable or non-acceptable?	4	1,2,3,4	2	1,2,4,7,11
6	To determine the formula of silver ammonia complex by potentiometric method. Determination of binary mixture of halides. (New expt.)	4	1,2,3,4	1	1,2,4,7,11

7	To determine CMC of sodium Lauryl Sulphate from measurement of conductivities at different concentrations.	4	1,2,3,4	1	1,2,4,7,11
8	To determine Hammette constant of m- and p- amino benzoic acid/nitro benzoic acid by pH measurement.	4	1,2,3,4	1	1,2,4,7,11
9	To determine the Michaelis – Menten's constant value (Km) of the enzyme Beta Amylase spectrophotometrically.				

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1. Practical Physical Chemistry, B. Viswanathan and P.S. Raghavan, Viva Books Private Limited, 2005.
2. Practical Physical Chemistry, A.M. James and F.E. Prichard, 3rd Edn., Longman Group Ltd., 1974.
3. Experimental Physical Chemistry, V.D. Athawale and P. Mathur, New Age International Publishers, 2001.

Course Description	
Semester	**II**
Course Name	**Inorganic Chemistry**
Course Code	**PSC2IC2**
Eligibility for Course	**T.Y.B.Sc.in Chemistry**
Credit	**4**
Hours	**60**

Course Objectives:

1. To study and understand Photochemical Reactions, Ligand substitution reactions of octahedral and tetrahedral complexes, Redox reactions: inner and outer sphere mechanisms, stereochemistry of substitution reactions of octahedral complexes

2. To study and understand Organometallic Chemistry of Transition metals, Eighteen and sixteen electron rule, Structure and bonding on the basis of VBT and MOT in organometallic compounds.

3. To study and understand Toxicity of metallic species including case studies. Interaction of radiation in context with the environment: Sources and biological implication of radioactive materials.

4. To study concept of green chemistry, Biomass and biofuels.

5. To study and understand Bioinorganic Chemistry related to Biological oxygen carriers; hemoglobin, hemerythrene and hemocyanine- structure of metal active center and differences in mechanism of oxygen binding, Copper containing enzymes, Nitrogen fixation Metal ion transport and storage Medicinal applications of cis-platin and related compounds.

Course Outcomes

Sr.No.	After completing the course, Student will able to:	Bloom Taxonomy Level (BTL)
CO1	Recall Organometallic Chemistry of Transition metals, Eighteen and sixteen electron rules, Preparation and property's structure and bonding of the Organometallic compounds	Remember
CO2	Explain Photochemical Reactions, Ligand substitution reactions of: Octahedral complexes, Square planar complexes, trans-effect, its theories and applications. Redox reactions: inner and outer sphere mechanisms, stereochemistry of substitution reactions of octahedral complexes	Understand
CO3	Explain Bioinorganic Chemistry related to biological oxygen carriers; hemoglobin, hemerythrene and hemocyanine- structure of metal active center and differences in mechanism of oxygen binding, Copper containing enzymes, Nitrogen fixation Metal ion transport and storage, Medicinal applications of cis-platin and related compounds.	Understand
CO4	Discuss the implication of toxic metallic species radioactive materials on environment and biological system using case studies.	Create

Unit	**Course Description**	Hrs	CO No.	PSO No.	PO No.
1.	**Inorganic Reaction Mechanism:**	15h	CO2	PSO1	PO2
1.1	Photochemical Reactions: Prompt and delayed reactions, Quantum yield, Recapitulation of fluorescence and phosphorescence. Photochemical reactions by irradiating at d-d and charge transfer bands.				
1.2	Ligand substitution reactions of: a) Octahedral complexes without breaking of metal-ligand bond (Use of isotopiclabelling method) b) Square planar complexes, trans-effect, its theories and applications. Mechanismand factors affecting these substitution reactions.				
1.3	Redox reactions: inner and outer sphere mechanisms, complimentary and non-complimentary reactions.				
1.4	Stereochemistry of substitution reactions of octahedral complexes. (Isomerization andracemization reactions and applications.)				
2.	**Organometallic Chemistry of Transition metals:**	15h	CO1	PSO1	PO2

2.1	Eighteen and sixteen electron rule and electron counting with examples.				
2.2	Preparation and properties of the following compounds (a) Alkyl and aryl derivatives transition metal complexes (b) Carbenes and carbynes of Cr, Mo and W (c) Alkene derivatives of Pd and Pt (d) Alkyne derivatives of Pd and Pt (e) Allyl derivatives of nickel **(f)** Sandwich compounds of Fe, Cr and Half Sandwich compounds of Cr, Mo.				
2.3	Basic organometallic reactions introduction: Ligand substitution, oxidative reactions, migratory reactions, migratory insertion, extrusion, oxidative addition, reductive elimination mechanism and stereochemistry				
3.	**Environmental Chemistry:**	15h	CO4	PSO2	PO5
3.1	Toxicity of metallic species: Mercury, lead, cadmium, arsenic, copper and chromium, with respect to their sources, distribution, speciation, biochemical effects and toxicology, control and treatment.				
3.2	Case Studies: (a) Itai-itai disease for Cadmium toxicity, **(b)** Arsenic Poisoning in the Indo-Bangladesh region.				
3.3	Interaction of radiation in context with the environment:Sources and biological implication of radioactive materials. Effect of low level radiation on cells- Its applications in diagnosis and treatment, Effect of radiation on cell proliferation and cancer.				
3.4	**Green Chemistry:** Biomass and Biofuels: Issues of Ethanol,Biodiesel from Plant Oils and from AlgaeActivity. Bio-based Liquid Fuels and Chemicals, Recycling Carbon Dioxide—A Feedstock for the Production of Chemicals and Liquid Fuels, Thermochemical Production of Fuels: Including Methanol and Hydrogen—Fuel of the Future.				
4.	**Bioinorganic Chemistry:**	15h	CO3	PSO2	PO5
4.1	Biological oxygen carriers; hemoglobin, hemerythrene and hemocyanine- structure of metal active center and differences in mechanism of oxygen binding, Differences between hemoglobin and myoglobin: Cooperativity of oxygen binding in hemoglobin and Hill equation, pH dependence of oxygen affinity in hemoglobin and myoglobin and it‟s implications.				
4.2	Activation of oxygen in biological system with examples of mono-oxygenases, and oxidases- structure of the metal center and mechanism of oxygen activation by these enzymes.				
4.3	Copper containing enzymes- superoxide dismutase, tyrosinase and laccase: catalytic reactions and the structures of the metal binding site				
4.4	Nitrogen fixation-nitrogenase, hydrogenases				

4.5	Metal ion transport and storage:Ionophores, transferrin, ferritin and metallothionins				
4.6	Medicinal applications of cis-platin and related compounds				

References

UNIT-I

1. P. Atkins, T. Overton, J. Rourke, M. Weller and F. Armstrong, Inorganic Chemistry, 5thEd., Oxford University Press, 2010.
2. D. Banerjea, Coordination Chemistry, Tata McGraw Hill, 1993.
3. W. H. Malik, G. D./Tuli and R. D. Madan, Selected Topics in Inorganic Chemistry, 8thEd., S. Chand & Company ltd.
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6. Gurdeep Raj, Advanced Inorganic Chemistry-Vol.II, 12th Edition, Goel publishing house,2012.
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Unit II

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2. R.C Mehrotra and A.Singh, Organometallic Chemistry- A unified Approach, 2nded, NewAge International Pvt Ltd, 2000.
3. R.H Crabtree, The Organometallic Chemistry of the Transition Metals, 5th edition, WileyInternational Pvt, Ltd 2000.
4. B.Doughlas, D.H McDaniel and J.J Alexander. Concepts and Models of Inorganic Chemistry, 2nd edition, John Wiley and Sons. 1983.
5. Organometallic Chemistry by G.S Sodhi. Ane Books Pvt Ltd.
6. G. Miessler and D. Tarr, Inorganic Chemistry, 3rd Ed., Pearson Education, 2004
7. Organometallic chemistry by B.D.Gupta.
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Unit III

1. Environmental Chemistry 5th edition, Colin Baird Michael Cann, W. H. Freeman andCompany, New York, 2012.
2. Environmental Chemistry 7th edition, Stanley E. Manahan, CRC Press Publishers,

3. Environmental Contaminants, Daniel A. Vallero, ISBN: 0-12-710057-1, Elsevier Inc.,2004.
4. Environmental Science 13th edition, G. Tyler Miller Jr. and Scott E. Spoolman, ISBN-10:0-495-56016-2, Brooks/Cole, Cengage Learning, 2010.
5. Fundamentals of Environmental and Toxicological Chemistry 4th edition, Stanley E. Manahan, ISBN: 978-1-4665-5317-0, CRC Press Taylor & Francis Group, 2013.
6. Living in the Environment 17th edition, G. Tyler Miller Jr. and Scott E. Spoolman, ISBN-10: 0-538-49414-X, Brooks/Cole, Cengage Learning, 2011
7. Poisoning and Toxicology Handbook, Jerrold B. Leikin, Frank P. Paloucek, ISBN: 1-4200-4479-6, Informa Healthcare USA, Inc.
8. Casarett and Doull‟s Toxicology- The Basic Science of Poisons 6th edition, McGraw-Hill,2001.

Unit IV

1. R. W. Hay, Bioinorganic Chemistry, Ellis Harwood, England, 1984.

2. I. Bertini, H.B.Gray, S. J. Lippard and J.S. Valentine, Bioinorganic Chemistry, First SouthIndian Edition, Viva Books, New Delhi, 1998.
3. J. A. Cowan, Inorganic Biochemistry-An introduction, VCH Publication, 1993.

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8. Robert R.Crechton, Biological Inorganic Chemistry – An Introduction, Elsevier

9. J. R. Frausto da Silva and R. J. P. Williams The Biological Chemistry of the Elements,Clarendon Press, Oxford, 1991.
10. JM. D. Yudkin and R. E. Offord A Guidebook to Biochemistry, Cambridge UniversityPress, 1980.

Course Description	
Semester	**II**
Course Name	**Inorganic Chemistry Practical**
Course Code	**PSC2ICP**

Eligibility for Course	**T.Y.B.Sc.in Chemistry**
Credit	**2**
Hours	**30**

Course Outcomes

COs. No.	After completing the course, Students will be able to:	Bloom Taxonomy Level (BTL)
CO1	Analyse ores and alloys using volumetric and gravimetric analysis.	Analyse
CO2	Estimate percentage of metals in the ore and alloy	Evaluate
CO3	Apply the potentiometric method for redox titrations of Fe, Cu etc.	Apply

Ores and Alloys

1) Analysis of Devarda‟s alloy
2) Analysis of Cu – Ni alloy
3) Analysis of Tin Solder alloy
4) Analysis of Brass alloy

Instrumentation

1) Estimation of Copper using Iodometric method Potentiometrically.
2) Estimation of Fe+3 solution using Ce(IV) ions Potentiometrically

Reference:

1. Advanced experiments in Inorganic Chemistry., G. N. Mukherjee., 1st Edn., 2010., U.N.Dhur& Sons Pvt Ltd

2. The Synthesis and Characterization of Inorganic Compounds by William L. Jolly 3. Inorganic Chemistry Practical Under UGC Syllabus for M.Sc. in all India Universities By: DrDeepak Pant

Course Description	
Semester	**II**
Course Name	**Organic Chemistry**
Course Code	**PSC2OC2**
Eligibility for Course	**T. Y BSc (Chemistry)**
Credit	**2**
Hours	**60**

Course Outcomes

After successful completion of this course students will be able to

Sr No.	COs	Bloom Taxonomy Level (BLT)
CO1	Explain the Generation of carbanion, enolate, enamine with their alkylation & acylation reaction and name reactions with their mechanism.	Understand
CO2	Illustrate mechanism, stereochemistry, applications and importance of name reactions and rearrangements.	Understand
CO3	Explain the role of reagents in organic synthesis.	Analyse
CO4	Interpret the structure of organic compounds using combined of spectral techniques.	create

Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
1	**1.1. Alkylation of Nucleophilic Carbon Intermediates:** 1.1.1. Generation of carbanion, kinetic and thermodynamic enolate formation, Regioselectivity in enolate formation, alkylation of enolates. 1.1.2. Generation and alkylation of dianion, medium effects in the alkylation of enolates, oxygen versus carbon as the site of alkylation. 1.1.3. Alkylation of aldehydes, ketones, esters. 1.1.4. Nitrogen analogs of enols and enolates- Enamines and Imines anions, alkylation of enamines and imines. 1.1.5. Alkylation of carbon nucleophiles by conjugate addition (Michael reaction). 1.2. Reaction of carbon nucleophiles with carbonyl groups: 1.2.1. Mechanism of Acid and base catalyzed Aldol condensation, Mixed Aldol condensation with aromatic aldehydes, regiochemistry in mixed reactions of aliphatic aldehydes and ketones, intramolecular Aldol reaction and Robinson annulation. 1.2.2. Addition reactions with amines and iminium ions; Mannich reaction. 1.2.3. Amine catalyzed condensation reaction: Knoevenagel reaction. 1.2.4. Acylation of carbanions. Asymmetric methodology with enolates and Enamines	15	1	2	4,6
2	Mechanisms, stereochemistry (if applicable) and applications of the following: 2.1. Reactions: Baylis-Hilman reaction, McMurry Coupling, Corey-Fuchs reaction, Nef reaction, Passerini reaction. 2.2. Concerted rearrangements: Hofmann, Curtius, Lossen, Schmidt, Wolff, Bamberger Rearrangements. 2.3. Cationic rearrangements: Tiffeneau-Demjanov, Pummerer, Dienone-phenol, Rupe, Wagner-Meerwein. 2.4. Anionic rearrangements: Brook, Neber, Von	15	2	4	5,6

	Richter, Wittig, Benzylic acid Rearrangements, Payne.				
3	**3.1 Elimination Reactions:** E1,E2 E1CB, Stereochemistry of elimination, elimination Vs Substitution, Anti and Syn Elimination. Dehydrohalogenation, Dehalogenation, Dehydration, Hoffmann and Saytzeff elimination, Pyrolytic elimination. **3.2 Organometallic Chemistry** Organolithium, Organomagnesium, Organozinc, Organocupper, **3.3 Introduction to Molecular Orbital Theory for Organic Chemistry:**. Molecular orbitals: Formation of σ- and π-MOs by using LCAO method. Formation of π MOs of ethylene, butadiene, 1, 3, 5-hexatriene, allylcation, anion and radical. Concept of nodal planes and energies of π-MOs	15	3	3	4,6
4	**Spectroscopy:** **4.1. Proton magnetic resonance spectroscopy:** Chemical and magnetic equivalence, Chemical shift values and correlation for protons bonded to carbon and other nuclei as in alcohols, phenols, enols, carboxylic acids, amines, amides. Spin-spin coupling, Coupling constant (J), Factors affecting J, geminal, vicinal and long range coupling (allylic and aromatic). First order spectra. **4.2. 13C NMR spectroscopy:** Theory and comparison with proton NMR, proton coupled and decoupled spectra, off-resonance decoupling. Factors influencing carbon shifts, correlation of chemical shifts of aliphatic, olefin, alkyne, aromatic and carbonyl carbons. **4.3. Mass spectrometry:** Determination of molecular formula of organic compounds based on isotopic abundance and HRMS. Fragmentation pattern in various classes of organic compounds (including compounds containing hetero atoms), McLafferty rearrangement, Retro-Diels Alder reaction. 4.4. Structure determination involving individual or combined use of the above spectral techniques. 4.5. Applications of UV and IR spectroscopy: (8 L) 3.2.1. Ultraviolet spectroscopy: Recapitulation, UV spectra of dienes, conjugated polyenes (cyclic and acyclic), carbonyl and unsaturated carbonyl compounds, substituted aromatic compounds. Factors affecting the position and intensity of UV bands – effect of conjugation, steric factor, pH, and solvent polarity. Calculation of absorption maxima for above classes of compounds by Woodward-Fieser rules (using Woodward-Fieser tables for values for	15	4	3	4,8

	substituents). 4.6. Infrared spectroscopy: Fundamental, overtone and combination bands, vibrational coupling, factors affecting vibrational frequency (atomic weight, conjugation, ring size, solvent and hydrogen bonding). Characteristic vibrational frequencies for alkanes, alkenes, alkynes, aromatics, alcohols, ethers, phenols, amines, nitriles and nitro compounds. Detailed study of vibrational frequencies of carbonyl compounds, aldehydes, ketones, esters, amides, acids, acid halides, anhydrides, lactones, lactams and conjugated carbonyl compounds.				

Organic Chemistry Practical

Course Description	
Semester	**II**
Course Name	**Organic Chemistry**
Course Code	**PSC2OCP**
Eligibility for Course	**T.Y.B.Sc (Chemistry)**
Credit	**2**
Hours	**30**

After successful completion of this course students will be able to

Sr. No	COs	Bloom Taxonomy Level (BLT)
CO1	Identify the chemical type of components present in a binary mixture of an organic compound.	Apply
CO2	Apply skills in the separation and qualitative analysis of organic compounds of binary mixtures by microscale technique.	Apply
CO3	Make use of crystallization, sublimation and distillation for purification of the organic compounds.	Apply
CO4	Demonstrate the practical aspects in the preparation of the organic compounds derivatives.	Understand

Sr. No.	Course Description	Hrs	CO No.	PSO No.	PO No.
1	Separation of Binary mixture using micro-scale technique 1. Separation of binary mixture using physical and chemical methods. 2. Characterization of one of the components with the help of chemical analysis and confirmation of the structure with the help of	30	1-4	1-4	9-11

	derivative preparation and its physical constant. 3. Purification and determination of mass and physical constant of the second component. The following types are expected: (i) Water soluble/water insoluble solid and water insoluble solid, (ii) Non-volatile liquid-Non-volatile liquid (chemical separation) (iii) Water-insoluble solid-Non-volatile liquid.				

1. Organic Chemistry, J. Claydens, N. Greeves, S. Warren and P. Wothers, Oxford UniversityPress.

2. Advanced Organic Chemistry, F.A. Carey and R.J. Sundberg, Part A, page no. 713-769, and B, Plenum Press.

3. March‟s Advanced Organic Chemistry: Reactions, Mechanisms and Structure, Michael B. Smith, Jerry March, Wiley.

4. Organic Chemistry, R.T. Morrison, R.N. Boyd and S.K. Bhattacharjee, Pearson Publication (7th Edition)

5. Advanced Organic Chemistry: Reactions and mechanism, B. Miller and R. Prasad, PearsonEducation.

6. Advanced Organic Chemistry: Reaction mechanisms, R. Bruckner, Academic Press.

7. Understanding Organic Reaction Mechanisms, Adams Jacobs, Cambridge University Press.

8. Writing Reaction Mechanism in organic chemistry, A. Miller, P.H. Solomons, Academic Press.

9. Principles of Organic Synthesis, R.O.C. Norman and J.M Coxon, Nelson Thornes.

10. Advanced Organic Chemistry: Reactions and mechanism, L.G. Wade, Jr., Maya Shankar Singh, Pearson Education.

11. Mechanism in Organic Chemistry, Peter Sykes, 6th

12. Molecular Orbital and Organic chemical reactions, Ian Fleming Reference Edition, Wiley

13. Introduction to Spectroscopy, Donald L. Pavia, Gary M. Lampman, George S. Kriz,Thomson Brooks.

14. Spectrometric Identification of Organic Compounds, R. Silverstein, G.C Bassler and T.C.Morrill, John Wiley and Sons.

15. Organic Spectroscopy, William Kemp, W.H. Freeman & Company.

16. Organic Spectroscopy-Principles and Applications, Jagmohan, Narosa Publication.

17. Organic Spectroscopy, V.R. Dani, Tata McGraw Hill Publishing Co.

18. Spectroscopy of Organic Compounds, P.S. Kalsi, New Age International Ltd.

19. Organic Reaction Mechanisms, V.K. Ahluwalia, R.K. Parasher, Alpha ScienceInternational, 2011.

20. Reactions, Rearrangements and Reagents by S. N. Sanyal

21. Name Reactions, Jie Jack Li, Springer

22. Name Reactions and Reagents in Organic Synthesis, Bradford P. Mundy, M.G. Ellerd,and F.G. Favaloro, John Wiley & Sons.

Course Description	
Semester	**II**
Course Name	**Analytical Chemistry**
Course Code	**PSC2AC1**
Eligibility for Course	**T.Y.B.Sc (Chemistry)**
Credit	**4**
Hours	**60**

Course Outcomes

After successful completion of this course students will be able to

Sr. No	COs	Bloom Taxonomy Level (BLT)
CO1	Translate the theoretical principles of advanced separation techniques, spectroscopic techniques, radioanalytical techniques, electroanalytical techniques into applications.	Understand
CO2	Explain the working principles of surface analytical techniques such as SEM, STM, TEM, ESCA, Auger spectroscopy and ICP-AES	Understand
CO3	Compare the different ion sources and mass analyzers in mass spectroscopy	Analyze
CO4	Determine the electrical quantities such as charge, current, potential using Electroanalytical methods	Evaluate

Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
1.	**Chromatography**				
	1.1 Recapitulation of basic concepts in chromatography: Classification of chromatographic methods, requirements of an ideal detector, types of detectors in LC and GC, comparative account of detectors with reference to their applications (LC and GC respectively), qualitative and quantitative analysis.[2 L] 1.2 Concept of plate and rate theories in chromatography: efficiency, resolution, selectivity and separation capability. Van Deemter equation and broadening of chromatographic peaks. Optimization of chromatographic conditions.[5 L] 1.3 Gas Chromatography: Instrumentation of GC with special reference to sample injection systems – split/splitless, column types, solid/ liquid stationary phases, column switching techniques, temperature programming, Thermionic and mass spectrometric detector, Applications. [3 L] 1.4 High Performance Liquid Chromatography (HPLC): Normal phase and reversed phase with special reference to types of commercially available columns (Use of C8 and C18 columns). Diode array type and fluorescence detector, Applications of HPLC. Chiral and ion chromatography. [5 L]	15	1	1	1,2,6, 11
2.	**X-ray spectroscopy**:				
	principle, instrumentation and applications of X-ray fluorescence, absorption and diffraction spectroscopy. [4 L] 2.2 Mass spectrometry: recapitulation, instrumentation, ion sources for molecular studies, electron impact, field ionization, field absorption, chemical ionization and fast atom bombardment sources. Mass analyzers: Quadrupole, time of flight and ion trap. Applications. [6 L] 2.3 Radioanalytical Methods – recapitulation, isotope dilution method, introduction, principle, single dilution method, double dilution method and applications. [5 L]	15	1,3	1	1,2,6, 11
3.	**Surface Analytical Techniques**				
	Introduction, Types of surface measurements: Photon probe technique, electron probe technique, Ion probe technique, Scanning probe microscopy 3.2 Electron probe techniques: 3.1.1 Scanning Electron Microscopy (SEM):	15	2	1	1,2,6, 11

	Principle, Instrumentation and Application 3.1.2 Electron Spectroscopy (ESCA and Auger): Principle, instrumentation and Application 3.2 Atomic Spectroscopy [6 L] 3.2.1 Recapitulation: Flame AAS and furnace AAS Interferences - chemical and spectral, evaluation methods in AAS, qualitative and quantitative applications 3.2.2 AES: Principle of AES, Interferences Inductively Coupled Plasma- Atomic Emission Spectroscopy (ICP-AES) – Introduction, Principle, Instrumentation, applications 3.2.3 Applications of AAS and AES in environmental analysis				
4.	**Electroanalytical Methods**				
	(Numericals are Expected) 4.1 Ion selective potentiometry and Polarography: [10 L] Ion selective electrodes and their applications (solid state, precipitate, liquid –liquid, enzyme and gas sensing electrodes), ion selective field effect transistors, biocatalytic membrane electrodes and enzyme based biosensors. Polarography: Ilkovic equation, derivation starting with Cottrell equation, effect of complex formation on the polarographic waves. 4.2 Electrogravimetry: Introduction, principle, instrumentation, factors affecting the nature of the deposit, applications.[3 L] 4.3 Coulometry: Introduction, principle, instrumentation, coulometry at controlled potential and controlled current [2 L]	15	4	1	1,2,6, 11

References:

Unit I

1. Instrumental Analysis, Skoog, Holler & Crouch

2 HPLC Practical and Industrial Applications, 2 nd Ed., Joel K. Swadesh, CRC Press

Unit II 1.Essentials of Nuclear Chemistry, H J Arnikar, New Age Publishers (2005) 2. Fundamentals of Radiochemistry D. D. Sood , A. V. R. Reddy and N. Ramamoorthy 3. Principles of Instrumental Analysis - Skoog, Holler and Nieman, 5th Edition, Ch: 12 4. Principles of Instrumental Analysis - Skoog, Holler and Nieman, 5th Edition, Ch: 20

Unit III

1. Instrumental Analysis by Douglas A. Skoog - F. James Holler - Crouch, Publisher: Cengage; Edition, (2003), ISBN-10: 8131505421, ISBN-13: 978-8131505427

2. Physical Principles of Electron Microscopy, An Introduction to TEM, SEM, and AEM
3. Authors: Ray F. Egerton, ISBN: 978-0- 387-25800- 3 (Print) 978-0- 387-26016- 7 (Online)
4. Modern techniques of surface science by D.P. Woodruff, T.A. Delchar, Cambridge Univ. Press, 1994.
5. Introduction to Scanning Tunneling Microscopy by C. J. Chen, Oxford University Press, NewYork, 1993.
6. 5. Transmission Electron Microscopy: A text book for Material Science, David B Williams and C., Barry Carter, Springer
7. Modern Spectroscopy, by J.M. Hollas, 3rd Edition (1996), John Wiley, New York
8. Principles of Instrumental Analysis – Skoog, Holler, Nieman, 5th ed., Harcourt College Publishers, 1998.
9. Instrumental Analysis by Douglas A. Skoog - F. James Holler - Crouch, Publisher: Cengage; Edition (2003), ISBN10: 8131505421, ISBN-13: 978-8131505427

Unit IV

1. Principles of Instrumental Analysis – Skoog, Holler, Nieman, 5th Edition, Harcourt College Publishers, 1998. Chapters - 23, 24, 25.
2. Analytical Chemistry Principles – John H Kennnedy, 2nd edition, Saunders College Publishing (1990).
3. Modern Analytical Chemistry David Harvey; McGraw Hill Higher education publishers, (2000).
4. Vogel's Text book of quantitative chemical analysis, 6th edition, Pearson Education Limited, (2007).
5. Electrochemical Methods Fundamentals and Applications, Allen J Bard and Larry R Faulkner, John Wiley and Sons, (1980).
6. Instrumental Methods of Analysis Willard, Merrit, Dean and Settle, 7th edition, CBS publishers.

Analytical Chemistry Practical

Course Description	
Semester	**II**
Course Name	**Analytical Chemistry**
Course Code	**PSC2ACP**
Eligibility for Course	**T. Y. B.Sc (Chemistry)**
Credit	**2**
Hours	**30**

After successful completion of this course students will be able to

Sr. No.	COs	Bloom Taxonomy Level (BLT)
CO1	Demonstrate the operational skills on the selected instruments and retrieve information	Understand
CO2	Develop a sense of time management, safe use of chemicals and environmental safety	Apply
CO3	Measure the physical property of the samples and relate it with quantity	Evaluate
CO4	Construct the graphs based on the measurements and calculations	Evaluate

Sr. No.	Course Description	Hrs	CO No.	PSO No.	PO No.
1	To determine percent purity of washing soda in terms of sodium carbonate pH metrically.	4	1,2, 3,4	1,2	1,2,4, 7,11
2	To determine amount of Ti (III) and Fe (II) in a mixture by titration with Ce (IV) potentiometrically.	4	1,2, 3,4	1,2	1,2,4, 7,11
3	To determine the amount of nitrite present in the given water sample colorimetrically.	4	1,2, 3,4	1,2	1,2,4, 7,11
4	To determine the amount of Fe (II) and Fe (III) in a mixture using 1,10-phenanthroline spectrophotometrically.	4	1,2, 3,4	1,2	1,2,4, 7,11
5	Simultaneous determination of Cr (VI) and Mn (VII) in a mixture spectrophotometrically.	4	1,2, 3,4	1,2	1,2,4, 7,11
6	To determine the percentage composition of HCl and H_2SO_4 on weight basis in a mixture of two by conductometric titration with NaOH and $BaCl_2$.	4	1,2, 3,4	1,2	1,2,4, 7,11
7	To determine amount of potassium in the given sample of fertilizers using flame photometer by standard addition method.	4	1,2, 3,4	1,2	1,2,4, 7,11
8	Separation of benzene and toluene using gas chromatography and determination of column resolution (Rs). (demonstration)	4	1,2, 3,4	1,2	1,2,4, 7,11

References

1. Quantitative Inorganic Analysis including Elementary Instrumental Analysis by A. I. Vogels, 3rd Ed. ELBS (1964)

2. Vogel's textbook of quantitative chemical analysis, Sixth Ed. Mendham, Denny, Barnes, Thomas, Pearson education

3. Standard methods of chemical analysis, F. J. Welcher

4. Standard Instrumental methods of Chemical Analysis, F. J. Welcher

5. W.W.Scott."Standard methods of Chemical Analysis",Vol.I, Van Nostrand Company, Inc.,1939.

6. E.B. Sandell and H.Onishi,"Spectrophotometric Determination of Traces of Metals", Part-II, 4th Ed.,A Wiley Interscience Publication, New York,1978

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR ARTS, COMMERCE & SCIENCE COLLEGE, NEW PANVEL (AUTONOMOUS)

Re-accredited 'A+' Grade by NAAC
'College with Potential for Excellence' Status
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'Best College Award' by University of Mumbai

Program: M. Sc. I

Revised Syllabus of M. Sc. I Microbiology

Choice Based Credit System (CBCS)

w.e.f. Academic Year 2022-23

M. Sc. I Microbiology Syllabus

M. Sc. I Microbiology Syllabus Semester I and II

INDEX **SEMESTER I** **THEORY**

Course Code	Unit	Topic Headings	Credits	Lecture/Topic
PSC1MI-1 Molecular Genetics -1	I	Genetic Exchange among bacteria and Recombination	04	15
	II	Eukaryotic Transposable elements, DNA repair and Genetics of Cancer		15
	III	Regulation of gene expression in prokaryotes		15
	IV	Global regulation of genes in bacteria		15

Course Code	Unit	Topic Headings	Credits	Lecture/Topic
PSC1MI-2 Environmental Microbiology & sustainability	I	Theories of evolution and astrobiology	04	15
	II	Microbial Diversity		15
	III	Extremophiles		15
	IV	Environment & Natural resource Management & Safety Standards		15

Course Code	Unit	Topic Headings	Credits	Lecture/Topic
PSC1MI-3 Biochemistry	I	Concepts in chemical reactivity and aqueous solution	04	15
	II	Bioorganic molecules		15
	III	Degradation and transformation of organic molecules		15
	IV	Physiology and metabolism of anaerobic bacteria		15

Course Code	Unit	Topic Headings	Credits	Lecture/Topic
PSC1MI-4 Medical Microbiology and Microbial pathogenesis	I	Mechanisms of Pathogenesis- 1	04	15
	II	Mechanisms of Pathogenesis-2 and Human Microbiome		15
	III	Emerging infectious diseases in India(with emphasis on Etiology, virulence mechanism, diagnosis and prevention) and Epidemiology		15
	IV	Clinical Bacteriology		15

Unit	Topic Headings	Credits	Practical/Week
PSC1MIPR-1	Molecular Genetics -1	04	02
PSC1MIPR-2	Environmental Microbiology & sustainability	04	02
PSC1MIPR-3	Biochemistry	04	02
PSC1MIPR-4	Medical Microbiology and Microbial pathogenesis	04	02

INDEX **SEMESTER II** **THEORY**

Course Code	Unit	Topic Headings	Credits	Lecture/Topic
PSC2MI-1 Molecular Genetics -2	I	Regulation of Gene Expression in Eukaryotes	04	15
	II	Genetic regulation of the development of Drosophila , organelle DNA & population genetics		15
	III	Molecular tools for genetics		15
	IV	Metagenomics, comparative & functional Genomics, Proteomics		15

Course Code	Unit	Topic Headings	Credits	Lecture/Topic
PSC2MI-2 Research Methodology, Bioinformatics & Biostatistics	I	Research terminology and fundamentals	04	15
	II	Processing & analysis of data		15
	III	Statistics in research		15
	IV	Bioinformatics		15

Course Code	Unit	Topic Headings	Credits	Lecture/Topic
PSC2MI-3 Applied Biochemistry	I	Enzymology	04	15
	II	Signalling and stress		15
	III	Unusual biomolecules and bioactive compounds		15
	IV	Metabolism of one and two carbon compounds		15

Course Code	Unit	Topic Headings	Credits	Lecture/Topic
PSC2MI-4 Applied Immunology	I	Adversarial strategies during infection	04	15
	II	Immunodeficiency		15
	III	Advances in Allergy and other hypersensitivity		15
	IV	Tumor Immunology & Autoimmune diseases		15

Unit	Topic Headings	Credits	Practical/Week
PSC2MIPR-1	Molecular Genetics -2	04	02
PSC2MIPR-2	Research Methodology, Bioinformatics & Biostatistics	04	02
PSC2MIPR-3	Applied Biochemistry	04	02
PSC2MIPR-4	Applied Immunology	04	02

M. Sc. I Microbiology Semester I Syllabus

Course Code	**:**	**PSC1MI-1**	**Title of the Paper**	**:**	**Molecular Genetics -1**
Credits	**:**	**4**	**Total No. of Lectures**	**:**	**60 (15 Lectures/Unit)**

Sub unit	Topics	No. of Lectures
Unit I	**Genetic Exchange among bacteria and Molecular basis of Homologous Recombination**	
1.1	**Conjugation** 1.1.1 Overview, Classification of self-transmissible plasmids 1.1.2 Mechanism of DNA transfer during Conjugation in Gram negative bacteria 1.1.3 Chromosome transfer by plasmids-Formation of Hfr strains, transfer & mobilization of chromosomal DNA by integrated plasmids, prime factors 1.1.4 Transfer system of gram positive bacteria-Plasmid pheromones	**05**
1.2	**Transformation** 1.2.1 Development of Competence in Gram positive bacteria and Gram negative bacteria, competence based on type IV secretion systems. 1.2.2 Regulation of competence in Bacillus subtilis- Competence pheromones. 1.2.3 Role of natural transformation- Nutrition, repair, recombination, Importance of natural transformation for forward and reverse genetics. 1.2.4 Artificially induced competence- Calcium ion induction, transformation by plasmids, transfection by phage DNA, transformation of cells with chromosomal genes, Electroporation.	**05**
1.3	**Homologous recombination at molecular level** 1.3.1 Models for Homologues recombination 1.3.2 Homologues recombination protein machines 1.3.3 Homologous recombination in E.coli (Rec BCD pathway) 1 .3.4 Homologous recombination in eukaryotes- Mating type switching 1.3.5 Site Specific recombination	**05**
Unit II	**Transposable elements, DNA repair and Genetics of Cancer**	
2.1	2.1.1 Transposable genetic elements in eukaryotes: Transposable Ac and Ds Elements in Maize, P Elements and Hybrid Dysgenesis in Drosophila. 2.1.2 Retrovirus and Retro transposons : Retrovirus, Retrovirus like elements, Retroposons 2.1.3 Transposable elements in Humans 2.1.4 The Genetic and Evolutionary Significance of Transposable Elements: Transposons as mutagens, Genetic transformation with transposons, Transposons and Genome organization, Evolutionary Issues Concerning Transposable Elements	**07**
2.2	**DNA repair** 2.2.1 Eukaryotic Nucleotide Excision repair 2.2.2 Mismatch repair mechanism in humans 2.2.3 Non-homologous end joining (NHEJ) pathway for repairing double stranded breaks	**02**
2.3	**Genetic Basis of Cancer** 2.3.1 Cancer: A Genetic Disease, Forms of Cancer, Cancer and the Cell Cycle	**06**

	2.3.2 Oncogenes: Tumor-Inducing Retroviruses and Viral Oncogenes, Cellular Proto-Oncogenes, protein products of protooncogenes, Changing cellular protooncogenes into oncogenes, Chromosome Rearrangement and Cancer. 2.3.3 Tumor Suppressor Genes: the Retinoblastoma tumor suppressor gene- RB, P53, Breast cancer tumor suppressor genes, MicroRNAs genes, Mutator genes, Telomere shortening genes 2.3.4. The multistep nature of cancer	
Unit III	**Regulation of gene expression in prokaryotes**	
3.1	**Operon Systems** (Detailed Molecular structure of repressor and operator sites) 3.1.1 The *E. coli* Lac operon 3.1.2 The *E.coli* Gal operon 3.1.3 The *E. coli* ara operon 3.1.4 The *E. coli* Maltose operon 3.1.5 Trp operon of *Bacillus subtilis* 3.1.6 Riboswitch regulation	**15**
Unit IV	**Global regulation of genes in bacteria**	
4.1	**Global regulation systems** 4.1.1 Regulation of Nitrogen assimilation 4.1.2 Pathways for nitrogen assimilation, regulation of nitrogen assimilation by the Ntr system 4.1.3 Stress response In Bacteria: Heat shock regulation in *E coli* 4.1.4 Iron regulation in *E coli* 4.1.5 Regulation of Sporulation in *Bacillus subtilis*	 **01** **03** **03** **02** **06**
	Self-study: Solve at least five problems on gene transfer and regulation given at the end of the chapter in Lehninger/schaum series/Russell etc	

PRACTICALS BASED ON PSC1MIPR-1

1. Demonstration of Conjugation in *E. coli*
2. Preparation of competent E. coli cells
3. Isolation of plasmid DNA from mini-cultures and maxi cultures
4. Transformation of competent cells using plasmid DNA
5. Endospore formation in Bacillus subtilis: Requirements for germination and outgrowth of spores, correlation between sporulation and protease activity
6. Response of nutrient stress on the growth and size of *Pseudomonas sp.*
7. Cancer genetics- visit to ACTREC, TIFR, BARC etc

REFERENCES

1. iGenetics- A Molecular Approach, Russell, P.J., 3rd edition, 2010, Pearson International edition
2. Fundamental Bacterial Genetics, Trun Trempy, 1st edition, 2004, Blackwell Publishing
3. Molecular Biology of the Gene, Watson, Baker, Bell, Gann, Levine, Losick, 7th edition, 2007, Pearson Education
4. Genes IX, Lewin, B., 2006, Jones and Bartlett Publishers
5. Genetics: A Conceptual Approach, Benjamin Pierce 4th edition, 2008, W. H. Freeman & Co
6. Principals of Genetics, Snustad & Simmons, 6th edition, 2012, John Wiley & Sons Inc
7. Molecular biology –Genes to proteins 3rd ed. by Burton E. Tropp (Jones & Bartlett publishers)
8. Molecular Genetics of bacteria, 3rd Edition by Larry Snyder and Wendy Champness (ASM press)

Course Code : PSC1MI-2 Title of the Paper :Environmental Microbiology and Sustainability
Credits : 4 Total No. of Lectures : 60 (15 Lectures/Unit)

Sub unit	Topics	No. of Lectures
Unit I	**Theories of evolution and astrobiology**	
1.1	History of evolution	**01**
1.2	**Theories of organic evolution** a. Lamarckism b. Darwinism c. Modern synthetic theory d. Germplasm theory e. Mutation theory	**04**
1.3	Introduction to molecular evolution	**01**
1.4	**Neutral theory of evolution** a. Polymorphism b. Divergence c. Near neutral theory of evolution	**03**
1.5	Mechanisms of Molecular Evolution and the Modern Molecular Clock	**02**
1.6	**Astrobiology** a. Introduction b. The space environment c. Microbiological studies in the space environment d. Microbial transfer through space	**04**
Unit II	**Microbial Diversity**	
2.1	The expanse of microbial diversity	**01**
2.2	Estimates of total number of species, measures and indices of diversity, the species concept for prokaryotes and eukaryotes	**03**
2.3	Culture-dependent microbiology	**03**
2.4	Newer approaches for exploring uncultivable bacteria: Culture independent molecular methods	**04**
2.5	Methods of extracting total bacterial DNA from a habitat; the metagenomic approach	**02**
2.6	**Bioprospecting** a. Pharmacologically active agents of microbial origin b. Industrial enzymes c. Novel antifoulants and anti-biofilm agents from microbes	**04**
Unit III	**Extremophiles**	
3.1	**Physiology, Biochemistry and Applications of:** a. Thermophiles b. Psychrophiles c. Piezophiles d. Radiation resistant organisms	**07**
3.2	**Physiology, Biochemistry and Applications of:**	**05**

	a. Acidophiles b. Alkaliphiles c. Halophiles	
3.3	Geo Microbiology – Bio corrosion and Bioleaching	**03**
Unit IV	**Environment & Natural Resource Management & Safety Standards**	
4.1	**Natural resources:** a. Renewable/ non-renewable resources of Land, water, forest, minerals, energy, food b. Associated problems and management practices c. Environmental Impact Assessment and Sustainable Development	**02**
	Solid waste management: a. Classification of solid waste b. Effects of solid waste pollution c. Key components of solid waste management 1. On site disposal options 2. Offsite disposal options d. Biodegradable waste from kitchen, abattoirs and agricultural fields and their recycling by aerobic composting or bio-methanation e. Non-biodegradable waste like plastics, glass, metal scrap, e waste and building materials, and its recycling	**04**
	Hazardous waste management: a. Hazardous wastes: definition, levels of biohazards, Risk assessment and handling procedures b. Xenobiotic compounds and its biodegradation c. Management of hazardous waste using biotechnological applications d. Examples: cyanide detoxification, petrochemical industry effluents, phenols, Hazardous waste from paint, pesticides and chemical industries Probable means to reduce these waste through Common Effluent	**05**
	Biosafety: a. Need for biosafety levels b. Biosafety guidelines for GMOs and LMOs c. Role of Institutional bio safety committee. RCGM, GEAC, etc. for GMO applications in food and agriculture d. Environmental release of GMOs e. Overview of national regulations and relevant international agreements f. Ecolabelling, ISO 14001 g. Generally Recognized as Safe (GRAS)	**04**
	Self-study topics: 1. Methods of extracting total bacterial DNA from a habitat 2. Case study : EIA report of a polluted ecosystem	

PRACTICALS BASED ON PSC1MIPR-2

1. Enrichment and isolation of cellulose degraders from natural resources
2. Isolation and characterization of thermophiles and thermotolerant organisms from hot spring water samples.
3. Screening of Halophilic bacteria from salt pans and identification of an isolate by conventional biochemical tests
4. Extraction of membrane lipids of halophilic archaea and its detection by TLC
5. Determination of Bacteria, algae and fungi present in natural ecosystems samples and calculate their relative abundance and frequency of occurrence
6. Determine the microbial activities in the soil samples by estimating hydrolysis of FDA
7. Extraction of community DNA from extreme habitat
8. Estimation of chromium using spectrophotometric method
9. Visit to common effluent treatment plant (cETP)

REFERENCES

Unit 1

1. Cell biology, genetics, Molecular Biology, Evolution and Ecology by P.S. Verma and V.K. Agarwal by S Chand publishers
2. Population Genetics by Matthew Hamilton, Wiley Blackwell, A John Wiley & Sons, Ltd., Publication
3. Principles of population genetics by Daniel Hartl and Andrew Clark 3rd edition, Sinauer Associates, Inc. Publishers
4. The causes of molecular evolution by John Gillespie, New York Oxford University Press 1991
5. Basic concepts of molecular evolution Anne- Mieke Van Damme (https://www.kuleuven.be/aidslab/phylogenybook/firstEdition/Chapter1.pdf)
6. Mechanisms of molecular evolution Tomoko Ohta National Institute of Genetics, Mishima, 411-8540, Japan (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1692885/pdf/11127908.pdf)
7. Molecular Evolution Lecture Notes Anders Gorm Pedersen (http://www.cbs.dtu.dk/dtucourse/cookbooks/gorm/27615/lecturenotebook.pdf)
8. .Space Microbiology ,Gerda Horneck, David M. Klaus, Rocco L. Mancinelli https://mmbr.asm.org/content/74/1/121.full
9 . Venturing into new realms? Microorganisms in space, Christine Moissl-Eichinger Charles Cockell Petra Rettberg (https://academic.oup.com/femsre/article/40/5/722/2198066)
10 . Minireview The theory and application of space microbiology: China's experiences in space experiments and beyond (https://onlinelibrary.wiley.com/doi/pdf/10.1111/1462-2920.13472)

Unit 2

1. Microbial diversity and bioprospecting by Alan T Bull
2. Microbial diversity – Exploration and Bioprospecting by S Ram Reddy, M A Singara Charya and Girisham , Scientific publishers (India)
3. Review Microbial Diversity: The Gap between the Estimated and the Known Luciana Cristina Vitorino https://pdfs.semanticscholar.org/f2d9/70d4ca8a5069cf95df1da44322dcaa01353a.p df
4. https://biomed.brown.edu/Courses/BIO48/20.SpeciesConcepts.HTML
5. https://www.researchgate.net/publication/264238213_Bioprospecting- download the pdf

Unit 3

1. Gerday, C., Glansdorff, N., & American Society for Microbiology. (2007). Physiology and biochemistry of extremophiles. Washington, D.C: ASM Press.
2. Horikoshi, K., Antranikian, G., Bull, A.T., Robb, F.T., Stetter, K.O. (Eds.) (2011), Extremophiles Handbook. Springer
3. Fred A. Rainey and Aharon Oren (2006). Methods in Microbiology - Volume 35, Extremophiles, 1st edi., Academic Press.
4. S.K.Kawatra and K.A. Natarajan,"Mineral Biotechnology- Microbial Aspects of Mineral Beneficiation, Metal Extraction, and Environmental Control", published by SME, Littleton, CO (USA) 2001
5. S.W.Borenstein, Microbiologically influenced corrosion handbook, Woodhead pub. Ltd., Cambridge (1994)
6. Microorganisms In Biofouling and Biocorrosion: https://nptel.ac.in/courses/113108055/module7/lecture34.pdf

Unit 4

1. Textbook for Environmental Studies For Undergraduate Courses of all Branches of Higher Education by Erach Bharucha for University Grants Commission
2. Essential environmental studies, S.P.Mishra, S.N.Pandey,Ane books pvt ltd
3. Environmental management, Jadhav H. V., 2002, Vipul Prakashan.
4. Environmental Biotechnology (Industrial Pollution Management) by S N Jogdand, Himalaya publishing house
5. Environment and Ecology, S.P.Mishra, S.N.Pandey, Ane books pvt ltd
6. Technical EIA guidance manual for Common Hazardous Waste Treatment, Storage and Disposal Facilities, Prepared by Ministry of environment and forests, Government of India, 2010: http://environmentclearance.nic.in/
7. Guidelines for environmentally sound management of e-waste, ministry of environment & forests central pollution control board, Delhi,2008: http://www.cpcb.nic.in/latest/e waste pdf
8. Evidence-Based Biosafety: a Review of the Principles and Effectiveness of Microbiological Containment Measures, 2008: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2493080/

Course Code	**: PSC1MI-3**	**Title of the Paper**	**: Biochemistry**
Credits	**: 4**	**Total No. of Lectures**	**: 60 (15 Lectures/Unit)**

Sub unit	Topics	No. of Lectures
Unit I	**Concepts in chemical reactivity and aqueous solution**	
1.1	Aqueous solutions: Concentrations based on weight, volume and degree of saturation. [Only problem solving]	**05**
1.2	Acids and bases Bronsted concept of conjugate acid-conjugate base, pH, pOH, buffers, titration curves, Hendersen - Hasselbach equation, polyprotic acids, amphoteric salts [problem solving]	**06**
1.3	Chemical reactivity and forces between molecules	**04**
Unit II	**Bioorganic molecules**	
2.1	**Protein Chemistry**: Peptides and the peptide bond, protein structures, protein types, factors determining structure , dynamics of globular proteins, Chaperonins, prion motifs and domains	**07**
2.2	**Carbohydrates**: Derivatives of monosaccharides, glycoconjugates, carbohydrates as informational molecules	**04**
2.3	**Lipids**: structural lipids, lipids as signal, cofactors and pigments	**02**
2.4	Coenzymes, antioxidants and metals	**02**
2.5	**Self-study**: Solve at least five problems given at the end of the chapter in Lehninger or any other textbook	
Unit III	**Degradation and transformation of organic molecules**	
3.1	Biotic reactions, mechanistic aspects Environmental factors affecting biodegradation	**03**
3.2	Degradation and transformation of aromatic compounds: monocyclic, polycyclic, carboxylates and related compounds, halogenated hydrocarbons	**10**
3.3	Persistence and biomagnification of xenobiotics	**02**
3.4	Self-study: identify a product containing aromatic compound and design a flow sheet to degrade or transform it	
Unit IV	**Physiology and metabolism of anaerobic bacteria**	
4.1	Anaerobes and oxygen, physiology of anaerobes, anaerobes in natural environments, types of anaerobic and microaerophilic bacteria	**08**
4.2	Techniques in Anaerobic Microbiology	**03**
4.3	Applications of anaerobes	**04**

PRACTICALS BASED ON PSC1MIPR-3

1. Preparation of buffers
2. Extraction, isolation, partial purification (if necessary), calculation of percentage yield and performing a confirmatory test for the following:
    a. Lactose from milk
    b. Albumins and globulins from egg white
3. Determination of pk values by titration curves
4. Interpretation of Ramchandran plot
5. Analysis/estimation of aromatic compounds like naphthalene
6. Cultivation of anaerobic bacteria using Gaspak method
7. Cultivation of anaerobes- *Clostridium* species using litmus milk, observation of stormy fermentation of milk, use of Robertson's cooked meat medium and anaerobic chamber
8. Anti-oxidant assay by DPPH method

REFERENCES

Unit 1

1. Biochemical calculations, Segel I.R., John Wiley and Sons, 1995
2. Schaum's solved problem series. 3000 solved problems in Chemistry. David E. Goldberg. McGraw Hill International Editions 1997
3. Biochemistry: The chemical reactions of living cells (Vol 1) David E. Metzler Academic Press

Unit 2

1. Biochemistry 3rd edition, Mathew, Van Holde and Ahern , Pearson Education
2. Lehninger-Principles of Biochemistry, Michael M. Cox and David L. Nelson, 5th Edition. W.H. Freeman and Company, New York reprinted 2008
3. Biochemistry, Voet D. and Voet J.G., 4th edition, 1995, John Willey and Sons Inc

Unit 3

1. Environmental degradation and transformation of organic chemicals- Alasdair H. Neilson and Ann-Safie Allard. CRC press, 2008
2. Biotransformations: Microbial degradation of health-risk compounds edited by Ved Pal Singh. Elsiever 1995.
3. Microbial Ecology: Fundamentals and applications 4th ed. Ronald H. Atlas and Richard Bartha. Reprint 2005. Pearson Education.
4. Environmental Microbiology. Raina M. Maier, Ian L. Pepper, Charles P. Gerba. Academic Press (Elsevier) 2000

Unit 4

1. Anaerobic bacteria K.T.Holland, J.S. Knapp, J.S. Shoesmith. Chapman &Hall, New York. 1987.
2. Bacterial Metabolism, Gottschalk, G., 2nd edition, 1985, Springer-Verlag
3. Brock Biology of Microorganisms. Michael Madigan, John M. Martinko. Pearson International edition. 11th edition

Additional Reading Material

1. Biochemistry and Physiology of anaerobic bacteria. Lars G. Ljungdahl, Michael Adams, Larry L. Barton et al. 2003 Springer-Verlag New York, Inc.
2. Principles of Biochemistry, Zubay, G., 4th edition, 1998, Wm.C. Brown Publishers
3. Laboratory manual in biochemistry by Jayaraman J. , New Age International Publishers .

4. An introduction to Practical biochemistry 3rd edition, David T Plummer, Tata McGraw Hill edition 1998

Course Code: PSC1MI-4 Title of the Paper: Medical Microbiology and Microbial Pathogenesis
Credits : 4 Total No. of Lectures: 60 (15 Lectures/Unit)

Sub unit	Topics	No. of Lectures
Unit I	**Mechanisms of Pathogenesis-1**	
1.1	Overview of bacterial mechanisms of evading/surviving host defense Bacterial persistence within the host a. Surviving phagocytosis eg: *Legionella*, *Salmonella*, and *Mycobacterium* b. Chronic infections eg: Brucellosis and typhoid fever	**01** **04**
1.2	Toxins and secretion systems a. Bacterial toxins and intoxications- eg: Diphtheria and Botulism-its regulation , mode of action b. Secretion Systems specific to Gram Negative Bacteria and Gram-Positive Bacteria	**02** **03**
1.3	Mechanisms of Virulence Regulation: I. Types of Regulation II. Bacterial communication and virulence: a. Quorum Sensing signalling molecules b. Mechanisms of quorum sensing in Gram Negative and Gram positive bacteria	**02** **03**
Unit II	**Pathogenesis and Human Microbiome**	
2.1	**Microbial biofilms** a. Structure, properties and formation b. Biofilm-related Infections on Tissue Surfaces c. Biofilms Associated with Medical Devices and Implants	**05**
2.2	**Antibiotic Resistance** a. Genetic Basis of antimicrobial resistance b. Mechanistic basis of antimicrobial resistance- modification of antibiotic molecules, decreased penetration and efflux, changes in target sites, Resistance Due to Global Cell Adaptations	**04**
2.3	**The Human Microbiome** a. Introduction to the concept of Microbiome, The Human Microbiome Project b. Gut microbiome- types of organisms, functions, role in health and disease	**06**
	Self-Study: 1. Current developments in the Human Microbiome project 2. Microbiome of any other system or organ other than gut	
Unit III	**Emerging infectious diseases in India and Epidemiology**	
3.1	Emerging infectious diseases (with emphasis on etiology, virulence mechanism, diagnosis and prevention)	**10**

	a. Pandemic Influenza b. Nipah Virus c. *Acinetobacter* d. *Candida auris* e. Hepatitis C f. Rickettsial infections	
3.2	**Epidemiology** a. Methods and procedures for epidemiological study of infections. b. Epidemiology of infectious diseases, case studies- food borne diseases, XDR-TB	**05**
Unit IV	**Clinical Bacteriology**	
4.1	Laboratory Methods for Antimicrobial susceptibility testing a. Conventional testing methods b. Commercial Testing methods c. Other methods- Time kill curves, Serum killing curves d. Testing antibiotic combinations	**04**
4.2	Detection of specific types of Antibiotic Resistance a. Methicillin(Oxacillin) resistant and decreased Vancomycin susceptibility in *Staphylococci spps.* b. Beta lactam resistance and Decreased susceptibility to Vancomycin in Enterococci	**04**
4.3	Quality Control in Medical Microbiology a. Laboratory design and safe microbiological practice GLP in culture and media preparation b. Sample management and Process control (an overview) c. Quality control of culture media, reagents, equipments, process, personnel, report	**07**

PRACTICALS BASED ON PSC1MIPR-4

1. Study of few virulence mechanisms in pathogens
2. Study of Quorum Sensing and Quorum sensing inhibitors in *C. violaecium*
3. Microbial Biofilm formation on various surfaces
4. Determination of Minimum Biofilm Inhibition Concentration of an antibiotic
5. Detection of specific types of Antibiotic Resistance.
    a. MRSA
    b. VRE
6. Antibiotic susceptibility testing- Conventional micro broth dilution method according to CLSI guideline.
7. Checker Board Assay for detecting synergistic activity of two antibiotics
8. Determination of Quality Assurance of laboratory media, reagents.
9. Problems on Epidemiology

TEXTBOOKS

1. Bacterial Pathogenesis- A Molecular Approach by Brenda Wilson, Abigail Saylers et al, Third ed, ASM Press, 2011
2. Virulence Mechanisms of Bacterial Pathogens, by Indira Kudva, Nancy Cornick et al, Fifth ed, ASM Press, 2016
3. Medical Biofilms-Detection Prevention and Control by Jana Jass, Susanne Surman et al, Wiley, 2003
4. The Human Microbiota and Microbiome ed by Julian Marchesi, Advances in Molecular and Cellular Microbiology 25, CAB International, 2014
5. A brief guide to emerging infectious diseases and zoonoses.WHO
6. Understanding emerging and re-emerging infectious diseases by Suparna Duggal and Jyoti Mantri Himalaya Publishing House
7. Friis, Robert H_Sellers, Thomas A, Epidemiology for Public Health Practice-Jones and Bartlett Learning (2014).pdf.
8. Principles of Epidemiology in Public Health Practice-Third Edition,An Introduction to Applied Epidemiology and Biostatistics –Centers for Disease Control and Prevention (CDC).
9. Handbook of Microbiological Quality Control, Pharmaceutical and Medical DevicesRosamund M Baird. (CRC Press)
10. Introduction to Diagnostic Microbiology for the Laboratory Sciences, Maria DannessaDelost, 2015, Jones and Bartlett Learning
11. Ananthanarayan and Paniker's Textbook of Microbiology, by Reba Kanungo, 10thedUniversities Press; Tenth edition, 2017
12. Bailey and Scotts Diagnostic Microbiology Forbes, Sahem et al 12thed, Moshby

REFERENCES

1. Micromanagement in the gut: micro environmental factors govern colon mucosal biofilm structure and functionality by Rosemarie De Weirdt and Tom Van de Wiele, Biofilms and Microbiomes (2015) 1, 15026; doi:10.1038/npjbiofilms.2015.26
2. Clinical and Pathophysiological Overview of Acinetobacter Infections: a Century of Challenges, Clin Microbiol Rev 30:409 –447.https://doi.org/10.1128/CMR.00058- 16.Published on 14th Dec, 2016
3. Nett JE (2019) *Candida auris*: An emerging pathogen "incognito"? PLoSPathog 15(4): e1007638. https://doi.org/10.1371/journal.Published: April 8, 2019
4. Spivak ES, Hanson KE. 2018. Candida auris: an emerging fungal pathogen. J Clin Microbiol56:e01588-17. https://doi.org/10.1128/JCM.01588-17.
5. Ang BSP, Lim TCC, Wang L. 2018. Nipah virus infection. J Clin Microbiol 56:e01875-17.https://doi.org/10.1128/JCM.01875-17.
6. Abdad MY, Abou Abdallah R, Fournier P-E, Stenos J, Vasoo S. 2018. A concise review of the epidemiology and diagnostics of rickettsiases: Rickettsia and Orientia spp. J Clin Microbiol56:e01728-17. https://doi.org/10.1128/JCM.01728-17.
7. Rickettsial Infections: Indian Perspective Narendra Rathi And Akanksha Rathi, Indian Pediatrics Vol 47 February 17, 2010
8. Special Article on Quality Assurance in Microbiology by D.R. Arora- Indian Journal of Medical Microbiology, (2004) 22 (2) : 81-86.

M. Sc. I Microbiology Semester II Syllabus

Course Code: PSC2MI-1 **Title of the Paper: Molecular Genetics -2**

Credits : 4 **Total No. of Lectures: 60 (15 Lectures/Unit)**

Sub unit	Topics	No. of Lectures
Unit I	**Regulation of Gene Expression in Eukaryotes**	
1.1	**Control of Gene Expression in Eukaryotes:**	
	1.1.1 Role of regulatory proteins, activators and repressors molecules	**05**
	1.1.2 The Role of Chromatin in Regulating Gene transcription	**02**
	1.1.3 Silencing and Genomic Imprinting	**02**
	1.1.4 RNA Processing Control	**02**
	1.1.5 RNA Interference	**02**
	1.1.6 Post transcriptional regulation of gene expression	**02**
Unit II	**Genetic Regulation of the Development Of *Drosophila* , Organelle DNA & Population Genetics**	
2.1	**Drosophila developmental** a. Stages b. Embryonic development c. Maternal effect genes d. Segmentation genes e. Homeotic genes	**04**
	Self-study: Drosophila a traditional geneticist's and embryologist ‘s tool.	**04**
2.2	**2.2.1 Organelle DNA:** a. The genetics of organelle encoded traits b. The endosymbiotic theory **2.2.2 Mitochondrial DNA** a. The gene structure and organization of mitochondrial DNA b. Non universal codons in Mitochondrial DNA, replication, transcription and translation of Mitochondrial DNA c. Evolution of Mitochondrial DNA **2.2.3 Chloroplast DNA** a. Properties similar to Eubacterial DNA b. Gene structure and organization of chloroplast DNA c. Replication, transcription and translation of chloroplast DNA	**02** **03** **02**
2.3	**Population genetics** 1. Genetic structure of population 2. Hardy-Weinberg Law 3. Genetic variation in space and time 4. Genetic variation in Natural population 5. Forces that change gene frequencies in populations: a. Mutation b. Random genetic drift c. Migration d. Natural selection	**05**

	e. Balance between mutation and selection f. Assertive mating g. Inbreeding 6. Summary of the effects of evolutionary forces on the genetic structure of population 7. The role of genetics in conservation Biology	
Unit III	**Molecular Tools For Genetics**	
3.1	Polymerase Chain Reaction- Fundamentals of the PCR, Variations/ Modifications of PCR: Reverse transcriptase PCR, Differential display PCR, Real time Fluorescent PCR, Hot- Start PCR, Multiplex PCR, Nested PCR, Applications	**05**
3.2	**Molecular tools for studying genes and gene activity** 3.2.1 Molecular separations: Gel electrophoresis, Two-dimensional gel electrophoresis 3.2.2 Labelled tracers: Autoradiography, Liquid scintillation counting Nonradioactive tracers 3.2.3 Using nucleic acid hybridization: Southern blots, DNA fingerprinting and DNA typing, In situ hybridization: Locating genes in chromosomes, Immunoblots 3.2.4. DNA sequencing and physical mapping: The Sanger Chain-Termination Sequencing method, High-throughput Sequencing, Restriction Mapping, Site-directed mutagenesis 3.2.4 Mapping and quantifying transcripts, Northern blots, S1 mapping, Primer extension, Run-off transcription and G-less cassette transcription 3.2.5 Measuring transcription rates in vivo: Reporter gene transcription, Measuring protein accumulation in vivo: Assaying DNA – protein interactions, foot printing methods, Chromatin immune-precipitation (ChIP) 3.2.6 Knockouts: Gene knock out in yeast, Gene knockouts in mouse, Knocking down expressed gene by RNA interference (RNAi)	**10**
Unit IV	**Metagenomics, Comparative & Functional Genomics, Proteomics**	
4.1	**Metagenomics** 4.1.1 Comparative Genomics: finding Genes that make us human, recent changes in the human genome 4.1.2 Characterization of Gene amplification and deletions in Cancer using DNA microarrays (Representational Oligonucleotide Microarray Analysis (ROMA) 4.1.3 Functional genomics-DNA Microarray technology, Serial analysis of gene expression (SAGE)	**08**
4.2	**Proteomics** 4.2.1 Separation and identification of proteins (2D PAGE, MALDI –TOF), Protein profiling (LC-MS) 4.2.2 Protein interaction by Co-immunoprecipitation, protein tagging system, Protein Microarrays, Protein-protein interaction Mapping (Two hybrid assay, TAP tag procedure)	**07**
	Self-study: Use of MALDI-TOF for identification of microbial cultures	

PRACTICALS BASED ON PSC2MIPR-1

1. Southern hybridization technique [Demonstration]
2. Northern Blotting technique [Demonstration]
3. Western blotting [Demonstration]
4. Restriction digestion of DNA &Restriction mapping
5. Design of primer & its use for polymerization by PCR
6. DNA electrophoresis
7. Protein electrophoresis (PAGE)
8. Problems on population genetics
9. LC-MS protein expression profile , MALDI-TOF, Microarray- Visit to research institute

REFERENCES

1. iGenetics- A Molecular Approach, Russell, P.J., 3rd edition, 2010, Pearson International edition
2. Fundamental Bacterial Genetics, Trun, Trempy, 1st edition, 2004, Blackwell Publishing
3. Molecular Biology of the Gene, Watson, Baker, Bell, Gann, Levine, Losick, 7th edition, 2007, Pearson Education
4. Genes IX, Lewin, B., 2006, Jones and Bartlett Publishers
5. Genetics: A Conceptual Approach, Benjamin Pierce 4th edition, 2008, W. H. Freeman & Co
6. Principals of Genetics, Snustad & Simmons, 6th edition, 2012, John Wiley & Sons Inc
7. Molecular biology –Genes to proteins 3rd ed. by Burton E. Tropp (Jones & Bartlett publishers)
8. Molecular Genetics of bacteria, 3rd Edition by Larry Snyder and Wendy Champness (ASM press)
9. Molecular biology -Understanding the Genetic Revolution by David P. Clark(Elsevier Academic press)
10. Molecular Biotechnology Principles and applications of Recombinant DNA 4th edi Glick, Pastermak, Patten
11. Recombinant DNA J.D. Watson 2nd ed
12. PCR, Clive R. Newton, Alex Graham. (1997); BIOS Scientific Publishers.
13. Molecular Biology by R. F. Weaver 3rd edition, McGraw-Hill international edition

Course Code: PSC2MI-2 **Title of the Paper: Research Methodology, Bioinformatics & Biostatistics**
Credits : 4 **Total No. of Lectures: 60 (15 Lectures/Unit)**

Sub unit	Topics	No. of Lectures
Unit I	**Research terminology and fundamentals**	
1.1	1.1.1 Definition of research, Scientific thinking, significance of research, general characteristics of research, objectives of research, classification and types of research, types of research methods 1.1.2. Research methods verses methodology, research and scientific method, Criteria of good research 1.1.3. Identification and formulation of research problem 1.1.4. Study designs	**05**
1.2	**Communication & Scientific Writing** <u>1.2.1 Communication skills</u> 1.2.1.1. The importance of communication through English 1.2.1.2. The process of communication and factors that influence communication sender, receiver, channel, code, topic, message, context, feedback, noise, filters & barriers 1.2.1.3. Verbal and non-verbal communication: body language 1.2.1.4. comparison of general communication and business communication, science communication 1.2.1.5. Presentation skills- structure of presentation- Types of presentation, oral, power point -Handling power point, slides organisation, content, body language, gestures, voice modulation <u>1.2.2 Scientific Writing</u> 1.2.2.1 General structure of scientific reports :- Different types of scientific documents - journal articles, books, thesis, conference and project reports 1.2.2.2 Components of a research paper - Publication process, copyright transfer. Open access 1.2.2.3. Literature search 1.2.2.4. Formulation of research proposal 1.2.2.5. Style of referencing(citation styles)- Harvard, Vancouver, APA, MLA reference writing, Vancouver, APA, MLA reference writing	**05** **05**
Unit II	**Processing & analysis of data**	
2.1	**Hypotheses** 2.1.1 Meaning, nature of hypothesis, 2.1.2 Functions of hypothesis 2.1.3 Importance of hypothesis 2.1.4 Kinds of hypothesis 2.1.5 Characteristics of good hypothesis 2.1.6 Formulation of hypothesis	**07**
2.2	**Data collection and processing** 2.2.1 Definition, scope and limitations of data collection and processing	**08**

	2.2.2 Sampling-sampling frame, importance of probability sampling, simple random sampling, systemic sampling, stratified random sampling, cluster sampling 2.2.3 Types of data, Collection of data, classification & tabulation-diagrammatic & graphical representation ,Primary data, secondary data 2.2.4 Measurement scales, variables & their measurements 2.2.5 Validity, effect measure and choice of statistical test 2.2.6 Experimental protocols	
Unit III	**Statistics in research**	
3.1	3.1.1 Measures of central tendency -mean, median, mode, geometric mean 3.1.2 Measures of dispersion- Range, Q.D., M.D., variance, standard deviation 3.1.3 Correlation and Regression analysis: Correlations and regressions-: Relation between two variables, scatter diagram, definition of correlations & their equations, interpretation of regression coefficients, principles of least squares, Two regression lines, curve fitting Karl Pearson's coefficient of correlation, Spearman's coefficient of correlation	**05**
3.2	Hypothesis testing 3.2.1 Null and alternate hypothesis 3.2.2 Type-I & Type-II errors 3.2.3 Level of significance 3.2.4 Power of test 3.2.5 p value	**03**
3.3	**Parametric tests** 3.3.1 Large sample Tests a. Testing significance of single population mean b. Testing significance of two population mean 3.3.2 Small sample Tests a. Testing significance of single population mean b. Testing difference between two independent normal population mean c. Testing difference between two correlated normal population mean d. Testing significance of correlation coefficient 3.3.3 $\chi 2$ test a. Testing single population variance b. Testing Goodness of fit c. Testing association between two attributes 3.3.4 F-test- Testing equality of variance a. ANOVA- one-way classification, two way classification	**07**
Unit IV	**Bioinformatics**	
4.1	4.1 Introduction and Revision of T.Y.B.Sc topics to give an overview of bioinformatics 4..1.1 Biological databases-nucleic acid sequence databases- gene bank/ EMBL/ DDBJ	**01** **01** **03**

	4.1.2 Protein sequence data bases- (UniProtKB), Derived databases(Prosite, BLOCKS, Pfam/Prodom) Structural databases (PDB , NDB) and Enzyme databases	
4.2	4.2.1 Concept in sequence analysis - Needleman & Wunsch , Smith & Waterman alignment algorithms 4.2.2 Scoring Matrix for nucleic acids and protein- MDM.BLOSUM.CSW 4.2.3 Alignment: Pair wise BLAST, FASTA 4.2.4 Multiple sequence alignment, PRAS, CLUSTAL W	**01** **01** **01** **01**
4.3	Phylogenetic analysis and Tree construction Basic concepts of phylogenetic analysis, rooted/uprooted trees, approaches for phylogenetic tree construction	**02**
4.4	Structure predictions for proteins- Basic approaches for protein structure predictions, comparative modelling, fold recognition	**02**
4.5	Chemo-informatics- Introduction, applications in pharmaceutical industries	**01**
4.6	Immuno-informatics- Overview, Reverse vaccinology , Rational Vaccine design	**01**
	Self-Study : Study of 3D structures of enzymes /protein	

PRACTICALS BASED ON PSC2MIPR-2

1) Literature review on any current research of 30-40 types pages (It can be on the research project topic that the student wishes to do in MSC part2)
2) Problem solving in biostatistics (Correlation, regression and testing of statistical hypothesis)
3) Practical Based On Bioinformatics-
   a. Visiting NCBI and EMBL websites & list services available, software tools available and databases maintained
   b. Visiting & exploring various databases mentioned in syllabus
   c. Using BLAST and FASTA for sequence analysis
   d. Fish out homologs for given specific sequences (by teacher) - decide sequence of some relevance to their syllabus and related to some biological problem e.g. evolution of a specific protein in bacteria, predicting function of unknown protein from a new organism based on its homology)
   e. Six frame translation of given nucleotide sequence
   f. Restriction analysis of given nucleotide sequence
   g. Pair-wise alignment and multiple alignment of a given protein sequences
   h. Formation of phylogenetic tree

BOOKS

1) Research Methodology: A guide for Researchers in Agricultural Science, Social Science and other related fields. Pradip kumar Sahu. Springer 2006
2) Ranjit Kumar, 2005 Research Methodology- A step-by-step Guide for beginners, 3rd edition, Sage publications.
3) Fundamentals of Research methodology and statistics- Yogesh Kumar Singh, New Age International Publishers

4) Biostatistics: A foundation for analysis in health sciences. Daniel WW, Cross CL. 10thEdn, Wiley.2013

5) Mount, D. W. (2001) Bioinformatics: sequence and genome analysis. Cold Spring Harbor Laboratory Press, New York.

6) Introduction to Bioinformatics T.K. Attwood and D.J Perry-Smith

7) Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins by Baxevanis A.D. and Ouellette, Third Edition. John Wiley and Son Inc., 2005

REFERENCE BOOKS

1) Biostatistical Analysis. Zar JH. 5th Edition Pearson Education.2010.

2) Principles of Biostatistics. Pagano M., Gauvreau K., 2ndEdn. Cargege Learning, 2010

3) Fundamentals of Biostatistics. Rosner B. 7thEdn. Duxbury Thomson 2011

4) Introductory Applied Biostatistics D'Agostino RB., Sullivan LM., Beiser AS., Thomson Brooks/Cole 2006

5) Statistical Analysis In Microbiology: Statnotes, By Richard A. Armstrong And Anthony C. Hilton, A John Wiley & Sons, Inc. Publication, ISBN: 978-0-470-55930-7 December 2010 Wiley-Blackwell 192 Pages

Course Code : PSC2MI-3 **Title of the Paper: Applied Biochemistry**
Credits : 4 **Total No. of Lectures: 60 (15 Lectures/Unit)**

Sub unit	Topics	No. of Lectures
Unit I	**Enzymes: the catalysts of Cells**	
1.1	Information from kinetics, specificity of enzymatic action, mechanisms of catalysis	**07**
1.2	Inhibition and activation of enzymes	**02**
1.3	Enzyme isolation and purification	**06**
	Self-study: Draw Eadie-Hofstee, Hanes-Woolf plot, Dixon plot and Cornish-Bowden plot and interpret	
Unit II	**Signaling and stress**	
2.1	Introduction to two-component signalling systems	**07**
2.2	Synthesis of virulence factors in response to temperature, pH, nutrient, osmolarity and quorum sensors, chemotaxis, photoresponses, aerotaxis	**04**
2.3	Bacterial development and quorum sensing: Myxobacteria, Caulobacter, bioluminescence systems similar to LuxR/LuxI in non-luminescent bacteria	**04**
Unit III	**Natural and Unusual bio-molecules and bioactive compounds**	
3.1	Bioactive proteins & peptides: peptides as bioactive agents, peptides with anti-oxidative activity, antimicrobial peptides, enzyme based antimicrobial proteins, non-enzyme based antimicrobial proteins, commercialization of antimicrobial proteins and peptides. Lectins, surfactants, albumin, cryoprotectants, lyoprotectants	**09**
3.2	Classes of Natural Products: polyketides, terpenes & steroids, alkaloids, phenylpropanoids, Flavonoids. Non coding RNAs	**04**
3.3	Functional carbohydrates and hydrocolloids Cereal βGlucans, modified starch, microbial Polysaccharides, Chitosan	**02**
	Self-study: A report on source, structure and application on unusual hydrocolloid/ lipid(etc) molecules other than that listed above	
Unit IV	**Metabolism of one and two carbon compounds**	
4.1	**Metabolism of one carbon compounds** a. Methylotrophs: Oxidation of methane, methanol, methylamines and carbon assimilation in methylotrophic bacteria and yeasts b. Methanogens: Methanogenesis form H_2, CO_2, CH_3OH, HCOOH, methylamines, energy coupling and biosynthesis in methanogenic bacteria c. Acetogens: autotrophic pathway of acetate synthesis and CO2 fixation, d. Carboxidotrophs: Biochemistry of chemolithoautotrophic metabolism e. Cynogens and cynotrophs: cynogenesis and cyanide degradation	**11**
4.2	**Metabolism of two carbon compounds** a. Acetate-TCA and Glyoxylate cycle, modified citric acid cycle, carbon monoxide dehydrogenase pathway and disproportionation to methane b. Ethanol-acetic acid bacteria c. Glyoxylate and glycollate-dicarboxylic acid cycle, glycerate pathway, beta hydroxy aspartate pathway d. Oxalate as carbon and energy source	**04**

PRACTICALS BASED ON PSC2MIPR-3

1. Isolation, partial purification and study of enzyme kinetics of amylase.
2. Adaptation of *E. coli* to anaerobiosis
3. Effect of temperature and water activity on swarming of *Proteus spps*
4. Isolation of amylopectin and amylose from potato starch.
5. Isolation of Lycopene from tomatoes
6. Preparation of lectin from plant source and its application
7. Isolation of *Oxalobacter Sp.*

REFERENCE BOOKS

Unit I

1. Biochemistry: The chemical reactions of living cells (Vol 1) David E. Metzler. Academic Press.
2. Fundamentals of enzymology. 2nd edition. Nicholas C. Price and Lewis Stevens. Oxford Science Publication. Reprint 1998.

Unit II:

1. The physiology and biochemistry of prokaryotes, White D., Drummond, T. J. and Fuqua C., 3rd edition, 2007, Oxford University Press

Unit III:

1. Bioactive food proteins & peptides Applications in human health, ed Navam S. Hettiarachchy, CRC press, 2012
2. Natural products: the secondary metabolites. James R. Hansen. Royal Society of Chem.
3. Development & manufacture of Protein Pharmaceuticals. Ed Steven L. Nail and Michael J. Akers. Springer Science 2002 [ISBN 978-1-4615-0549-5]
4. Functional food carbohydrates. Costas G. Biliaderis and Marta S. Izydorczyk. CRC press 2007.
5. Chemistry of Natural products by SV Bhat, BA Nagasampagi& M Sivakumar, Berlin Springer (2005) (ISBN 3-540-40669-7).
6. Handbook of hydrocolloids. 2nd edition. Ed G.O. Phillips and P.A. Williams. CRC Press. Woodhead Publishing Limited [ISBN-978-1-84569-587-3]

Unit IV

1. Bacterial metabolism by Gottschalk, Springer-Verlag, 1985
2. Biotechnology H.J. Rehm and G. Reed (ed.), Volume 6a. Biotransformations, Verlag and Chemie, 1984

REFERENCE BOOKS

1. Laboratory manual in biochemistry by Jayaraman J. , New Age International Publishers .
2. Enzymes 3rd edition. Malcolm Dixon and Edwin C. Webb. Longman Group 1979.
3. An introduction to practical biochemistry 3rd . edition, David T Plummer, Tata McGraw Hill edition 1998
4. Experimental biochemistry –A student companion, Rao Beedu, S. Deshpande, IK international Pvt. Ltd.
5. Laboratory manual in biochemistry, Immunology and Biotechnology, Nigam A and Ayyagiri A. Tata McGraw Hill edition
6. Source of Experiments for teaching Microbiology, Primrose and Wardlaw
7. Microbial Physiology and Biochemistry Laboratory manual: A quantitative approach , David White

Course Code	**: PSC2MI-4**	**Title of the Paper: Applied Immunology**	
Credits	**: 4**	**Total No. of Lectures:**	**60 (15 Lectures/Unit)**

Sub unit	Topics	No. of Lectures
Unit I	**Adversarial strategies during infection**	
1.1	1.1.1 Bacterial survival strategies a. Evading complement b. Evading killing by macrophages 1.1.2 The host counter attack against bacteria a. Toxin neutralization b. Opsonization of bacteria 1.1.3 The habitat of intracellular bacteria: Bacterial survival strategies a. Defence against intracellular bacteria b. Role of activated Macrophages 1.1.4 Viral survival strategies a. Antigenic variations b. Non-functional T- cell epitopes c. Interference with antigen processing and/ or presentation d. Interference with immune effector mechanism 1.1.5 Immunity to fungi	**10**
1.2	**Vaccines** 1.2.1. Subunit vaccines a. Purified components as bacterial vaccines b. Viral subunit as vaccine c. Carbohydrate vaccine d. DNA and RNA vaccines 1.2.2 Newer approaches to vaccine development 1.2.3 Current vaccines 1.2.4 Difficulties in the development of Parasitic vaccines : Malaria 1.2.5 Vaccines for protection against bioterrorism 1.2.6 Immunization against cancer	**05**
	Self-study : Vaccines under development	
Unit II	**Immunodeficiency**	
2.1	2.1.1 Deficiencies of pattern recognition -Receptor signalling 2.1.2 Phagocytic cell defects 2.1.3 Complement system deficiencies 2.1.4 Cytokine and cytokine receptor deficiencies 2.1.5 Primary B-cell deficiency 2.1.6 Primary T- cell deficiency 2.1.7 Severe combined immunodeficiency 2.1.8 Diagnosis and treatment of primary immunodeficiency	**08**
2.2	**Immune Tolerance** 2.2.1 Major mechanisms for achieving tolerance	**07**

	2.2.2 Central Tolerance 2.2.3 Peripheral Tolerance 2.2.4 Tolerance induction 2.2.5 Immunoprivileged sites - The brain, the eyes	
Unit III	**Advances in Allergy and other hypersensitivities**	
3.1	3.1.1 Type – I hypersensitivity 3.1.2 Type – II hypersensitivity 3.1.3 Type – III hypersensitivity 3.1.4 Type – IV hypersensitivity 3.1.5 Type - V hypersensitivity (Mechanism/principle, examples, diagnosis and treatment of these hypersensitive)	**07**
3.2	**Transplantation and Transfusion Immunology** 3.2.1 Types of Graft 3.2.2 Types of graft rejection 3.2.3 Mechanisms of graft rejection 3.2.4 Matching the donor and recipient 3.2.5 Immuno-suppression 3.2.6 The foetus as an allograft 3.2.7 Blood transfusion - Blood grouping and cross matching - Transfusion reactions - Criteria for selection and rejection of Blood Donor	**08**
Unit IV	**Immunological disorders**	
4.1	**Tumor Immunology** 4.1.1 Cell- intrinsic and extrinsic mechanisms of tumor suppression 4.1.2 Role of inflammation in the enhancement of tumor initiation, promotion and progression 4.1.3 Tumor antigens and their classes 4.1.4 Approaches to cancer immunotherapy a. Passive immunotherapy with monoclonal antibodies b. Unmasking of the latent T- cell responses c. Antigen independent cytokine therapy	**07**
4.2	**Autoimmune diseases** 4.2.1 Causes 4.2.2 Mechanisms 4.2.3 Pathogenic effects of autoantibody 4.2.4 Pathogenic effects of complexes with auto antigens 4.2.5 T cell mediated hypersensitivity as a Pathogenic factor in autoimmune disease	**08**
	Self-Study Topics 1. Case studies – Autoimmune diseases 2. Case studies - Use of Immune therapies in cancer, transplantation and other immunological disorders	

PRACTICALS BASED ON PSC2MIPR-2

1. Hemoglobin estimation by Cyanmethaemoglobin method using Drabkins Fluid as one of the criteria used for selection of blood donor during collection of blood for safe transfusion.
2. Blood grouping and Compatibility testing /cross matching of blood for safe blood transfusion.
3. Determination Of Enzymes Of Oxidative Stress (SOD And Catalase)
4. NBT (nitroblue tetrazolium) Analysis Of Blood Sample
5. Serum Lysozyme Activity
6. Serum Myeloperoxidase Activity (MPO)
7. Rheumatoid factor test for laboratory diagnosis of Rheumatoid arthritis
8. Lupus erythematosus (LE) cell preparation-Principle, Procedure and Significance to be explained during the practicals using permanent slides/ color atlas of diagnostic immunology/Microbiology
9. RIST and RAST- Principle, Procedure and Significance to be explained during the practicals using power point presentation/ youtube.

Text books

1. Roitt's Essential Immunology 13th Ed. –Wiley Blackwell
2. Kuby Immunology 6th Ed – W. H. Freeman and Company, New York

Reference Books

1. Immunology –Essential and Fundamental – Sulbha Pathak, Urmi Palan, 3rd Ed. Capital Publishing Company (New Delhi-Kolkata)
2. Kuby Immunology 7th Ed – W. H. Freeman and Company, New York
3. Kuby Immunology 8th Ed – Macmillan education
4. Immunology – An Introduction 4th Ed – Tizard
5. Elements of Immunology- Fahim Halim Khan –Pearson Education
6. Medical Laboratory Technology - Kanai Mukherjee vol. 1

Evaluation Pattern

Choice Based Credit System (CBCS)

❖ **Revised Scheme of Examination**

The performance of the learners shall be evaluated into two parts. The learner's performance shall be assessed by Internal Assessment with 40% marks in the first part and by conducting the Semester End Examinations with 60% marks in the second part. The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below-

A) Internal Assessment: 40 % 40 Marks

Sr. No.	Particular	Marks
01	One periodical class test / online examination to be conducted in the given semester	20 Marks
02	Any two tools out of these (10 Marks each) 1. Group/ Individual Project 2. **Presentation and write up on the selected topics of the subjects (Semester I & II) / Case studies (Semester II)**. 3. Test on Practical Skills 4. Open Book Test **5. Quiz (Semester I)**	20 Marks

Question Paper Pattern

(Periodical Class Test for the Courses at Post-Graduate Programmes)

❖ Maximum Marks: 20

❖ Duration: 30 Minutes

Particular	Marks
Match the Column / Fill in the Blanks / Multiple Choice Questions/ True/False/Answer in One or Two Lines (Concept based Questions) (1 Marks each)	20 Marks

B) Semester End Examination: 60 % 60 Marks

- Duration: The examination shall be of $2\frac{1}{2}$ hours duration.

Question Paper Pattern

Theory question paper pattern
1. There shall be five questions each of 12 marks. 2. All questions shall be compulsory with internal options. 3. Question may be subdivided into sub-questions a, b, c… and the allocation of marks depends on the weightage of the unit.

❖ **Passing Standard**

The learners shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment and Semester End Examination. The learners shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 24 Out of 60) separately, to pass the course and minimum of grade D in each project wherever applicable to pass a particular semester.

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR

ARTS, COMMERCE & SCIENCE COLLEGE, NEW PANVEL (AUTONOMOUS)

Re-accredited 'A+' Grade by NAAC

'College with Potential for Excellence' Status Awarded by UGC

'Best College Award' by University of Mumbai

Affiliated to University of Mumbai with an Autonomous Status

Program: M.Sc. Biotechnology

M.Sc. Part-I

(Semester I & II)

Choice Based Credit & Grading System (60:40)

Total Credits: 96

(To be implemented from Academic Year 2022-2023)

(Approved in the academic council meeting held on _____)

Preamble:

Master of Science (M.Sc.) Programme in Biotechnology is a P.G. Programme of Department of Biotechnology, Changu Kana Thakur Arts, Commerce & Science College, New Panvel, affiliated to University of Mumbai with an Autonomous status. Biotechnology is technology based on biology. Biotechnology harnesses cellular and bio-molecular processes to develop technologies and products that help to improve our lives and the health. Modern biotechnology provides breakthrough products and technologies to combat debilitating and rare diseases, reduce our environmental footprint, feed the hungry, cleaner energy, and have safer, cleaner, and more efficient industrial manufacturing processes.

The Choice Based Credit and Grading System (CBCGS) to be implemented through this curriculum would allow students to develop a strong footing in the fundamentals and specialize in the disciplines of his/her liking and abilities. The proposed credit-based curriculum and grading system will even add much more to the existing interdisciplinary nature of biotechnology.

Under the 'autonomy' we have made an attempt to design Master's in Biotechnology course syllabus to cater to the needs of credit based- semester and grading system. The changing scenario of higher education in India and abroad is taken into consideration to make this syllabus more oriented towards current need of modern research and industrial sectors.

The present M.Sc. Biotechnology Second Year (Semester-I and II) syllabus is based on the remodeled M.Sc. Biotechnology Curriculum, May 2017, Department of Biotechnology, Ministry of Science and Technology, Government of India and revised syllabus of University of Mumbai. Syllabus is robust and well-designed to enable students to pursue high quality research or increase employability of the students.

It is hoped that the revised syllabus shall serve its objective of promoting outcome-based learning to meet the changing needs of the biotechnology sector.

Programme Outcomes for M.Sc. Degree

Sr. No.	OUTCOME FOR M.Sc. PROGRAMME	GRADUATE ATTRIBUTE
After completion of M.Sc. programme students will acquire		
PO-1	The ability to identify and describe broadly accepted methodologies of science, and different modes of reasoning.	Disciplinary knowledge
PO-2	An ability to demonstrate proficiency in various instrumentation, modern tools, and advanced techniques to meet industrial expectations and research outputs.	Disciplinary knowledge
PO-3	Ability to identify problems, formulate, and prove hypotheses by applying theoretical knowledge and skills relevant to the discipline.	Problem-solving
PO-4	The ability to articulate thoughts, research ideas, information, scientific outcomes in oral and in written presentation to range of audience.	Communication skills
PO-5	A capacity for independent, conceptual, and creative thinking, and critical analysis through the existing methods of enquiry.	Critical thinking
PO-6	Acquisition of skills required for cutting edge research, investigations, field study, documentation, networking, and ability to build logical arguments using scholarly evidence.	Research skills
PO-7	An ability to portray good interpersonal skills with the ability to work collaboratively as part of a team undertaking a range of different team roles	Teamwork
PO-8	The ability to understand ethical responsibilities and impact of scientific solutions in global, societal, and environmental context and contribute to sustainable development.	Moral and ethical awareness/ multicultural competence
PO-9	An openness to and interest in, life-long learning through directed and self-directed study.	self-directed learning
PO-10	The ability to translate the knowledge and demonstrate the skills required to be employed and successful professional development.	Life-long learning

Programme Specific Outcomes for M.Sc. Biotechnology

Name of the Programme:	M.Sc. Biotechnology
Upon completion of M.Sc. Biotechnology programme students will be able to:	
PSO-1	Demonstrate comprehensive knowledge and interdisciplinary skills in the core and allied courses in biotechnology along with other emerging trends.
PSO-2	Apply modern Bio-analytical tools, techniques, software and equipment to analyze and solve problems in different areas of biotechnology.
PSO-3	Design research problems, test hypothesis, prepare scientific report and use biostatical and bioinformatics tools for data interpretation and draw conclusions.
PSO-4	Apply entrepreneurial skills and appraise bioethics, biosafety, research ethics, and plagiarism and intellectual property rights.

M.Sc. Biotechnology Course Structure

Semester I

Course	Course Type	Course code	Marks	Credits	Nos of Lectures / week
1.1. Advanced Biological Chemistry	Core Course	PBT1ABC	100	4	4
1.2. Immunology	Core Course	PBT1IMM	100	4	4
1.3. Molecular Biology	Core Course	PBT1MOB	100	4	4
1.4. Emerging Techniques in Biological Sciences	Core Course	PBT1ETB	100	4	4
1.5. Practical-I Practical's of PBT1ABC & PBT1IMM	Core Course	PBT1PR1	100	4	8
1.6. Practical-II Practical's of PBT1MOB & PBT1ETB	Core Course	PBT1PR2	100	4	8
		Total	**600**	**24**	**32**

Semester II

Course	Course Type	Course code	Marks	Credits	Nos of Lectures / week
2.1. Metabolism	Core Course	PBT2MET	100	4	4
2.2. Cellular Processes and Developmental Biology	Core Course	PBT2CPD	100	4	4
2.3. Bioprocess Technology	Core Course	PBT2BPT	100	4	4
2.4. Research Methodology and Scientific Communication Skills	Core Course	PBT2RMS	100	4	4
2.5. Practical-I Practical's of PBT2MET & PBT2CPD	Core Course	PBT2PR1	100	4	8
2.6. Practical-II Practical's of PBT2BPT & PBT2RMS	Core Course	PBT2PR2	100	4	8
		Total	**600**	**24**	**32**

Examination Scheme

Choice Based Credit System (CBCS)

Revised Scheme of Examination

The performance of the learners shall be evaluated into two parts. The learner's performance shall be assessed by Internal Assessment with 40% marks in the first part and by conducting the Semester End Examinations with 60% marks in the second part. The allocation of marks for the Internal Assessment and Semester End Examination are as shown below:

A) INTERNAL ASSESSMENT : 40% **40 Marks**

Sr. No	Particular	Marks
1	One periodical class test/ online examination to be conducted in the given semester.	20 Marks
2	Any two tools out of these (10 Marks each)	20 Marks
	Group/Individual Project	
	Presentation and write-up on the selected topics of the subjects / Case studies	
	Test on Practical Skills	
	Open Book Test	
	Quiz	

Question Paper Pattern

(Periodical Class Test for the courses at Post-Graduate Programmes)

Maximum Marks: 20
Duration 30 Minutes

Particular	Marks
Match the column / Fill in the Blanks / Multiple Choice Questions / True/False / Answer in One or Two Lines (Concept based Questions) (1 Mark each)	20 Marks

B) Semester End Examination :60% **60 Marks**

Duration: The examination shall be of 2 ½ hours duration.

Question Paper Pattern

Theory Question Paper Pattern
1. There shall be five questions each of 12 marks. 2. All questions shall be compulsory with internal options. 3. Questions may be subdivided into sub questions a, b, c…… and the allocation of marks depends on the weightage of the unit.

Passing Standard

The learners to pass a course shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment and Semester End Examination. The learners shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 24 out of 60) separately, to pass the course and minimum of Grade D, in each project wherever applicable to pass a particular semester.

Semester-I

M.Sc. Biotechnology
Semester –I
Paper-I Advanced Biological Chemistry (PBT1ABC)

Course Objectives:	• To build upon the advanced concepts of protein structure and functions. • To emphasize upon the role of enzymes and lipid aggregates. • To introduce the students to recent trends in the bio-molecular structures and interactions.		
Course Outcomes:	After completing the course, Student will able to: • Discuss protein structure, folding pathways and diseases within the context. • Understand the enzyme catalysis, kinetics and relevance of enzymes. • Apply methodologies of Biomolecular interactions and DNA topology. • Elaborate on significance of Membrane architecture and lipid aggregates.		
Units	**Topics**	**Credit**	**Lectures**
Unit-I Protein Structure and Folding	Primary structure of proteins and their determination – end group analysis; cleavage of disulfide bond; separation, characterization of polypeptide chain; specific peptide cleavage reactions. Secondary structure: Alpha-Helix, Beta sheets, Turns and loops. Super-secondary structures: Domains and motifs. Ramachandran plot. Tertiary structure- fibrous (Collagen) and globular (Myoglobin) structure, Protein stability. Quaternary structure: Subunit Interactions, Symmetry in Proteins and Determination of Subunit Composition (Hemoglobin). Protein folding: Denaturation, Anfinsen's classical experiment mechanisms and Pathways of Protein folding. Molecular chaperons, Protein misfolding and diseases.	**4**	**15**

Unit- II **Enzymes and their Applications**	General characteristics of enzymes. Enzyme catalysis – general principles of catalysis. Enzyme Activity, Various factors influencing enzyme activity and Enzyme inhibition. Enzyme kinetics: Significance; Rapid Equilibrium and Steady State approach, Michaelis-Menten's and Haldane equations, Significance of Km, Catalytic efficiency and turnover number and Kinetic perfection. Order of kinetics. Methods of plotting enzyme kinetics data: Lineweaver-Burk, Hanes-Woolf, Woolf, Augustinsson-Hofstee, Eadie-Scatchard; Direct linear plot; Advantages and disadvantages. Relevance of enzymes in metabolic regulation, activation, inhibition and covalent modification. Clinical Enzymology- Enzymes as therapeutic agents and diagnostic tools.		**15**
Unit- III **Biochemistry of Nucleic acids**	Different forms of DNA, Super-helix topology- linking number, Twist and writhing number, measurement of supercoiling and Topoisomerases. Genome organization - bacterial genome; Structure of eukaryotic chromosomes; Heterochromatin and Euchromatin; DNA re-association kinetics (Cot curve analysis); DNA melting and buoyant density; DNA methylation & Imprinting. Nucleic acid binding protein – Leucine Zipper, Zinc fingers OB fold, Beta Barrel, Helix-turn-helix, and Helix-loop-helix. DNA – protein interaction, Methodologies for detection: Protein – Protein and DNA – Protein interactions.		**15**

Unit- IV **Membrane Architecture** **&** **Lipid Aggregates**	Composition and Architecture of membrane: structural lipids in membranes, membrane bound proteins- structure, properties, and function. Membrane Dynamics: lipid movements, flippase, FRAP, Lipid raft, Membrane fusion. Solubilization of the membrane by using different detergents Lipid aggregates: micelles, bilayers and liposomes.		**15**

References:

1.	Stryer, L. (2015). Biochemistry. (8th edition) New York: Freeman.
2.	Lehninger, A. L. (2017). Principles of Biochemistry (7th edition). New York, NY: Worth.
3.	Voet, D., &Voet, J. G. (2018). Biochemistry (5th edition). Hoboken, NJ: J. Wiley & Sons.
4.	Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., & Walter, P. (2008).
5.	Lodish, H. F. (2016). Molecular Cell Biology (8th Ed.). New York: W.H. Freeman.
6.	Krebs, J. E., Lewin, B., Kilpatrick, S. T., & Goldstein, E. S. (2014).
7.	Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., & Walter, P. (2002). MolecularBiology of the Cell. New York: Garland Science.
8.	Laouini et.al. Preparation, Characterization and Applications of Liposomes: State of the Art. journal of Colloid Science and Biotechnology Vol. 1, 147–168, 2012
9.	Lesk, A. M. (2004) Introduction to Protein Science: Architecture, Function, andGenomics. Oxford University Press, UK.
10.	Sheehan, D. (2009) Physical Biochemistry: Principles and Applications. John Wiley &Sons Ltd., UK.
11.	Uversky, V. N. and Fink, A.L. (2006) Protein Misfolding, Aggregation andConformational Diseases: Part A: Protein Aggregation and Conformational Diseases (Protein Reviews). Springer, USA.
12.	Enzymes: Biochemistry, Biotechnology & Clinical chemistry, (2001) Palmer Trevor, Publisher: Horwood Pub. Co., England.
13.	Metabolic Engineering: Principles and Methodologies. (1998). Gregory N Stephanopoulos, Aristos A Aristidou, Jens Nielsen. Publisher: Academic Press, San Diego, US.
14.	An Introduction to Practical Biochemistry.3rd Edition, (2001), David Plummer, Tata McGraw Hill Edu.Pvt.Ltd. India.
15.	Biochemical Methods.1st, (1995), S. Sadashivam, A. Manickam, New Age International Publishers, India.

M.Sc. Biotechnology
Semester –I
Paper-II Immunology (PBT1IMM)

Course Objectives:	The objectives of this course are to learn about structural features of components of immune system as well as their function. The major emphasis of this course will be on development of immune system and mechanisms by which our body elicits immune response. This will be imperative for students as it will help them to predict about nature of immune response that develops against bacterial, viral or parasitic infection.		
Course Outcomes:	On completion of this course, students should be able to: • Discuss structural features of components of immune system as well as their function. • Explain the concept of cytokines, hypersensitivity reactions and Autoimmunity. • Elaborate tumour immunology, immunodeficiency and Transplantation. • Evaluate useful animal models in Immunology. • Apply their knowledge and design immunological experiments to demonstrate and figure out kind of immune responses.		
Units	**Topics**	**Credit**	**Lectures**
Unit -I Overview of The Immune System	Overview of the Immune System Components of innate and acquired immunity; Phagocytosis; complement and inflammatory responses; pathogen recognition receptors (PRR) and pathogen associated molecular pattern (PAMP); innate immune response; mucosal immunity. Antigens: Immunogens, Hapten. Humoral Immunology Immunoglobulin: fine structure and superfamily Multigene organization of Ig gene, Variable region gene rearrangement and generation of antibody diversity, Class switching among the constant region Synthesis, assembly, and secretion of Immunoglobulins, B-cell development, activation, differentiation and memory.	**4**	**15**

	Cellular Immunology T-cell development (Early thymocyte development, Positive and negative selection, Apoptosis), T-cell development, activation, differentiation and memory (XA, JH).		
Unit -II Immune effector Mechanism	Cytokines: Properties, receptor, cytokine related diseases and cytokine based therapies. Hypersensitivity Reactions: Type I –IV. Autoimmunity: types of autoimmune diseases; mechanism for Induction of Autoimmunity; treatment of autoimmune diseases.		**15**
Unit -III Clinical Immunology	Immunodeficiency: Primary immunodeficiency, acquired or secondary immunodeficiency. Tumor immunology: tumor antigens; immune response to tumors and tumor evasion of the immune system, cancer immunotherapy. Transplantation: immunological basis of graft rejection; clinical transplantation and: clinical transplantation and immunosuppressive therapy		**15**
Unit- IV Immunodiagnostics and Animal Models	Immunodiagnostics: Haem-agglutination and Blood typing; Phage Display libraries; Microscopy and Imaging; TUNEL Assay; Assay for cytotoxic T Cell. Detection of Immunity in Vivo: Tuberculin Test, Testing of allergic responses, Arthur Reaction and adaptive transfer of Lymphocyte and Haemotopoietic Stem Cell. Animal models: Inbred-strain, Adoptive transfer technique, Congenic-strain, Transgenic animals, and their use in immunological studies, Knockout Mice.		**15**

References:

1.	Kindt, T. J., Goldsby, R. A., Osborne, B. A., & Kuby, J. (2006). Kuby Immunology. New York: W.H. Freeman.
2.	Brostoff, J., Seaddin, J. K., Male, D., & Roitt, I. M. (2002). Clinical Immunology. London: Gower Medical Pub.
3.	Murphy, K., Travers, P., Walport, M., & Janeway, C. (2012). Janeway's Immunobiology. New York: Garland Science.
4.	Elgert, Klaus D.: Immunology: Understanding the immune system. (2nd edition) Hoboken. John Wiley & Sons, Inc., 2009. 978-0-470-08157-0--(616.079Elg).
5.	Paul, W. E. (2012). Fundamental Immunology. New York: Raven Press.
6.	Goding, J. W. (1996). Monoclonal Antibodies: Principles and Practice: Production and Application of Monoclonal Antibodies in Cell Biology, Biochemistry, and Immunology. London: Academic Press.
7.	Parham, P. (2005). The Immune System. New York: Garland Science 7. C V Rao: An introduction to Immunology Narosa Publishing house 8. S. Pathak& U Palan: Immunology essential and fundamental, Second edition Parveen Publishing House.
8.	Praful Godkar: Textbook of Medical Biochemistry, Bahalani Publishers
9.	Medical Microbiology by Anantnarayan.
10.	Ian R Tizard: Immunology, An introduction, fourth edition, Thomson.
11.	Abbas, A.K., Lichtman, A.H. and Pillai, S. (2007) Cellular and Molecular Immunology. Saunders Elsevier, USA.

M.Sc. Biotechnology
Semester –I
Paper-III Molecular Biology (PBT1MOB)

Course Objectives:	The objectives of this course are to provide knowledge related to different mechanisms of transcription, translation, Gene Expression and Regulation in Prokaryotes & Eukaryotes. Thus providing them an insight to the basis of molecular biology.		
Course Outcomes:	After completing the course, Student will able to: • Compare the mechanism of replication in prokaryotes and eukaryotes • Elaborate on transcription in Prokaryotes & Eukaryotes • Explain the different DNA damage and repair systems • Discuss the mechanism of translation, gene expression and transposition		
Unit	**Topics**	**Credits**	**Lectures**
Unit- I Replication, Repair and Recombination	Replication mechanism in prokaryotes and eukaryotes; Enzymes and accessory proteins; Fidelity; Replication of single stranded circular DNA; Gene stability. DNA repair- enzymes; Photo-reactivation; Excision repair; Mismatch correction; SOS repair. Recombination: Homologous and non-homologous; Site specific recombination.	**4**	**15**
Unit- II Prokaryotic transcription and regulation	Prokaryotic Transcription: Transcription unit; Promoters, Operators, Regulatory elements, Initiation; Attenuation; Termination-Rho-dependent and independent; Anti-termination Transcriptional regulation-Positive and negative; Operon concept-*lac, trp and ara* operons Transcriptional control in lambda phage.		**15**

Unit-III Eukaryotic Transcription and Post Transcriptional Modifications	Eukaryotic transcription and regulation; RNA polymerase- structure and types; Eukaryotic promoters and enhancers; General Transcription factors; TATA binding proteins (TBP) and TBP associated factors (TAF); Transcriptional and post-transcriptional gene silencing. Post Transcriptional Modifications- Processing of hnRNA, tRNA, rRNA; capping and polyadenylation; Splicing; RNA editing; Nuclear export of mRNA; mRNA stability; Catalytic RNA. Regulatory RNA and RNA interference mechanisms.		**15**
Unit-IV Translation and Transposition	Translation machinery; Ribosomes; Composition and assembly; Universal genetic code; Degeneracy of codons; Termination codons; Wobble hypothesis; Mechanism of translation ; Co- and post-translational modifications. Protein degradation: Ubiquitin-Proteasome pathway and lysosomal proteolysis. Transposition- Transposable genetic elements in prokaryotes and eukaryotes; Mechanisms of transposition; Role of transposons in mutation.		**15**

References:

1.	Genes XI, 11th edition (2012), Benjamin Lewin, Publisher - Jones and Barlett Inc. USA
2.	J.D. Watson, T.A. Baker, S.P. Bell, A. Gann, M. Levin, R. Losick. (2013). Molecular Biology of the Gene (7th edition). Benjamin Cummings, San Francisco, USA.
3.	R.F. Weaver (2007). Molecular Biology. (4th edition). McGraw Hill. New York. USA.
4.	Genome 3 T.A Brown
5.	iGenetics A Molecular Approach Third Edition, Peter J. Russell
6.	Molecular Biology, 5th Edition (2011), Weaver R., McGrew Hill Science. USA
7.	Lewin's GENES XII 2017 Jocelyn E. Krebs , Elliott S. Goldstein , Stephen T. Kilpatrick Jones and Bartlett Publishers

M.Sc. Biotechnology
Semester –I
Paper-IV- Emerging Techniques in Biological Sciences (PBT1ETB)

Course Objectives:	The objectives of this course are to provide introductory knowledge concerning genomics, proteomics and their applications. The students will be given exposure to advanced analytical tools to study biological system.		
Course Outcomes:	After completing the course, Student will able to: • Illustrate the principle underlying various advance microscopy & spectroscopy and proteomics techniques • Elaborate on emerging techniques in Genomics & Transcriptomics • Discuss the advanced techniques used in molecular cytogenetics • Understand the principle & application of the CRISPR-CAS system		
Unit	**Topics**	**Credits**	**Lectures**
Unit-I Advanced Microscopic and Spectroscopic Techniques	Microscopy: Scanning and Transmission microscopes: different fixation and staining techniques for EM, Freeze-etch and freeze- fracture methods for EM, Image processing methods in microscopy. Confocal microscopy, Atomic Force Microscopy, Super-Resolution Imaging with Stochastic Optical Reconstruction Microscopy (STORM) and Photo-activated Localization Microscopy (PALM). Spectroscopy- Principle and applications of UV Visible, ORD, CD, NMR, FTIR, ESR and X-ray diffraction.	**4**	**15**
Unit-II Protein Purification & its Characterization	Protein purification and characterization Techniques: Dialysis, Salting in and Salting out, Chromatography: Size exclusion, Affinity, Ion-exchange and FPLC. 2D-PAGE, isoelectric focusing, Mass spectrometry and its versions. Protein Expression Profiling: Protein Microarrays/ Protein chips: Types and applications. Gel-based quantitative proteomics: DIGE (Difference in Gel Electrophoresis). Gel-free based quantitative proteomic: Surface plasmon resonance. In vivo and In-vitro labelling- SILAC and ICAT		**15**

Unit-III **Functional & Comparative genomics and Transcriptomics**	Genomics: Gene expression by SAGE and Microarrays: Construction of microarrays – genomic arrays, cDNA arrays and oligo arrays and its applications. Next Generations Sequencing (NGS): Principles and Instrumentation. Assigning Gene Function Experimentally: Gene Knockouts in Yeast, Mouse & *Mycoplasma genitalium,* Metagenomic Analysis. Transcriptomics: Northern blotting, DDRT PCR, gel free assays like biolayer interference		**15**
Unit-IV **Molecular Cytogenetics**	Advanced fluorescence techniques: Fluorescence Lifetime (FLIM), Fluorescence Resonant Energy Transfer (FRET), Fluorescence Correlation Spectroscopy (FCS) Advanced Cytogenetic techniques and applications - FISH, M-FISH, SKY, CGH, Marker Chromosomes, and Prenatal Diagnosis of Common Aneuploidies. CRISPR CAS: History, principle and Applications. Identification and classification of organisms using Molecular markers- 16S rRNA typing/sequencing.		**15**

References:

1.	Principles and Techniques of Biochemistry and Molecular Biology,7th edition, (2010), Wilson K.M., Walker J.M., Cambridge University Press, U
2.	Biophysical chemistry by Upadhyay, Upadhyay and Nath, Himalaya publication house.
3.	Biophysics. 1st edition (2002), Pattabhi V and Gautham N. Kluwer Academic Publisher, USA.
4.	Huang, B., Bates, M., & Zhuang, X. (2009). Super-Resolution Fluorescence Microscopy. Annual Review of Biochemistry, 78(1), 993-1016. doi:10.1146/annurev.biochem.77.061906.092014
5.	Molecular Cytogenetics: Protocols and Applications, Edited by: Y. S. Fan © Humana Press Inc., Totowa, NJ 2001.
6.	Lander, E. (2016). The Heroes of CRISPR. Cell, 164(1-2), 18-28. Doi: 10.1016/j. cell.2015.12.041.
7.	Genomics. Seventh Edition. Blackwell Publishing, USA
8.	Microarray and Microplates: Applications in biomedical sciences Shu Ye, Ian Day, 2003, Bios Scientific Ltd, oxford.
9.	iGenetics A Molecular Approach Third Edition, Peter J. Russell

M.Sc. Biotechnology
Semester –I
PRACTICAL- I (PBT1PR1) 8- Credits
(Practicals of PBT1ABC and PBT1IMM)

1.	Preparation of buffers and Reagents
2.	Viscosity study of protein.
3.	Titration of amino acids and calculation of pK value
4.	Protein Estimation using the following methods: Bradford and Folin Lowry method
5.	Experimental verification that absorption at OD260 for denatured DNA as compared to native double stranded DNA
6.	Isolation partial purification and Characterization of any one enzyme • Preparation of cell-free lysates • Ammonium Sulfate precipitation • Dialysis of the purified protein solution • Enzyme assay • Generating a Purification Table Enzyme Kinetic Parameters: Km, V_{max} and K_{cat}
7.	LDH Zymography
8.	Video demonstration of membrane dynamics
9.	Cell permeability testing- osmotic fragility
10.	Preparation of TAB and sterility testing
11.	Perform serum electrophoresis (horizontal)
12.	To perform the Dot blot assays
13.	To check antibody titer by Tube precipitation test
14.	In-vitro demonstration of phagocytosis and calculating phagocytic index
15.	Latex bead agglutination / precipitation test for detection of rheumatoid factor (RF).
16.	Separation of lymphocytes on Ficoll Histopaque and viability count
17.	Demonstration/Video of tuberculin test, hypersensitivity reaction Arthur reaction.
18.	Complement fixation test

M.Sc. Biotechnology
Semester –I
PRACTICAL- II (PBT1PR2)
(Practicals of PBT1MOB & PBT1ETB) 08 Credits

1.	Diauxic growth curve of *E.coli*
2.	Extraction of Genomic DNA Extraction from Bacteria and separation by Agarose gel electrophoresis
3.	Extraction of Genomic DNA Extraction from human samples (Cheek cells, Blood) and separation by Agarose gel electrophoresis
4.	Restriction Enzyme digestion of plasmid DNA
5.	Ligation Reaction
6.	Conjugation in bacteria
7.	Demonstration/ video of 2D PAGE
8.	Demonstration of affinity & gel filtration chromatography techniques
9.	Microscopy types Confocal, Fluorescence, STORM – videos and pictures – Write up
10.	To determine an unknown protein concentration by plotting a standard graph of BSA using UV-Vis Spectrophotometer and validating the Beer- Lambert's Law
11.	Photo album of chromosomal abnormalities in normal and disease condition: • Numerical Detected By Using Different Probes – Centromeric, Locus Specific, Telomeric Structural -Translocations and Fusion Genes • Detection Of Inversions And Interstitial Deletions By SKY • CGH For a disease or cancer
12.	Overview of MALDI-TOF-MS Virtual
13.	Recovery of DNA from low-melting temperature agarose gel
14.	To resolve soluble proteins by Native PAGE followed by staining with Coomassie Brilliant Blue R-250
15.	To resolve soluble proteins by discontinuous, SDS-gel electrophoresis under denaturing conditions followed by staining with Coomassie Brilliant Blue R-250 and silver stain
16.	Identification of protein using analytical technique Mass spectroscopy (demonstration)
17.	FTIR/NMR spectrum based theory questions

Semester –II

M.Sc. Biotechnology
Semester –II
Paper-I Metabolism (PBT2MET)

Course Objectives:	The objectives of this course are to build upon knowledge of biochemical principles with specific emphasis on different metabolic pathways. The course shall make the students aware of various disease pathologies within the context of each topic.		
Course Outcomes:	After completing the course, Student will able to: • Illustrate major metabolic pathways with Principles of Metabolic regulations. • Justify role of metabolic pathways in various disease pathology. • Correlate different adaptations in plants with respect to carbon assimilation. • Discuss role of phytochemicals.		
Units	**Topics**	**Credit**	**Lectures**
Unit –I **Bioenergetics, Carbohydrate & Lipid Metabolism**	Bioenergetics and Thermodynamics-basic principles; equilibria and concept of free energy; coupled interconnecting reactions in metabolism and common Biochemical reactions. Carbohydrate Metabolism- Overview of major pathways of carbohydrate metabolism. HMP and Uronic acid pathways with their significance, Metabolism of other important sugars – fructose. Coordinated regulation of glycogen breakdown and synthesis. Inborn errors of carbohydrate metabolism. Synthesis of essential fatty acids- Overview.	**4**	**15**
Unit -II **Amino-acid and Nucleic acid Metabolism**	Biosynthesis of essential amino acids. Metabolic breakdown of amino acids leading to Krebs cycle intermediate. Disorders of amino acid metabolism.		**15**

	Nucleic acid metabolism Biosynthesis and degradation of purines and pyrimidines with regulation, disorders of Nucleic acid metabolism.		
Unit –III **Plant metabolism**	C-3 cycle and C-4 cycles, CAM, glyoxalate pathway, photosynthetic formation of hydrogen. Integration of carbohydrate metabolism in plants. Nitrogen fixation and role of nitrogenase, Annamox reactions. Plant secondary metabolism – Introduction, Pathways for secondary Metabolite 1. Mevalonate pathways 2.Shikimate Pathway 3.Isoprene Unit Pathways Major Secondary metabolites with their functions (alkaloid, terpenoids, phenolics).		**15**
Unit- IV **Principles of Metabolic regulations and Metabolic Engineering**	Principles of Metabolic regulations-Regulations of Metabolic pathways and analysis of Metabolic control. Integration of Metabolic pathways. Synthetic Biology-Introduction and applications. Metabolic Engineering- Historical perspective and introduction. Importance of metabolic engineering, Plant and microbial metabolic engineering-examples Metabolic flux analysis. future of metabolic engineering		**15**

References:

1.	Lehninger, Principles of Biochemistry. 7th Edition (2008), David Nelson& Michael Cox, W.H. Freeman and company, NY
2.	Phytochemical Method, 3rd edition (1998), A.J. Harborne, Springer, UK.
3.	Pharmacognosy, 14th edition, (2008), Dr. C. K. Kokate, A. P. Purohit, S. B. Gokhale, NiraliPrakashan, India
4.	Biochemistry: 7th Edition, (2012), Jeremy Berg, Lubert Stryer, W.H. Freeman and company, NY
5.	Voet, D., & Voet, J. G. (2016). Biochemistry (5th ed.). Hoboken, NJ: J. Wiley & Sons
6.	Harper's Biochemistry- 27th edition
7.	Devlin, Thomas M.: Textbook of biochemistry with clinical correlations. [ed. by] (7th ed.) Hoboken. John Wiley & Sons, Inc., 2011. 978-0-470-28173-4--(612.015Dev
8.	Buchanan B; Gruissem W et al (2nd Ed.) Biochemistry and Molecular Biology of Plants John Wiley & Sons 2015.

M.Sc. Biotechnology
Semester –II
Paper-II- Cellular Processes and Developmental Biology (PBT2CPD)

Course Objectives	The objectives of this course are to provide an understanding of the functions of cells at molecular level and give a thorough knowledge about protein trafficking, biomolecules, cellular development and Human Embryonic development.		
Course Outcomes	Students should be able to: • Outline the concept of cell cycle regulation, cellular signaling, transport and trafficking. • Determine the role of Cell ECM and cell -cell interactions in maintenance of cellular integrity and functions; • Analyze genes and genetic changes affecting cycle regulation and mechanisms that lead to apoptosis. • Understand Human Embryonic development and Post fertilization events		
Unit	**Topics**	**Credits**	**Lectures**
Unit -I Cellular processes	Cell cycle and its regulation; Cell division: mitosis, meiosis and cytokinesis; Checkpoints in cell cycle regulation. Cell differentiation: stem cells, their differentiation into different cell types and organization into specialized tissues; cell-ECM and cell-cell interactions; Cell Signalling: Principles of signalling, Signalling molecules, receptors and their functions. Intercellular communications: nerve impulses, Neuro-transmitters; agonist & antagonist Reactions. Cell death: different modes of cell death and their regulation.	**4**	**15**
Unit -II Cellular transport, Membrane trafficking	Molecular mechanisms of membrane transport, nuclear transport Protein Transport: Translocation of Secretory Proteins across the ER Membrane, Insertion, Protein Modifications,		**15**

	Folding, and Quality Control in the ER, Protein sorting and export from Golgi Apparatus. Sorting of Proteins: to Mitochondria and Chloroplasts. Molecular Mechanisms of Vesicular Traffic, early and later Stages of the Secretory Pathway, Receptor-Mediated Endocytosis.		
Unit -III Genome instability and cell transformation	Mutations, proto-oncogenes, oncogenes and tumour suppressor genes, physical, chemical and biological mutagens; types of mutations; intra-genic and inter-genic suppression; role of transposons in genome; viral and cellular oncogenes; tumor suppressor genes; structure, function and mechanism of action; activation and suppression of tumor suppressor genes; oncogenes as transcriptional activators.		**15**
Unit- IV Human Embryonic Development and Model Organism	Human Embryonic development: Events during fertilization, in-vitro fertilization, Zona Pellucida, glycoprotein, Oelemma protein and their role in fertilization, sperm antigens and their functional significance. Molecular and biochemical events during sperm function. Post fertilization events Major Model Organism in Developmental Biology: Xenopus, Zebra fish, Chick, Mouse, *C. elegans*, Drosophila		**15**

References:

1.	Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., & Walter, P. (2008). Molecular Biology of the Cell (5th Ed.). New York: Garland Science.
2.	Lodish, H. F. (2016). Molecular Cell Biology (8th Ed.). New York: W.H. Freeman.
3.	Krebs, J. E., Lewin, B., Kilpatrick, S. T., & Goldstein, E. S. (2014). Lewin's Genes XI. Burlington, MA: Jones & Bartlett Learning.
4.	Cooper, G. M., & Hausman, R. E. (2013). The Cell: a Molecular Approach (6th Ed.). Washington: ASM; Sunderland.
5.	Hardin, J., Bertoni, G., Kleinsmith, L. J., & Becker, W. M. (2012). Becker's World of the Cell. Boston (8th Ed.). Benjamin Cummings.
6.	Watson, J. D. (2008). Molecular Biology of the Gene (5th ed.). Menlo Park, CA: Benjamin/Cummings.

M.Sc. Biotechnology
Semester –II
Paper-III-Bioprocess Technology (PBT2BPT)

Course Objectives	The objectives of this course are to educate students about the fundamental concepts of bioprocess technology and its related applications, thus preparing them to meet the challenges of the new and emerging areas of the biotechnology industry.		
Course Outcomes	Students should be able to: • Appreciate relevance of microorganisms from industrial context • Give an account of design and operations of various fermenters • Calculate yield and production rates in a biological production process, interpret data and need for oxygen and oxygen transfer; • Understand important microbial/enzymatic industrial processes in the food and fuel industry.		
Unit	**Topics**	**Credits**	**Lectures**
Unit- I **Basic principles of biochemical engineering**	Sources of Microorganisms Used in Biotechnology- Literature search and culture collection supply, Isolation de novo of organisms producing metabolites of economic importance. Strain Improvement- Selection from naturally occurring variants, Manipulation of the genome of industrial organisms in strain improvement Bioreactor design and analysis- Batch and continuous fermenters; modifying batch and continuous reactors: chemostat with recycle, multistage chemostat systems, fed-batch operations; conventional fermentation v/s biotransformation; immobilized cell systems; large scale animal and plant cell cultivation; Upstream processing: media formulation and optimization; sterilization; aeration, agitation and heat transfer in bioprocess; scale up and scale down; measurement and control of bioprocess parameters. fermentation economics	**4**	**15**

Unit- II **Downstream processing, Industrial Production and Recovery processes**	Downstream processing and product recovery Separation of insoluble products - filtration, centrifugation, sedimentation, flocculation; Cell disruption; separation of soluble products: liquid-liquid extraction, precipitation, chromatographic techniques, reverse osmosis, ultra and microfiltration, electrophoresis; final purification: drying; crystallization; storage and packaging. Industrial Production and Recovery process of following (with one example each): Vitamins, Amino acids, Enzymes (Extra and Intra cellular), Antibiotics, Organic acids, Production of recombinant pharmaceuticals, Human growth hormone, Interferon vaccines. Biotransformation product (Steroids)		**15**
Unit- III **Applications of enzyme technology**	Rationale for immobilizing enzymes, Methods for enzyme immobilization, Properties of immobilized enzymes, applications of immobilized enzymes. Industrial applications of enzymes in pharmaceuticals, food industries, Detergents, paper and leather processing. Enzyme Engineering and its applications.		**15**
Unit- IV **Applications of microbial technology in food process operations and biofuels**	Microbial biomass production - mushrooms, SCP Fermented foods and beverages: Sauerkraut production, soya bean fermentations, coffee, cocoa and tea fermentations Food additives and supplements – Lipids, Nucleosides, nucleotides and related compounds – Vitamins Natural food preservatives - bacteriocins from lactic acid bacteria – production and applications e.g., Nisin Microbial production of colours and flavours. Polyhydric alcohols: low -calorie sweetener particularly useful for sweetening food products for diabetics		**15**

	Microbial exo-polysaccharides - Xanthan gum Process Food wastes- for bioconversion to useful products (Compost, biofuels, biomass cheap source of raw material in fermentation etc.)		

References:

1.	Shuler, M. L., & Kargi, F. (2002). Bioprocess Engineering: Basic Concepts. Upper Saddle River, NJ: Prentice Hall.
2.	Stanbury, P. F., & Whitaker, A. (2010). Principles of Fermentation Technology. Oxford: Pergamon Press.
3.	Blanch, H. W., & Clark, D. S. (1997). Biochemical Engineering. New York: M. Dekker.
4.	Bailey, J. E., & Ollis, D. F. (1986). Biochemical Engineering Fundamentals. New York: McGraw-Hill.
5.	El-Mansi, M., & Bryce, C. F. (2007). Fermentation Microbiology and Biotechnology. Boca Raton: CRC/Taylor & Francis.
6.	Alexander N. Glazer and Hiroshi Nikaido -Microbial Biotechnology: Fundamentals ofApplied Microbiology, 2ndEdition
7.	Michael Waites and Morgan , Rockney and Highton -Industrial microbiology : An Introduction
8.	Nduka Okafor Modern industrial microbiology and biotechnology Science Publishers, Enfield,
9.	Robert Whitehurst and Maarten Van Oort - Enzymes in food technology 2nded
10.	Lee, Y. K. (2013). Microbial Biotechnology: Principles and Applications. Hackensack,NJ: World Scientific.

M.Sc. Biotechnology
Semester –II
Paper-IV-Research Methodology and Scientific Communication Skills (PBT2RMS)

Course Objectives	The objectives of this course are to acquire the ability to articulate thoughts, research ideas, information, and scientific outcomes in oral and in written presentation to a range of audience. The course mainly emphasizing methodologies used to do research, use framework of these methodologies for understanding effective lab practices and scientific communication and appreciate scientific ethics.		
Course Outcomes	**After completing the course, Student will able to:** • Design research problems, formulating the objectives, test hypotheses and prepare scientific reports using appropriate research processes. • Appraise Research writing, Research ethics, Data fudging and Plagiarism with the help of statistical and referencing software. • Develop the concept of effective communication, presentation skills and computing skills for scientific research. • Critically analyze the classical papers in biotechnology through the existing methods of enquiry.		
Unit	**Topics**	**Credits**	**Lectures**
Unit-I Scientific Research and Research Methodology	Scientific Research: Meaning of Scientific Research, Definition, Characteristics, Types of Research, and Need of research. Identification of the problem: assessing the status of the problem, formulating the objectives, Hypotheses, Research Methods and Methodology: Selecting & defining Research problem Research Process Research Design/Plan: Preparing Research design (experimental or otherwise), Actual investigation, Surveys - Case Study - Field Studies & others.	**4**	**15**
Unit-II Research Ethics	Research in Practice: Literature review, Journals, Conference Proceedings, Journal Impact factor, Citation Index, h, g, h-g index, Referencing software: Mendeley, Endnote.		**15**

	Research Ethics: Social implications of research, biosafety issues Animal experimentation ethics, wild-life ethics and human experimentation ethics Data fudging and Plagiarism: Definition, Common types of plagiarism, Intentional and Unintentional plagiarism, Detection of plagiarism by anti-plagiarism tools (Turnitin, Duplichecker, Viper, Copyleaks), Use of URKUND, Turnitin and iThenticate software, Penalties for Plagiarism, Avoiding plagiarism.		
Unit-III **Process of communication**	Concept of effective communication- setting clear goals for communication; determining outcomes and results; initiating communication; avoiding breakdowns while communicating; creating value in conversation; barriers to effective communication; Presentation skills - formal presentation skills; preparing and presenting using overhead projector, PowerPoint; defending interrogation; scientific poster preparation & presentation; participating in group discussions; Computing skills for scientific research - web browsing for information search; search engines and their mechanism of searching; hidden Web and its importance in scientific research; internet as a medium of interaction between scientists; effective email strategy using the right tone and conciseness.		**15**
Unit-IV **Scientific communication**	Scientific Communication: Importance of scientific communication, Types of scientific communications, Logical organization of scientific data and documentation Different modes of scientific communication: Scientific Writing: What are Scientific Writing Skills, Good Scientific Writing Skills Research Proposal writing: Format and layout Research Paper writing: Format and layout Report Writing: Format and layout Thesis writing : (Introduction, Literature review, Materials and Methods, Results, Discussion, Conclusion and Implications, conflict of interest)		**15**

	Legal forms of communication in science: Plagiarism and scientific misconduct, Ethics in scientific communication, Patent submissions.		

References:

1.	Research methodology Techniques and Methods by C. R. Kothari, New age International publishers.
2.	Valiela, I. (2001). Doing Science: Design, Analysis, and Communication of Scientific Research. Oxford: Oxford University Press.
3.	On Being a Scientist: a Guide to Responsible Conduct in Research. (2009). Washington, D.C.: National Academies Press.
4.	Gopen, G. D., & Smith, J. A. The Science of Scientific Writing. American Scientist, 78 (Nov-Dec 1990), 550-558.
5.	Mohan, K., & Singh, N. P. (2010). Speaking English Effectively. Delhi: Macmillan India.
6.	Movie: Naturally Obsessed, The Making of a Scientist.
7.	Michael Alley, The Craft of Scientific Writing, fourth edition, Springer, 2018.
8.	Stephen B. Heard, The Scientists Guide To Writing, Princeton University Press, 2018.
9.	Fisher R A, The Design of Scientific Experiment (1971) 9th edition, Collier Macmillan Publishers, London
10.	Martha Davis, Scientific Papers And Presentations 2nd edition (2004), Academic Press
11.	H. Hofmann, Scientific Writing and Communication Papers, Proposals, and Presentations. New York: Oxford University Press, 2010, pp. xv–xvi
12.	John D'Angelo, Ethics in Science: Ethical Misconduct in Scientific Research (2012),CRC Press, USA
13.	David B. Resnik, The Ethics of Science: An Introduction (1998), Routledge Publication, UK5.

M.Sc. Biotechnology
Semester –II
PRACTICAL- I (PBT2PR1) 08 Credits
Practicals of (PBT2MET+ PBT2CPD)

1.	Isolation of starch from potato and its estimation by anthrone method
2.	The isolation and assay of glycogen from liver and skeletal muscles of bird/mammal
3.	Isolate chloroplasts from the given plant material, quantitate and resolve the proteins by SDS-PAGE to identify major chloroplast proteins
4.	TLC for amino acid separation
5.	Detection of saponification and Iodine value of lipids
6.	Estimation of urate/creatinine ratio to diagnose Lesch Nyhan syndrome
7.	Detection of phenylalanine for PKU
8.	Secondary metabolite study-Extraction and Qualitative estimation of phyto-constituents
9.	Determination of total Nitrogen content by Kjeldahl method
10.	Programmed cell death during limb development in Chick
11.	Karyotyping and Ideogram construction in onion roots using Colchicine treatment
12.	Candling, Observing chick embryo- stages of development: prepared slides/ preserved specimens
13.	Developmental Biology- Visit to laboratory/ video lectures for latest Developments in the field
14.	Cell death /apoptosis studies using flow-cytometry demonstration
15.	Isolation of cell organelle by differential centrifugation techniques from plant / animal sources

M.Sc. Biotechnology
Semester –II
PRACTICAL- I (PBT2PR1) 08 Credits
Practicals of (PBT2BPT+ PBT2RMS)

1.	Maintenance of the isolated production organism (Agar slants/ glycerol stocks /soil culture/ lyophilization) at least two methods
2.	Demonstration of media optimization by Placket Burman test
3.	Study of Working of lab bench fermenter (with production of enzyme or antibiotic using screened organism)
4.	Immobilize an organism / enzyme and detect the conversion of substrate to product
5.	Physico-chemical characterization of an industrial effluents
6.	Pigment production and isolation from a microbial source (yeast, fungi or bacteria) Spirulina
7.	Recovery and Assay of product formed (Bioassay or Enzyme assay)
8.	Detection of different food enzymes by simple tests (amylase, catalase, invertase, papain, pectinase, pepsin)
9.	Study of the pickling process (sauerkraut / pickled cucumbers) with respect to physical, chemical / biochemical and biological changes occurring during the pickling process
10.	Visit to industry and Report writing
11.	Research Methodology: Review writing/ Report writing/Research paper writing (Following proper Research methods/Methodology)
12.	Scientific presentation of research paper from a reputed journal.
13.	Research Data collection and analysis from different Sources • Research Data collection and analysis from Primary Sources • Research Data collection and analysis from Secondary Sources • Research Data collection and analysis for Survey based Research • Different Sampling methods for Research
14.	Scientific communication: • Gathering scientific data from various sources. • Written communication: Guide to clear writing, forms and styles of writing • Scientific publication writing • Oral communication variants • Concept of Plagiarism

15.	Write a research proposal on any topic of your interest from the MSc syllabus. (For research proposal contents and format refer to NSF guidelines. https://www.nsf.gov/pubs/policydocs/pappg19_1/nsf19_1.pdf, For reference work use Mendeley Desktop. https://www.mendeley.com/guides/desktop)
16.	To study a patent and to develop a patent application for a hypothetical product or process.
17.	Critical Analysis of Classical Papers: How does the Course Module work? Students may be divided in groups and each group may be responsible for one classical paper. Each week there may be a 1.5 hour presentation cum discussion for each of the papers. At the end of the semester each student will be asked to write a mini-review (2-3 pages long) on any one classical paper, other than the one he/she presented/discussed.

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II विद्या विनयेन शोभते II

Janardan Bhagat Shikshan Prasarak Sanstha's

CHANGU KANA THAKUR ARTS, COMMERCE & SCIENCE COLLEGE, NEW PANVEL (AUTONOMOUS)

Re-accredited 'A+' Grade by NAAC
'College with Potential for Excellence' Status Awarded by UGC
'Best College Award' by University of Mumbai

Program: Masters in Science (M. Sc.)

SYLLABUS

(Approved in the Academic council meeting held on--------)

M.Sc.-I Computer Science

Revised as per
Choice Based Credit & Grading System (60:40)
w. e. f. Academic Year 2022-23

MASTERS IN SCIENCE (M. Sc.)

Programme Outcomes

After completion of M.Sc. programme students will acquire

Sr. No.	After completion of M.Sc. program students will acquire	Graduate Attribute
PO1	An ability to identify and describe broadly accepted methodologies of science, and different modes of reasoning.	Disciplinary knowledge
PO2	An ability to demonstrate proficiency in various instrumentation, modern tools, advanced techniques and ICT to meet industrial expectations and research outputs.	Disciplinary knowledge/Digital literacy
PO3	An ability to identify problems, formulates, and proves hypotheses by applying theoretical knowledge and skills relevant to the discipline.	Problem-solving
PO4	An ability to articulate thoughts, research ideas, information, scientific outcomes in oral and in written presentation to a range of audience.	Communication skills
PO5	A capacity for independent, conceptual and creative thinking, analysis and problem solving through the existing methods of enquiry.	Problem solving
PO6	Skills required for cutting edge research, investigations, field study, documentation, networking, and ability to build logical arguments using scholarly evidence.	Research skills
PO7	An ability to portray good interpersonal skills with ability to work collaboratively as part of a team undertaking a range of different team roles	Teamwork
PO8	The ability to understand ethical responsibilities and impact of scientific solutions in global, societal and environmental context and contribute to the sustainable development	Moral and ethical awareness/ multicultural competence
PO9	An ability to demonstrate leadership, to take action and to get others involved.	Leadership
PO10	An openness to and interest in, life-long learning through directed and self-directed study	Self-directed learning
PO11	An ability to translate the knowledge and demonstrate the skills required to be employed and successful professional development.	Life-long learning

Masters in Science (Computer)
Syllabus for Semester I and II

Preamble:

M.Sc. in Computer Science is a two-year post-graduate programme with the objective to develop human resources with core competence in various thrust areas of Computer Science. It will provide students with opportunities to develop and hone core competency in the field of computer science and encourage them to make a mark in the much sought-after IT industry.

The Syllabus of this Course creates a unique identity for M.Sc. in Comp Science distinct from similar degrees in other related subjects, focuses on core Computer Science subjects, incorporate advanced and most recent trends, Identify and nurture research temper among students, Offer provision for internship with industry and Focus, as far as possible, only on open-source software

The syllabus for the semester I and semester II has tried to initiate steps to meet these goals. By extending the syllabus to semester III and semester IV, it is assumed that these goals will be met to a larger extent. The syllabus proposes to have four core compulsory courses in Semester I and Semester II. UNIT -1 of Paper I of Semester - I and Semester - II are ABILITY ENHANCEMENT UNITS and UNIT- 4 of all papers of Semester - I and Semester - II is SKILL ENHANCEMENT UNIT. Semester III and Semester IV proposes electives courses based on a recent and emerging area. Inclusion of Project as part of the internal assessment is an attempt to translate theory into practice. It is assumed that, with this back ground, a student can take up challenging research project in the semester III and semester IV and will be better fit for industry as he or she will have strong foundation on fundamentals and exposure to advanced and emerging trends.

We thank all the members of BOS in Computer Science; who have given their valuable comments and suggestions, which we tried to incorporate. Thank you to all stakeholders who provided feedback and suggested changes as well as University of Mumbai. Thanks to one and all who have directly or indirectly helped in this venture.

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO	Description After completing Master's Degree in Computer Science learners will be able to:
PSO 1	Understand the core and advanced subjects of Computer Science and its logical application to solve real-life case studies using Emerging technologies
PSO 2	Identify, analyze, and solve research based interdisciplinary computational problems
PSO 3	Get exposure to modern software tools and lifelong learning for professional development

Semester – I

[Under CBCS Scheme]

Course	Course Type	Course code	Hrs/ week	Internal assessment	Semester-end examination	Total	Credits
Analysis of algorithm and Research Computing	Core	PCS1ARC	4	40	60	100	4
Design and Implementation of Modern Compilers	Core	PCS1DMC	4	40	60	100	4
Advanced Database Management System	Core	PCS1ADS	4	40	60	100	4
Robotics	Core	PCS1ROB	4	40	60	100	4
Practical of PCS1ARC+ PCS1DMC	Core	PCS1PPR1	4	--	100	100	4
Practical of PCS1ADS+ PCS1ROB	Core	PCS1PPR2	4	--	100	100	4

Semester – II

[Under CBCS Scheme]

Course	Course Type	Course code	Hrs/ week	Internal assessment	Semester-end examination	Total	Credits
Cloud Computing-I	Core	PCS2CL1	4	40	60	100	4
Natural Language Processing	Core	PCS2NLP	4	40	60	100	4
Business Intelligence and Big Data Analytics – I (Business Intelligence)	Core	PCS+2BI1	4	40	60	100	4
Machine Intelligence(Fundamentals of Machine Intelligence)	Core	PCS2MIN	4	40	60	100	4
Practical of PCS2CL1+ PCS2NLP	Core	PCS2PPR1	4	--	100	100	4
Practical of PCS2BI1+ PCS2MIN	Core	PCS2PPR2	4	--	100	100	4

Examination Scheme

I. Continuous Internal Examination: 40 Marks

Marks	**Group Project*/ Individual Project**	**Presentation and write-up**	**Practical Skills**	**Open book test**	**Quiz**
5	Hypothesis/Topic of the project	Presentation skill	Demonstration of skill	**High order thinking questions (HOTS)**	**Quiz on application of subject in real life**
5	Actual laboratory work/Field work	Knowledge	Viva		
5	Result/output	Quality of ppt	Report		
5	Dissertation/Report	Writing skill	Problem solving ability		

II. External Examination: 60 Marks

- There shall be five questions each of 12 marks.
- All questions shall be compulsory with internal options.
- Question may be subdivided into sub-questions a, b, c… and the allocation of marks depends on the weightage of the unit.

Question	Based on	Marks
Q.1	Unit I	12
Q.2	Unit II	12
Q.3	Unit III	12
Q.4	Unit IV	12
Q.5	Unit I,II,III,IV	12

III. Practical Examination: 50 Marks

Sr. No.	Particulars of External	Marks
1	Laboratory Work	40
2	Journal	05
3	Viva	05
	TOTAL	50

Course Description	
Semester	**I**
Course Name	**Analysis of Algorithm and Research Computing**
Course Code	**PCS1ARC**
Eligibility for Course	**B.Sc.**
Credit	**4**
Hours	**60**

Course Objectives

1. Understand designing and backtracking techniques of an algorithm.
2. Understand analysis techniques, number theoretic and Np completeness aspects of an algorithm.
3. Analyze various research problems and ways to solve specific problems.
4. Develop an approach towards research and implementation in the form of a research paper.

Course Outcomes

1. Describe designing and advanced strategies of an algorithm.
2. Discuss the analysis techniques, number theoretic and NP completeness perspectives of an algorithm.
3. Discover a research problem and find a way to solve a specific research problem.
4. Create a research paper with professional skills.

Course Code: PCS1ARC	**Course Title** **Analysis of Algorithm and Research Computing**	**Credits 04**
Unit I	**Design and Advanced design strategies** The Role of Algorithms in Computing: Algorithms as a technology. Analyzing algorithms, Designing algorithms. Growth of Functions: Standard notations and common functions. Divide-and-Conquer: The maximum-subarray problem, Probabilistic Analysis and Randomized Algorithms: The hiring problem, Indicator random variables, Randomized algorithms. Dynamic Programming: Rod cutting, Elements of dynamic programming Greedy Algorithms: An activity-selection problem,	**15L**

	Elements of the greedy strategy. Backtracking algorithm: 8 queen problem.	
Unit II	**Analysis Techniques , Number-Theoretic Algorithms and NP – Completeness** Elementary Graph Algorithms: Representations of graphs, Minimum Spanning Trees: Growing a minimum spanning tree, Algorithms of Kruskal. Single-Source Shortest Paths: The Bellman-Ford algorithm, Single-source shortest paths in directed acyclic graphs, Dijkstra‘s algorithm. Elementary number-theoretic notions, Greatest common divisor, Modular arithmetic, Solving modular linear equations, The Chinese remainder theorem, Powers of an element, NP-Completeness: Polynomial time, Polynomial-time verification, NP-completeness and reducibility, NP-complete problems.	**15L**
Unit III	**Introduction of Research** Meaning of research, objectives of research, types of research, research approaches, significance of research, research methods versus methodology, research methods vs methodology, research and scientific method, research process, Criteria of good research, Problems encountered by researchers in India. What is research Problem? Selecting the problem, techniques involved in defining a problem, Different research designs: Exploratory research studies, Descriptive and Diagnostic Research Studies, Hypothesis testing research studies. Sample design, quantitative and qualitative data, experiments and surveys, data preparation, Degree of freedom, standard error.	**15L**

Unit IV	**Research Computing** Interpretation and report: Techniques of Interpretation, Precautions of interpretation, Significance of report writing, Different steps in writing report, Layout of research report, types of reports, oral presentation, Mechanics of research writing, Precautions for writing research report and conclusion, accuracy, confusion matrix, sensitivity and specificity, ROC curve, t-test. Research paper: What is research paper, Understand assignment, Choose a research paper topic, conduct preliminary research, Develop a thesis statement, create research paper outline, draft of research paper: introduction, a compelling body, the conclusion, the second draft, revision process, research paper checklist.	**15L**
	Text book: • Introduction to Algorithms, Third Edition, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, PHI Learning Pvt. Ltd-New Delhi (2009) • Researching Information Systems and Computing, Brinoy J Oates, Sage Publications India Pvt Ltd (2006)	
	References: • Algorithms, Sanjoy Dasgupta, Christos H. Papadimitriou, Umesh Vazirani, McGraw-Hill Higher Education (2006). • Grokking Algorithms: An illustrated guide for programmers and other curious people, MEAP, Aditya Bhargava, http://www.manning.com/bhargava • Research Methodology, Methods and Techniques, Kothari, C.R.,1985, third edition, New Age International (2014) • Basic of Qualitative Research (3rd Edition), Juliet Corbin & Anselm Strauss, Sage Publications (2008). • Research Methodology, third edition by C. R. Kothari, Gaurav Garg	

Practical Course on Analysis of Algorithm & Research Computing	
Sr. No	**List of Practical Experiments on Analysis of Algorithm and Research Computing**
1	Write a program to implement the Rod Cutting problem.
2	Write a program to implement a merge sort algorithm. Compare the time and memory complexity.
3	Given an array of numbers of length l. Write a program to generate a random permutation of the array using (i) permute-by-sorting () and (ii) permute-by-cyclic ().
4	Write a program to implement Longest Common Subsequence (LCS) algorithm.
5	Write a program to implement Kruskal's algorithm.
6	Write a program to implement Dijkstrass's algorithm.
7	Write a program to implement Euclid's algorithm to implement gcd of two non-negative integers a and b. Extend the algorithm to find x and y such that gcd(a,b) = ax+by. Compare the running time and recursive calls made in each case.
8	Write a program to verify (i) Euclid's theorem (ii) Fermat's theorem.
9	Write a program to implement greedy set cover algorithm to solve set covering problem.
10	Write a research paper.

Module/ Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
1	Designing strategies of an algorithm	15h	1	1	2
2	Analysis techniques of an algorithm	15h	2	1	2
3	Discover a research problem	15h	3	2	3
4	Create a research paper	15h	4	3	4

Course Description	
Semester	**I**
Course Name	**Design and Implementation of Modern Compiler**
Course Code	**PCS2DMC**
Eligibility for Course	**B.Sc.**
Credit	**4**
Hours	**60**

Course Objectives

1. Apply the basic concepts and methods of Compiler Design.
2. Understand the Structure of Compilers.
3. Improving designing and optimization of source programs.
4. Explore concepts of converting source program to target program.

Course Outcomes

1. Describe the Phases of Compiler.
2. Explain step by step transformation of source code to target code.
3. Explain Methods for Code Optimization.
4. Evaluate data flow, logic flow, liveness of variables through the program.

Course Code PCS2BI1	**Course Title** **Design and Implementation of Modern Compiler**	**Credits 04**
Unit I	**Introduction to Compilers** The structure of a compiler, A simple approach to the design of lexical analyzers, Regular expressions, Finite automata, From regular expressions to finite automata, Minimizing the number of states of a DFA, Context-free grammars, Derivations and Parse trees, Parsers, Shift-reduce parsing, Operator-precedence parsing, Top- down parsing, Predictive parsers.	**15 L**
Unit II	**Automatic Construction of Efficient Parsers** LR parsers, The canonical collection of LR(0) items, Constructing SLR parsing tables, Constructing canonical LR parsing tables,	**15 L**

	Constructing LALR parsing tables, Using ambiguous grammars, An automatic parser generator, Implementation of LR parsing tables, Constructing LALR sets of items.	
Unit III	**Advanced syntax analysis and basic semantic analysis** Syntax-directed translation schemes, Implementation of syntax-directed translators, Initial introduction to the ongoing Tiger compiler, bindings for the Tiger compiler, type- checking expressions, type-checking declarations, activation records, stack frames, frames in the Tiger compiler, translation to intermediate code, intermediate representation trees, translation into trees, declarations, basic blocks and traces, taming conditional branches, liveness analysis, solution of dataflow equations, liveness in the Tiger compiler, interference graph construction	**15 L**
Unit-IV	**Dataflow analysis and loop optimization** The principle sources of optimization, Loop optimization: The DAG representation of basic blocks, Dominators, Reducible flow graphs, Depth-first search, Loop-invariant computations, Induction variable elimination, Some other loop optimizations. Dataflow Analysis: intermediate representation for flow analysis, various dataflow analyses, transformations using dataflow analysis, speeding up dataflow analysis, alias analysis.	**15 L**

Text book:

- Compilers: Principles, Techniques and Tools 2nd edition, Alfred V. Aho , Monica
- S. Lam , Ravi Sethi , Jeffrey D. Ullman , Pearson (2011)
- Modern Compiler Implementation in Java, Second Edition, Andrew Appel and Jens Palsberg, Cambridge University Press (2004).

Reference:

- Principles of Compiler Design, Alfred Aho and Jeffrey D. Ullman, Addison Wesley (1997).
- Compiler design in C, Allen Holub, Prentice Hall (1990)

Sr. No.	List of Practical Experiments on Design and Implementation of Modern Compiler
1	Write a program to convert the given NDFA to DFA.
2	Write a program to convert the given Right Linear Grammar to Left Linear Grammar form.
3	Write a program to illustrate the generation on SPM for the input grammar.
4	Write a program to illustrate the generation on OPM for the input operator grammar
5	Implement a simple program analyzer and interpreter for the straight-line programming language
6	Add semantic actions to your parser to produce abstract syntax for the MiniJava language together with a PrettyPrintVisitor
7	Design a set of visitors, which translate a MiniJava program into intermediate representation trees
8	Implement the translation to Assem instructions for your favorite instruction set (let μ stand for Sparc, Mips, Alpha, Pentium, etc.) using maximal munch.
9	Write a code to generate the DAG for the input arithmetic expression.
10	Write a program to demonstrate loop unrolling and loop splitting for the given code sequence containing loop.

Module/ Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
1	**Introduction to Compilers**	**15h**	**1**	**1**	**2**
2	**Automatic Construction of Efficient Parsers**	**15h**	**2**	**2**	**3**
3	**Advanced syntax analysis and basic semantic analysis**	**15h**	**3**	**2**	**5**
4	**Dataflow analysis and loop optimization**	**15h**	**4**	**3**	**5**

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Course Description	
Semester	**I**
Course Name	**Advanced Database Systems**
Course Code	**PCS1ADS**
Eligibility for the Course	**B.Sc.**
Credit	**4**
Hours	**60**

Course Objectives

This course will help the students to acquire the theoretical foundation of Database Management Systems. It includes concepts relating to various advanced database models, and concepts like database mining and warehousing. This course also describes in major details about the advanced concepts of relation database management systems. The course also provides sample database management system architecture. Thus, this is an advanced course, which will further develop the knowledge and skill acquired by the students at the basic level.

Course Outcomes

After completing the course, Student will be able to

1. Describe the concept of distributed database systems.
2. Analyze database management in a centralized and distributed environment.
3. Illustrate data modeling and database development processes for object-oriented, Temporal, and Spatial databases.
4. Explain the use of deductive, active, and multimedia databases.

Course Code : PCS1ADS	Course Title Advanced Database Systems	Credits 04
Unit I	**Distributed Database Concepts** Definition of Distributed databases and Distributed Database Management System (DDBMS), Distributed transparent system. DDBMS Architecture: DBMS standardization, Global, Local, External, and Internal Schemas, Architectural models for DDBMS. Distributed database design: Design problem of distributed systems, Design, strategies (top-down, bottom-up), Fragmentation, Allocation and replication of fragments. Query Processing Overview, Query Optimization.	**15L**
Unit II	**Transaction Processing in Distributed databases and Parallel databases:** Transaction Management: Definition and examples, formalization of a transaction, ACID properties, classification of transaction. Concurrency Control: definition, execution schedules, examples, locking based algorithms, timestamp ordering algorithms, deadlock management. DBMS reliability: Definitions and Basic Concepts, Local Recovery Management, In-place update, out-of-place update, Distributed Reliability Protocols, Two phase commit protocol, Three phases commit protocol. Parallel Database System: Definition of Parallel Database Systems. Parallel query evaluation: Speed up and scale up, Query Parallelism: I/O Parallelism (Data Partitioning) Intra-query Parallelism, Inter –Query Parallelism, Intra Operation Parallelism, Inter Operation Parallelism.	**15L**

Unit III	**Object Oriented, Temporal and Spatial Databases:** Object Oriented Database: Object Identity, Object structure, Type Constructors, Encapsulation of Operations, Methods, Persistence, Type and Class Hierarchies, Inheritance, Complex Objects, Object-oriented DBMS, Languages and Design: ODMG Model, Object Definition Languages (ODL), Object Query Languages (OQL). Temporal and Spatial Database: Introduction to Temporal Database: Time ontology, structure, and granularity, Temporal data models, Temporal relational algebras. Introduction to Spatial Database: Definition, Types of spatial data, Geographical Information Systems (GIS), Conceptual Data Models for spatial databases, Logical data models for spatial databases: rastor and vector model. Physical data models for spatial databases: Clustering methods (space filling curves), Storage methods (R-tree). Query processing.	**15L**
Unit IV	**Deductive, Active, Multimedia and XML Databases** Deductive Database: Introduction to recursive queries, Datalog Notation, Clause Form and Horn Clauses, Interpretation of model: Least Model semantics, The fixed point operator, safe Datalog program, recursive query with negation. Active Database: Languages for rule specification: Events, Conditions, Actions. XML and Database: Structure of XML Data, XML Document Schema, Querying and Transformation, Storage of XML Data. Introduction to multimedia database systems.	**15L**

	Text book: • Distributed Database; Principles & Systems By Publications, Stefano Ceri and Giuseppo Pelagatti,, McGraw-Hill International Editions (1984) • Database Management Systems, 3rd edition, Raghu Ramakrishnan and Johannes Gehrke, McGraw-Hill (2002). • Fundamentals of Database Systems, 6thEdition, Elmasri and • Navathe, Addison. Wesley (2003). • Unifying temporal data models via a conceptual model, C.S. Jensen, M.D. Soo, and R.T. Snodgrass: Information Systems, vol. 19, no. 7, pp. 513-547, 1994. • Spatial Databases: A Tour by Shashi Shekhar and Sanjay Chawla, Prentice Hall, 2003 (ISBN 013-017480-7) • Principles of Multimedia Database Systems, Subramanian V. S. Elsevier Publishers, 2013	
	References: • Principles of Distributed Database Systems; 2nd Editied By M. Tamer Ozsu and Patrick Valduriez, Person Education Asia. · Database System Concepts, 5th edition, Avi Silberschatz , Henry F. Korth , S. Sudarshan: McGraw-Hill (2010) • Database Systems: Concepts, Design and Applications, 2nd edition, Shio Kumar Singh, Pearson Publishing, (2011). • Multi-dimensional aggregation for temporal data. M. Böhlen, J. Gamper, and C.S. Jensen. In Proc. of EDBT-2006, pp. 257-275, (2006). • Moving objects databases (chapter 1 and 2), R.H. Güting and M. Schneider: Morgan Kaufmann Publishers, Inc., (2005) • Advanced Database Systems, (chapter 5, 6, and 7), Zaniolo et al.: Morgan Kaufmann Publishers, Inc., (1997)	

Practical Course on Advanced Database Systems	
Sr No	**List of Practical Experiments on Advanced Database Systems**
1	For a given a global conceptual schema, divide the schema into vertical fragments and Place the replication of the global conceptual schema on different nodes and execute queries that will demonstrate a distributed database environment.
2	Create different types that include attributes and methods. Define tables for these types by adding a sufficient number of tuples. Demonstrate insert, update and delete operations on these tables. Execute queries on them
3	For a given global conceptual schema, divide the schema into horizontal fragments and place them on different nodes. Execute queries on these fragments that will demonstrate distributed databases environment.
4	Place the replication of global conceptual schema on different nodes and execute queries that will demonstrate distributed databases environment.
5	Create a nested table and insert a sufficient number of tuples and execute queries
6	Create a table with multimedia attribute and issue queries on it.
7	Create a temporal database and issue queries on it.
8	Create a table that stores spatial data and issue queries on it.
9	Formulate a database using active rules with row and statement levels.
10	Create an XML database and demonstrate insert, update and delete operations on these tables. Issue queries on it.

Module/ Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
1	Distributed Database Concepts	15h	1	1	1
2	Transaction Processing in Distributed databases and Parallel databases	15h	2	3	2,3
3	Object Oriented, Temporal and Spatial Databases:	15h	3	3	2,3
4	Deductive, Active, Multimedia and XML Databases	15h	4	2	1,2

Course Description	
Semester	**I**
Course Name	**Robotics**
Course Code	**PCS1RBT**
Eligibility for Course	**B.Sc.**
Credit	**4**
Hours	**60**

Course Objectives

1. Understand the working principles of physical components of robotic system
2. Learn the internal and external perceptions of the robot based on different types of sensors
3. To impart the knowledge about planning, mapping, and navigation of robot
4. Provide hands-on practice to build actual robot

Course Outcomes

1. Describe the concepts of robotics and its components
2. Analyze the internal and external perceptions of the robot based on different types of sensors
3. Evaluate the planning, mapping, and navigation of robots
4. Construct a robot using Raspberry Pi

Course Code: PCS1RBT	Course Title Robotics	Credits 4
Unit I	**Introduction to Robotics:** What is a Robot? Definition, History of Robots: Control Theory, Cybernetics, Grey Walter Tortoise, Analog Electronic Circuit, Reactive Theory, Braitenberg's Vehicle, Artificial Intelligence, Vision Based Navigation, Types of Robot Control. Robot Components: Embodiment, Sensors, States, Action, Brains and Brawn, Autonomy, Arms, Legs, Wheels, Tracks, and What really drives them effectors and actuators: Effector, Actuator, Passive and Active Actuation, Types of Actuator, Motors, Degree of freedom Locomotion: Stability, Moving and Gaits, Wheels and Steering, Staying on the path. Manipulators: End effectors, Teleoperation, Why is manipulation hard? Sensors: Types of Sensors, Levels of Processing, Passive and Active sensors, Switches, Light sensors, Resistive position sensor.	**15 L**
Unit II	**Sonar, Lasers and Cameras:** Ultrasonic and Sonar sensing, Specular Reflection, Laser Sensing, Visual Sensing, Cameras, Edge Detection, Motion Vision, Stereo Vision, Biological Vision, Vision for Robots, Feedback or Closed Loop Control: Example of Feedback Control Robot, Types of feedback control, Feed forward or Open loop control.	**15 L**
Unit III	**Languages for Programming Robot:** Algorithm, Architecture, The many ways to make a map, What is planning, Cost of planning, Reactive systems, Action selection, Subsumption architecture, How to sequence behavior through world, hybrid control, Behavior based control and Behavior Coordination, Behavior Arbitration, Distributed mapping, Navigation and Path planning.	**15 L**
Unit-IV	**Building Robots With Raspberry Pi and Python:** Hardware components of Raspberry pi, installation of Raspberry pi, Building Robot- ,Required Components, Assembling robot, Robot Movement-H-bridge, Programme Robot with predefined route, Line following using	**15 L**

	TCRT5000 sensor , Avoiding Obstacles-Ultrasonic sensors for analog object detection,HC-SR04 working and mounting, Measuring short distance

References

1. The Robotics Primer by Maja J Matarić, MIT press Cambridge, Massachusetts, London, England (2007).
2. Learn Robotics With Raspberry Pi , Matt Timmons –Brown

Practical Course on Robotics	
Sr. No.	**List of Practical Experiments on Robotics**
Perform following practical's using Robosim and JGameGrid	
1	Write a program to create a robot (i) With gear (ii) Without gear and move it forward, left, right
2	Write a program to create a robot with a two motor and move it forward, left, right
3	Write a program to do a square using a while loop, doing steps with a for loop, to change directions based on condition, controlling motor speed using switch case
4	Write a program to create a robot with light sensors to follow a line
5	Write a program to create a robot that does a circle using 2 motors
6	Write a program to create a path following robot
7	Write a program to register obstacles
Perform following practical's using Raspberry Pi	
8	Build and assemble a robot using Raspberry Pi
9	Implement Line following using TCRT5000 sensor
10	Implement Object detection using HC-SR04 sensor

Module/ Unit	**Course Description**	**Hrs**	**CO No.**	**PSO No.**	**PO No.**
1	Introduction to Robotics	15h	1	1	1
2	Sonar, Lasers and Cameras	15h	2	3	2
3	Languages for Programming Robot	15h	3	3	2
4	Building Robots With Raspberry Pi and Python	15h	4	2	6

Semester II

Course Description	
Semester	**II**
Course Name	**Cloud Computing**
Course Code	**PCS2CLD**
Eligibility for Course	**B.Sc.**
Credit	**4**
Hours	**60**

Course Objectives:

1. To provide comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, and architecture
2. To analyze different cloud computing platforms for implementing solutions
3. To expose the students to frontier areas of Cloud Computing Management services
4. To make students aware of security threats in cloud computing

Course Outcomes: Learners will be able to

1. Articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing
2. Identify problems, and explain, analyze, and evaluate various cloud computing platforms for the solution
3. Implement different types of Service Oriented Architecture systems
4. Analyze the issues in Resource provisioning and Security governance in clouds

Course Code: PCS2E1A	Course Title **Cloud Computing-I**	Credits 04
Unit I	**Introduction** Introduction, Roots of Cloud Computing: From mainframe to Cloud, Benefits of Cloud Computing SOA, Web services, Web 2.0, Mashups, Grid computing, Utility computing, Hardware virtualization, Essentials of Cloud characteristics, Challenges, Cloud economics, Role of Networks in Cloud Computing: Cloud types and service models.	**15L**
Unit II	**Cloud Platforms:** Features of Cloud and Grid Platforms: Cloud Capabilities and Platform Features, Traditional Features Common To Grids and Clouds, Data Features and Databases, Programming and Runtime Support. Parallel and Distributed Programming Paradigms: Parallel Computing and Programming Paradigms, MapReduce, Twister and Iterative MapReduce, Hadoop Library from Apache. **Examples:** Openstack, Opennimbus, Eucalyptus Primary Cloud Service models, GAE, AWS, and Azure: Public Clouds and Service Offerings, Google App Engine (GAE), Amazon Web Service (AWS), Microsoft Windows Azure	**15L**
Unit III	**Management of cloud services** Reliability, availability, and security of services deployed from the cloud. Performance and scalability of services, tools, and technologies used to manage cloud services deployment; Cloud Economics: Cloud Computing infrastructures available for implementing cloud-based services. Economics of choosing a Cloud platform for an organization, based on application requirements, economic constraints and business needs (e.g Amazon, Microsoft and Google, Salesforce.com, Ubuntu and Redhat)	**15L**

Unit IV	**Security in Cloud Computing** Introduction, Global Risk and Compliance aspects in cloud environments and key security terminologies, Technologies for Data security, Data security risk, Cloud computing and identity, Digital identity and access management, Content level security, Security-As-A-Cloud Service	**15L**

Text book:

- Rajkumar Buyya, "Cloud computing principles and paradigms", Wiley
- Gautam Shroff, Enterprise Cloud Computing, Cambridge
- Rajkumar Buyya, "Mastering Cloud computing", McGraw Hill
- Tim Mather, Subra K, Shahid L.,Cloud Security and Privacy, Oreilly, ISBN-13 978-81-8404-815-5
- Distributed and cloud computing from parallel processing to the internet of things by Kai Hwang, Geoffry C. Fox, and Jack J. Dongarra

References:

- Kai Hwang, Jack Dongarra, Geoffrey Fox: Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, MK Publishers, 2012. 2.
- Michael Miller, Cloud Computing: Web-Based Applications that change the Way you work and collaborate Online, Pearson Publication, 2012.
- Dr. Kumar Saurabh,"Cloud Computing", Wiley Publication

Course Code: PCS2PR2	**Practical Experiments on Cloud Computing**
	List of Practical Experiments on Cloud Computing
1	Develop Applications using Google AppEngine
2	Implement MapReduce and Hadoop
3	Implement private cloud with Xen server
4	Creating a Failover Cluster using Failover Cluster Manager
5	Implement private cloud with Exi server
6	Installation and Configuration of virtualization using KVM
7	Study and implement Cloud Security management with Two-Factor Authentication
8	Study and implementation of Single-Sing-On
9	Managing Hyper-V environment with SCVVM 2012
10	Using Data Protection Manager for Backup and Recovery

Module/ Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
1	Introduction	15h	1	1	1
2	Cloud Platforms	15h	2	2	2
3	Management of cloud services	15h	3	3	3
4	Security in Cloud Computing	15h	4	2	8

Course Description	
Semester	**II**
Course Name	**Natural Language Processing**
Course Code	**PCS2NLP**
Eligibility for Course	**B.Sc.**
Credit	**4**
Hours	**60**

Course objectives:

1. To understand natural language processing and to learn how to apply basic algorithms in this field
2. To get acquainted with the basic concepts and algorithmic description of the main language levels: morphology, syntax, semantics, and pragmatics
3. To design and implement applications based on natural language processing
4. To implement various language Models

Course outcomes: On successful completion of the course, the learner should:

1. Have a broad understanding of the field of natural language processing
2. Have a sense of the capabilities and limitations of current natural language technologies,
3. Be able to model linguistic phenomena with formal grammar
4. Understand the mathematical and linguistic foundations underlying approaches to the various areas in NLP
5. Be able to apply NLP techniques to design real-world NLP applications such as machine translation, text categorization, text summarization, information extraction, etc.

Course Code: PCS2NLP	Course Title	Credits
	Natural Language Processing	**04**
Unit I	**Introduction to NLP** Introduction to NLP History of NLP, Generic NLP system, levels of NLP, Knowledge in Speech and language processing, Ambiguity in Natural language, stages in NLP, challenges of NLP, Applications of NLP	**15L**
Unit II	**Word Level Analysis** An Outline of English Syntax Words- The Elements of Simple Noun Phrases Verb Phrases and Simple Sentences Noun Phrases Revisited Adjective Phrases Adverbial Phrases, Grammars and Sentence Structure What Makes a Good Grammar A Top-Down Parser A Bottom-Up Chart Parser Top-Down Chart Parsing Finite State Models and Morphological Processing Grammars and Logic Programming Parsing tools such as Stanford Parser. N –Grams- N-gram language model, N-gram for spelling correction.	**15L**
Unit III	**Syntax Analysis** Part-Of-Speech tagging(POS)- Tag set for English (Penn Treebank), Rule-based POS tagging, Stochastic POS tagging, Issues –Multiple tags & words, Unknown words. Introduction to CFG, Sequence labeling: Hidden Markov Model (HMM), Maximum Entropy, and Conditional Random Field (CRF).	**15L**
Unit IV	**Semantic Analysis** Lexical Semantics, Attachment for the fragment of English- Sentences, Noun phrases, Verb phrases, Prepositional phrases, Relations among lexemes & their senses –Homonymy, Polysemy, Synonymy, Hyponymy, WordNet, Word Sense Disambiguation (WSD) Applications: Named Entity Recognition, Information retrieval, Question answers system, Machine translation. **Sentiment Analysis**	**15L**

	What is Sentiment Analysis, Types of Sentiment Analysis, Importance of Sentiment Analysis, Challenges of Sentiment Analysis.	

Text Books:

1. Daniel Jurafsky, James H. Martin ―Speech and Language Processing‖ Second Edition, Prentice Hall, 2008.
2. Christopher D.Manning and Hinrich Schutze, ― Foundations of Statistical Natural Language Processing ―, MIT Press, 1999.
3. D. Jurafsky, J. H. Martin, "Speech and Language Processing", Pearson Education, 2002.

Reference Books:

1. Siddiqui and Tiwary U.S., Natural Language Processing and Information Retrieval, Oxford University Press (2008).
2. https://monkeylearn.com/sentiment-analysis
3. Daniel M Bikel and Imed Zitouni ― Multilingual natural language processing applications‖ Pearson, 2013
4. Alexander Clark (Editor), Chris Fox (Editor), Shalom Lappin (Editor) ― The Handbook of Computational Linguistics and Natural Language Processing ― ISBN: 978-1-118
5. Steven Bird, Ewan Klein, Natural Language Processing with Python, O'Reilly
6. Brian Neil Levine, An Introduction to R Programming
7. Niel J le Roux, Sugnet Lubbe, A step by step tutorial: An introduction into R application and programming
8. Christopher D. Manning, Hinrich Schutze, Foundations of Statistical Natural Language Processing, The MIT Press, Cambridge, Massachusetts, 1999.

Course Code: PCS2PR1	Course Title
	Practical Course on Natural Language Processing
Note: - The following set of practicals can be performed using any Python Libraries for NLP such as NLTK, spaCy, genism: Link:-https://www.python.org/downloads/	
Sr. No.	**List of Practical Experiments on Natural Language Processing**
1	Write a program to implement sentence segmentation and word Tokenization
2	Write a program to Implement stemming and lemmatization
3	Write a program to Implement a tri-gram model
4	Write a program to Implement PoS tagging using HMM & Neural Model
5	Write a program to Implement syntactic parsing of a given text
6	Write a program to Implement dependency parsing of a given text
7	Write a program to Implement Named Entity Recognition (NER)
8	Write a program to Implement Text Summarization for the given sample text

Module /Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
1	Introduction to NLP	15h	1	1	1
2	Word Level Analysis	15h	2	2	3
3	Syntax Analysis	15h	3	2	3
4	Semantic Analysis	15h	4	2	3

Course Description	
Semester	**II**
Course Name	**Business Intelligence and Big data Analytics**
Course Code	**PCS2BI1**
Eligibility for Course	**B.Sc.**
Credit	**4**
Hours	**60**

Course Objectives

1. Apply the basic concepts and methods of business analytics
2. Understand the basic concepts of Business Data Warehouse
3. Improving strategic decision-making by designing Data Warehouse model.
4. To explore data mining concepts and solutions.

Course Outcomes

1. Describe the concepts of Business Intelligence
2. Explain business Data Warehouse
3. Build business Data Warehouse
4. Evaluate data mining process and Association analysis

Course Code: PCS2BI1	**Course Title**	**Credits 04**
	Business Intelligence and Big Data Analytics	
Unit I	**Introduction to Business Intelligence:** Operational and Decision Support System, Data-Information-Knowledge- Decision making-Action cycle. Basic definitions-Business Intelligence; Data warehousing, Business Intelligence architecture, Use and benefits of Business Intelligence. Knowledge Discovery in Databases: KDD process model, Data Pre-processing: Cleaning: Missing Values; Noisy Values; Inconsistent values; redundant values. Outliers, Integration, transformation, reduction, Discretization: Equal Width Binning; Equal Depth Binning,Normalization, Smoothing	**15 L**

Unit II	**Introduction to Business Data Warehouse:** Definition of Data warehouse, Logical architecture of Data Warehouse, Data Warehouse model- Enterprise warehouse; Data Marts; Virtual warehouse. Populating business Data Warehousing: data integration and extract, transform, load (ETL).	**15 L**
Unit III	**Designing Business Data Warehouse:** OLTP and OLAP systems, Designing business information warehouse: Principles of dimensional modeling, Data cubes, Data cube operations, data cube schemas.	**15 L**
Unit-IV	**Introduction to Data Mining:** Data mining definitions and process: business and data understanding. Association Analysis: Definition of association rule, General issues: Support; Confidence; Lift; Conviction, Frequent Item sets: APriori Algorithm; Issues with APriori Algorithm, Data structures: Hash tree and FP tree.	**15 L**

Text book:

- Business Intelligence (2nd Edition), Efraim Turban, Ramesh Sharda, Dursun Delen, David King, Pearson (2013)
- Business Intelligence for Dummies, Swain Scheps, Wiley Publications (2008).
- Building the Data Warehouse, Inmon: Wiley (1993).
- Data Mining: Introductory and Advanced Topics, Dunham, Margaret H, Prentice Hall (2006)
- Data Mining: Practical Machine Learning Tools and Techniques,Second Edition, Witten, Ian and Eibe Frank, Morgan Kaufmann (2011)

Reference:

- Business Intelligence Road Map, Larissa T. Moss, Shaku Atr, Addison-Wesley

- Data Modeling Techniques for Data Warehousing by IBM; International Technical Support Organization, Chuck Ballard, Dirk Herreman, Don Schau, Rhonda Bell, Eunsaeng Kim, Ann Valencic:http://www.redbooks.ibm.com
- Data Mining: Concepts and Techniques, The Morgan Kaufmann Series in Data Management Systems, Han J. and Kamber M. Morgan Kaufmann Publishers, (2000).
- Data Mining with Microsoft SQL Server 2008, MacLennan Jamie, Tang ZhaoHui and Crivat Bogdan, Wiley India Edition (2009).

Sr. No.	List of Practical Experiments on Business Intelligence & Big Data Analytics (Business Intelligence)
1	Import the legacy data from different sources such as (Excel , SqlServer, Oracle etc.) and load in the target system. (You can download sample database such as Adventureworks, Northwind, foodmart etc.)
2	Perform the Extraction Transformation and Loading (ETL) process to construct the database in the Sqlserver.
3	a. Create the Data staging area for the selected database. b. Create the cube with suitable dimension and fact tables based on ROLAP, MOLAP and HOLAP model.
4	a.Create the ETL map and setup the schedule for execution. b. Execute the MDX queries to extract the data from the datawarehouse.
5	a. Import the datawarehouse data in Microsoft Excel and create the Pivot table and Pivot Chart. 57 b. Import the cube in Microsoft Excel and create the Pivot table and Pivot Chart to perform data analysis.
6	Apply the what – if Analysis for data visualization. Design and generate necessary reports based on the datawarehouse data
7	Develop an application to pre process data imported from external sources.
8	Create association rules by considering suitable parameters.
9	Write a program in Python based on Hash Tree

10	Write a program in Python based on FP Tree

The BI tools such as Tableau / Power BI / BIRT / R / Excel or any other can be used.

Module/ Unit	**Course Description**	Hrs	CO No.	PSO No.	PO No.
1	Introduction to Business Intelligence	15h	1	1	2
2	Introduction to Business Data Warehouse	15h	2	1	1
3	Designing Business Data Warehouse	15h	3	2	5
4	Introduction to Data Mining	15h	4	3	6

Course Description	
Semester	**II**
Course Name	**Machine Intelligence**
Course Code	**PCS2MI1**
Eligibility for Course	**B.Sc.**
Credit	**4**
Hours	**60**

Course Objectives:

1. To be able to formulate machine learning problems corresponding to different applications
2. To understand various machine learning algorithms along with their advantages and disadvantages
3. To be able to apply machine learning algorithms to solve problems of moderate complexity.

Course Outcomes:

1. Identify basic concepts and types of learning from data
2. Describe dimensionality reduction technique for attribute reduction
3. Create ensemble models using different Machine Learning techniques
4. Build probabilistic and unsupervised learning models for handling unknown patterns

Course Code: PCS2MI1	Course Title	Credits 04
	Machine Intelligence	
Unit I	**Learning-Standard Linear methods:** Statistical Learning: What Is Statistical Learning, Assessing Model Accuracy. Linear Regression: Simple Linear Regression, Multiple Linear Regressions, Other Considerations in the Regression Model, The Marketing Plan, Comparison of Linear Regression with K-Nearest Neighbors. Classification: An Overview of Classification, Why Not Linear Regression? , Logistic Regression, Linear Discriminant Analysis, ,A Comparison of Classification Methods.	**15 L**
Unit II	**Selection and improvements of linear learning methods:** Resampling Methods: Cross-Validation, The Bootstrap. Linear Model Selection and Regularization: Subset Selection, Shrinkage Methods, Dimension Reduction Methods, Considerations in High Dimensions.	**15 L**
Unit III	**Non-Linear Learning methods:** Polynomial Regression, Step Functions, Basis Functions, Regression Splines, Smoothing Splines, Local Regression, Generalized Additive Models, Tree-Based Methods: The Basics of Decision Trees. Bagging, Random Forests, Boosting.	**15 L**
Unit-IV	**Support Vector machines, Principle Component Analysis and Clustering:** Support Vector Machines: Maximal Margin Classifier. Support Vector Classifiers: Support Vector Machines, SVMs with More than Two Classes Relationship to Logistic Regression. Unsupervised Learning: The Challenge of Unsupervised Learning, Principal Components Analysis, Clustering, Methods: K-Means Clustering, Hierarchical Clustering, Practical Issues in Clustering.	**15 L**

Text book:

- An Introduction to Statistical Learning with Applications in R: Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Springer 2013.
- The Elements of Statistical Learning: Data Mining, Inference, and Prediction (Second Edition) : Trevor Hastie, Robert Tibshirani, Jerome Friedman, Springer (2008).

Reference:

- Introduction to Machine Learning (Second Edition): Ethem Alpaydın, The MIT Press (2010).
- Pattern Recognition and Machine Learning: Christopher M. Bishop, Springer (2006)
- Bayesian Reasoning and Machine Learning: David Barber, Cambridge University Press (2012)
- Machine Learning: The Art and Science of Algorithms that Make Sense of Data: Peter Flach, Cambridge University Press (2012) Machine Learning for Hackers: Drew Conway and John Myles White, O'Reilly (2012)
- Machine Learning in Action: Peter Harrington, Manning Publications (2012).
- Machine Learning with R: Brett Lantz, Packt Publishing (2013)
- https://class.coursera.org/ml-005/lecture/preview
- https://github.com/josephmisiti/awesome-machine-learning.

Sr. No.	List of Practical Experiments on Machine Intelligence (Fundamentals of Machine Intelligence)
1	Implement simple linear regression model on a standard data set and plot the least square regression fit. Comment on the result. [One may use inbuilt data sets like Boston, Auto etc]
2	Implement multiple regression model on a standard data set and plot the least square regression fit. Comment on the result. [One may use inbuilt data sets like Carseats, Boston etc].
3	Fit a classification model using following: (i) logistic regression (ii) Linear Discriminant Analysis (LDA) and (iii) Quadratic Discriminant Analysis (QDA)

	on a standard data set and compares the results. [Inbuilt datasets like Smarket, Weekly, Auto, Boston etc may be used for the purpose].
4	Fit a classification model using K Nearest Neighbour (KNN) Algorithm on a given data set. [One may use data sets like Caravan, Smarket, Weekly, Auto and Boston].
5	Use bootstrap to give an estimate of a given statistic. [Datasets like Auto, Portfolio and Boston etc may be used for the purpose].
6	For a given data set, split the data into two training and testing and fit the following on the training set: (i) Linear model using least squares (ii) Ridge regression model (iii) Lasso model (iv) PCR model (v) PLS model Report test errors obtained in each case and compare the results. [Data sets like College, Boston etc may be used for the purpose].
7	For a given data set, perform the following: (i) Perform the polynomial regression and make a plot of the resulting polynomial fit to the data. (ii) Fit a step function and perform cross validation to choose the optimal number of cuts. Make a plot of the fit to the data. [Use data set like Wage for the purpose].
8	For a given data set, do the following: (i) Fit a classification tree (ii) Fit a regression tree [One may choose data sets like Carseats, Boston etc for the purpose].
9	For a given data set, split the dataset into training and testing. Fit the following models on the training set and evaluate the performance on the test set: (i) Boosting (ii) Bagging (iii) Random Forest [Data sets like Boston may be used for the purpose].
10	Fit a support vector classifier for a given data set. [Data sets like Car, Khan, Boston etc may be used for the purpose].
11	Perform the following on a given data set: (i) Principal Component Analysis (ii) Hierarchical clustering. [Data set like NC160, USArrests etc may be used for the purpose].

Note: The above practical experiments require the R Software

Module /Unit	Course Description	Hrs	CO No.	PSO No.	PO No.
1	Learning-Standard Linear methods:	15h	1	1	1
2	Selection and improvements of linear learning methods:	15h	2	2	2
3	Non-Linear Learning methods:	15h	3	1	1
4	Support Vector machines, Principle Component Analysis and Clustering:	15h	4	2	2