



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**

SYLLABUS

(Approved in the Academic council meeting dated 27/06/2023)

**F. Y. B. Sc. Information Technology
Undergraduate Certificate in the field of
Information Technology**

Revised as per
NEP 2020

Choice Based Credit System (60:40)

w.e.f. Academic Year 2023-2024

BACHELOR'S IN SCIENCE (B. Sc.)

Programme Outcomes

Sr. No.	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, analyse, 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, analyse 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

	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.

Examination Scheme

Choice Based Credit System (CBCS)

➤ Revised Scheme of Examination

1. For Major Courses (100 Marks)

The performance of the learners shall be evaluated into two components, as the first component by 'Continuous Internal Assessment (CIA)' with 40% marks and as the second component by conducting the 'Semester End Examinations (SEE)' with 60% marks. The allocation of marks for the Continuous Internal Assessment (CIA) and Semester End Examinations are as shown below:

A) Continuous Internal Assessment (CIA): 40 %

40 Marks

Sr. No.	Particular	Marks
01	One periodical class test / online examination to be conducted in the given semester	20 Marks
02	Group/ Individual Survey Project/Presentation and write up on the selected units of the courses /Case studies / Test based on tutorials /Book Review /Poetry Appreciation/ Open Book Test	15 Marks
03	Active participation in routine class instructional deliveries and overall conduct as a responsible learner, mannerism and articulation and exhibition of leadership qualities in organizing related academic activities	05 Marks

Question Paper Pattern (Periodical Class Test)

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/True or False/ 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 (SEE): 60 %

60 Marks

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

Question Paper Pattern

Theory question paper pattern
1. There shall be three/four questions each of 20/15 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.

➤ **Practical Examination (PE) for Major Courses: 50 Marks**

- The Practical Examination (PE) shall be of 100 marks for Major Courses

2. For Value Education Courses (VEC)/ Ability Enhancement Courses (AEC) /Indian Knowledge System (IKS) (50 Marks)

The performance of the learners shall be evaluated into two components, as the first component by ‘Continuous Internal Assessment (CIA)’ with 40% marks and as the second component by conducting the ‘Semester End Examinations (SEE)’ with 60% marks. The allocation of marks for the Continuous Internal Assessment (CIA) and Semester End Examinations (SEE) are as shown below:

A) Continuous Internal Assessment (CIA): 40 %

20 Marks

Sr. No.	Particular	Marks
01	One periodical class test / online examination to be conducted in the given semester	20 Marks

Question Paper Pattern (Periodical Class Test)

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 (SEE): 60 %

30 Marks

- Duration: The examination shall be of 1 hour's duration.

Question Paper Pattern

Theory question paper pattern
<ol style="list-style-type: none"> 1. There shall be two/three questions each of 15/10 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.

3. Co-Curricular Courses (CC) (50 Marks)

The performance of the learners shall be evaluated into two components. The allocation of marks are as shown below:

A) Continuous Internal Assessment (CIA): 40 %

20 Marks

Sr. No.	Particular	Marks
01	One project / case study based on curriculum to be assessed by the teacher concerned	20 Marks
	Written Document	15 Marks
	Viva/presentation	05 Marks

B) Semester End Examination (SEE): 60 %

30 Marks

- Duration: The examination shall be of 1 hour's duration.

Question Paper Pattern

Theory question paper pattern
1. There shall be two/three questions each of 15/10 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.

4. For Vocational Skill Courses (VSC), Skill Enhancement Courses (SEC) and Minor Courses (50 Marks)

The performance of the learners shall be evaluated into two components. The allocation of marks are as shown below:

A) Practical Examinations (PE)/Field Work (FW)/Test Based on Tutorials: 40 % 20 Marks

Journal/Lab book/workbook, Viva Voce	05 Marks
Practical/Laboratory Work/field work/Test based on tutorials	15 Marks

B) Semester End Examination (SEE): 60 %

30 Marks

- Duration: The examination shall be of 1 hour's duration.
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Question Paper Pattern

Theory question paper pattern
1. There shall be two/three questions each of 15/10 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.

5. For Open Elective Courses (OE) (50 Marks)

The performance of the learners shall be evaluated into two components. The allocation of marks are as shown below:

A) Continuous Internal Assessment (CIA): 40 %

20 Marks

Sr. No.	Particular	Marks
01	One project / case study / Test based on Practical skills/test based on tutorials (Workbook)/ Open book test/ Field work based on curriculum to be assessed by the teacher concerned	20 Marks

B) Semester End Examination (SEE): 60 %

30 Marks

- Duration: The examination shall be of 1 hour's duration.

Question Paper Pattern

Theory question paper pattern
<ol style="list-style-type: none">1. There shall be two/three questions each of 15/10 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

- For Major courses: The learners shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Continuous Internal Assessment (CIA) and 40% marks in Semester End Examination (SEE) (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 Continuous Internal Assessment (CIA) and Semester End Examination (SEE).
- For AEC, VEC, VSC, SEC, IKS, Minor, OE and CC courses: Learners should remain present for Continuous Internal Assessment (CIA) and Semester End Examination (SEE)/ Practical Examination (PE). A learner will be said to have passed the course if the learner obtains minimum of 40% marks in the Continuous Internal Assessment (CIA) and Semester End Examination (SEE)/ Practical Examination together and obtain minimum 10 marks out of 30 marks in Semester End Examination (SEE)/ Practical Examination (PE).

➤ **Rules of A.T.K.T.**

- I. A learner shall be allowed to keep term for Semester II irrespective of the number of courses of failure in the Semester I.
- II. A learner shall be allowed to take Admission to Semester III if he/she passes both Semester I and Semester II

OR

A learner shall be allowed to keep term for Semester III, if he/she fails in not more than two Major courses and not more than eight other courses of Semester I and Semester II taken together with not more than four other courses each in Semester I and Semester II.

- III. A learner shall be allowed to keep term for Semester IV irrespective of the number of courses of failure in the Semester III.
- IV. A learner shall be allowed to take Admission to Semester V and Keep Terms if he/she Passes in all Semester I and Semester II and failed in not more than two Major courses and not more than eight other courses of Semester III and Semester IV taken together with not more than four other courses each in Semester III and Semester IV

OR

Passes in all Semester III and Semester IV and failed in not more than two Major courses and not more than eight other courses of Semester I and Semester II taken together with not more than four other courses each in Semester I and Semester II.

- V. A learner shall be allowed to keep term for Semester VI irrespective of the number of courses of failure in the Semester V.
- VI. The result of Semester VI shall be withheld by the College till the learner passes all the Semesters from I – V.
- VII. A Learner is allowed to take admission in semester VII (UG Hon. /PG Part I) only if he passed all courses of semesters I to VI (132 Credits).

➤ **Eligibility Condition to appear for Additional Examination of any Semester**

(Applicable only for Regular Semester End Examinations)

A learner who remains absent in some or all the subjects on medical grounds or for representing the College or University in NSS, NCC, Sports, Cultural Activities or co-curricular/extracurricular/extension activities with prior permission of the Principal or Head of the institute reported to the examination section, by producing necessary documents and

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testimonials, will be allowed to appear for the Additional Semester End Examination (ASEE). This is not applicable for any A.T.K.T. / Supplementary Examinations.

➤ **Supplementary Examination (SE)**

The college will conduct supplementary examinations for semester II, IV, and VI after the declaration of their respective results.

Note:

- 1) It is noted that the concerned regulation of the College is amended and implemented to Semester I to Semester II of undergraduate programmes, under faculty of Arts, Commerce and Science with effect from the academic year 2023 - 2024.
- 2) All these rules may be amended as and when required with authorisation of Academic bodies.

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Sr. No.	Heading	Particulars
1	Title of Course	Information Technology
2	Eligibility for Admission	<p>(a) A candidate for being eligible for admission to the degree course of Bachelor of Science-Information Technology, shall have passed XII standard examination of the Maharashtra Board of Higher Secondary Education or it's equivalent with Mathematic and Statistics as one of the subject and should have secured not less than 45% marks in aggregate for open category and 40% marks in aggregate in case of Reserved category candidates.</p> <p>(b) Candidate who have passed Diploma (Three years after S.S.C. – Xth Std.) in Information Technology/ Computer Technology/ Computer Engineering/Computer Science/ Electrical, Electronics and Video Engineering and Allied Branches/Mechanical and Allied Branches/ Civil and Allied branches are eligible for direct admission to the Second Year of the B.Sc. (I.T.) degree course.</p> <p>(c) However, the Diploma should be recognized by the Board of Technical Education or any other recognized Government Body. Minimum marks required 45% aggregate for open category candidates and 40% aggregate for reserved category candidates.</p> <p>OR</p> <p>Candidates with post HSC-Diploma in Information Technology/Computer Technology/ Computer Engineering/ Computer Science/ and Allied branches will be eligible for direct admission to the Second Year of B.Sc. (I.T.). However, the Diploma should be recognized by the Board of Technical Education or any other recognized Government Body Minimum Marks required 45% aggregate for open category candidates and 40% aggregate for reserved category candidates.</p>
3	Passing marks	40%
4	Ordinances/Regulations (if any)	
5	No. of Semesters	Two
6	Level	U.G.

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7	Pattern	Semester (60:40)
8	Status	New
9	To be implemented from Academic year	2023-2024

Choice Based Credit System (CBCS)
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To be implemented from the Academic year 2023-2024
Course Structure

No. of Courses	Semester I	Credits	No. of Courses	Semester II	Credits
A	<i>Discipline Specific Course (Major)</i>		A	<i>Discipline Specific Course (Major)</i>	
1	Introduction to C++ programming	02+01	1	Programming Fundamentals Using Python	02+01
2	Computer Organization & Design	02+01	2	Database Management System	02+01
B	<i>Indian Knowledge System (IKS)</i>		B	<i>Minor</i>	
4	History of Evolution and Growth of IT in India	02	3	Introduction to Embedded System	01+01
C	<i>Vocational Skill Course (VSC)</i>		C	<i>Vocational Skill Course (VSC)</i>	
5	Introduction to Statistics	01+01	4	Linear Algebra	01+01
D	<i>Skill Enhancement Course (SEC)</i>		D	<i>Skill Enhancement Course (SEC)</i>	
6	Introduction to Web Designing	01+01	5	Advanced Web Programming	01+01
E	<i>Open Elective (OE)</i>		E	<i>Open Elective (OE)</i>	
7	Multimedia Applications	02	6	Privacy and Security in Online Social Media	02
8	Introduction to Photoshop	02	7	Introduction to Game Designing and Cartoon Animation	02
F	<i>Value Education Course (Any One)</i>		F	<i>Value Education Course (Any One)</i>	
9	Digital Technology and Solutions	02	8	Digital Technology and Solutions	02
10	Understanding India	02	9	Understanding India	02
11	Environmental Studies	02	10	Environmental Studies	02
E	<i>Ability Enhancement Course (AEC) (Any One)</i>		E	<i>Ability Enhancement Course (AEC) (Any One)</i>	
12	Marathi	02	12	Marathi	02
13	Hindi	02	13	Hindi	02
G	<i>Co-curricular Courses (Any One)</i>		G	<i>Co-curricular Course (Any One)</i>	
14	Foundation Course in NSS-I	02	14	Foundation Course in NSS-II	02
15	Foundation Course in NCC-I	02	15	Foundation Course in NCC-II	02
16	Foundation Course in PE-I	02	16	Foundation Course in PE-II	02
17	Foundation Course in PA-I	02	17	Foundation Course in PA-II	02
Total Credits		22	Total Credits		22

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To be implemented from the Academic year 2023-2024

SEMESTER I

Course Code	Course Type	Course Title	Credit
UIT1ICT	Major Subject I	Introduction to C++ programming	02
UIT1ICP	Major Subject I Practical	Introduction to C++ programming practical	01
UIT1COT	Major Subject II	Computer Organization & Design	02
UIT1COP	Major Subject II Practical	Computer Organization & Design Practical	01
UIT1HET	IKS Minor	History of Evolution and Growth of IT in India	02
UIT1HST	VSC1	Introduction to Statistics	01
UIT1HSP	VSC I Practical	Introduction to Statistics Practical	01
UIT1IWT	SEC1	Introduction to Web Designing	01
UIT1IWP	SEC1 Practical	Introduction to Web Designing Practical	01
Total Credits			12

Open Elective Courses

Course Code	Course Type	Course Title	Credit
UOE1MAT	Open Elective 1	Multimedia Applications	02
UOE1IPT	Open Elective 2	Introduction to Photoshop	02
Total Credits			04

Value Added Courses

Course Code	Course Type	Course Title	Credit
UVEC1DTS	VAC	Digital Technology and Solutions	02
Total Credits			02

Semester I

Course Description: B.Sc. (Information Technology)	
Semester	I
Course Name	Introduction to C++ Programming
Course Code	UIT1ICT
Credit	2
Hours	2 Hrs. per week

Course Objectives	The objective of this course is to introduce the concepts of the basic C++ programming language and object-oriented programming language.
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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 characteristics of object oriented programming approach with C++.
	4) Elaborate Classes and objects in OOPs.

Module/Unit	Course Description	Hrs.
I	<p>Programming Logic and Techniques: Introduction, Algorithm, Flowchart</p> <p>Introduction to C++: History of C++, Structure of C++ Program, Variables and Assignments: Variables, variable declarations, Identifiers, local and global variables, Constants, Reference variable, Symbolic constant.</p> <p>Operators: Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Operator Precedence</p> <p>Input and Output: cin, cout, include directives and Namespaces, Comments, Data types</p> <p>Decision Making: if-else, nested if-else, switch Loops: while, for, do while</p> <p>Manipulators: setw, endl, sizeof, Increment and decrement operators, Type Cast Operators, Scope resolution operators. String functions.</p>	15hrs

II	<p>Introduction to OOPs: Object oriented programming, Comparison of procedural and object oriented approach, Applications of OOPs, Characteristics of OOPs – Objects, Classes, Data Abstraction, Encapsulation, Inheritance, Polymorphism, and Reusability.</p> <p>Classes and Objects: Classes, Class declaration, Creating Objects, Member function of a class, Objects as function arguments, Dynamic Memory Allocation, Static Data Members, Friend Function</p> <p>Constructors: Introduction, Types of Constructors: Default Constructor, Parameterized Constructor, Copy Constructor Inheritance: Single Inheritance, Multiple Inheritance</p>	15hrs
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References:

1. “Let us C++” , Y.P.Kanetkar, Seventh edition, BPB publication
2. Object Oriented programming with C++ , E Balagurusamy , Third Edition ,Tata McGraw Hill.
3. Schaum’s outlines “Programming with C++”, J.R.Hubbard, Second Edition, Tata McGrawHill

Course Description: B.Sc.(Information Technology)	
Semester	I
Course Name	Introduction to C++ Programming Practical
Course Code	UIT1ICP
Credit	1
Hours	2 Hrs. per week

Course Objectives	The objective of this course is to introduce the programming concepts of the C++ language and object-oriented programming language.
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Course Outcomes	After completing the course, Student will be able to:
	1) Demonstrate basic C++ programs.
	2) Construct C++ programs using conditional statements and loops.
	3) Explain use of functions and arrays in C++ programs.
	4) Build programs using classes and objects, constructors and inheritance.

Module/Unit	Course Description	Hrs.
1	Basic Programs: <ol style="list-style-type: none"> Write a program to display the message HELLO WORLD. Write a program to declare some variables of type int, float and double. Assign some values to these variables & display these values. 	2hrs
2	Programs on variables: <ol style="list-style-type: none"> Write a program to swap two numbers without using a third variable. Write a program to find the area of rectangle, square and circle. 	2hrs
3	Programs on Decision Making Statements (if-else, nested if-else): <ol style="list-style-type: none"> Write a program to check whether the number is positive, negative or zero. Write a program to find the largest of three numbers. 	2hrs
4	Loops (While, do...while, for, Switch) <ol style="list-style-type: none"> Write a program to enter a number from the user and display the month name. If number>13 then display 	2hrs

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	invalid input using switch case. b. Write a program to check whether the number is even or odd.	
5	Functions: a. Program on Functions	2hrs
6	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.	2hrs
7	String operations for string length , string concatenation, string reverse, string comparison	2hrs
8	Write a C++ program using class and object Student to print name of the student, roll no. Display the same.	2hrs
9	Write a friend function for adding the two complex numbers, using a single class	2hrs
10	Write a friend function for adding the two different distances and display its Sum, using two classes.	2hrs
11	Design a class Complex for adding the two complex numbers and also show the use of constructor.	2hrs
12	Overload the + for concatenating the two strings. For e.g. "Py" + "thon" = Python.	2hrs
13	Overload the operator + for adding the timings of two clocks, And also pass objects as an argument.	2hrs
14	Design a class for single level inheritance.	2hrs
15	Design a class for multiple inheritances.	2hrs

Course Description: B.Sc. (Information Technology)	
Semester	I
Course Name	Computer Organization and Design
Course Code	UIT1COT
Credit	2
Hours	2 Hrs per week

Course Objectives	To understand the basic structure and organization of computers and to acquire the basic knowledge of digital logic levels and the application of knowledge and to understand digital electronics circuits.
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Course Outcomes	After completing the course, Student will be able to:
	1) Explain the underlying principles of computers.
	2) Analyse how data is transferred between various peripheral devices in the computer.
	3) Define the various types of number systems and logic gates.
	4) Elaborate the different types of Flip-Flops.

Module/ Unit	Course Description	Hrs.
I	<p>Computer Abstractions and Technology: Basic structure and operation of a computer, Computer Hardware, Software, functional units and their interaction , Types of Operating Systems – Android OS, Linux OS, Windows OS, Memory and its types.</p> <p>Number System & Binary Arithmetic: 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, Error detection and correction. Binary Addition, Binary Subtraction, Subtraction Using 1’s Complement , Subtraction Using 2’s Complement, Binary Multiplication , Binary Division, Octal Addition, Octal Subtraction, Hexadecimal Addition, Hexadecimal Subtraction, BCD Addition, BCD Subtraction , Code Addition , Code Subtraction</p> <p>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</p>	15hrs

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	bubbled logic, Assertion level.	
II	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-map and obtain K-map from Boolean expression, Quine Mc clusky Arithmetic Circuits : Introduction to Arithmetic Circuits: Adder, BCD Adder, Excess – 3 Adder, Binary Subtractors, BCD Subtractors. Multiplexer, Demultiplexer, ALU, Encoder and Decoder: Introduction, Multiplexer, Demultiplexer, Encoder, Decoder, ALU. Sequential Circuits: Flip-Flop: Introduction, Terminologies used, S-R flip-flop, D flip-fop, JK flip-flop, Race-around condition, Master – slave JK flip-flop, T flip-flop, Application of flip-flops, Counters, Registers	15hrs

References:

- 1) Digital Electronics and Logic Design, N. G. Palan, Technova
- 2) Patterson and Hennessy, Computer Organization and Design, Morgan Kaufmann, ARM Edition, 2011
- 3) R P Jain, Modern Digital Electronics, Tata McGraw Hill Education Pvt. Ltd., 4th Edition, 2010.

Course Description: B.Sc.(Information Technology)	
Semester	I
Course Name	Computer Organization and Design Practical
Course Code	UIT1COP
Credit	1
Hours	2Hrs per week

Course Objectives	To acquire the basic knowledge of digital logic levels and to understand digital electronics circuits As well as prepare the learners to perform the analysis and design of various digital electronic circuits.
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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 arithmetic circuits.
	4) Design Encoder, Decoder, Multiplexer and Demultiplexer.

Module/Unit	Course Description	Hrs
1	Study and verify the truth table of various logic gates (NOT, AND, OR, NAND, NOR, EX-OR, and EX-NOR).	2hrs
2	Simplify given Boolean expression and realize it.	2hrs
3	Design and implement a circuit based on the problem given and minimizing using K-maps.	2hrs
4	.Verifying De Morgan's laws.	2hrs
5	Implement other given expressions using minimum number of gates.	2hrs
6	Design and implement Binary – to – Gray code converter.	2hrs
7	Design and implement Gray – to – Binary code converter.	2hrs
8	Design and implement Binary – to – BCD code converter	2hrs
9	Design and implement Binary – to – XS-3 code converter	2hrs
10	Design and verify a half adder.	2hrs

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11	Design and verify a full adder	2hrs
12	Design and verify full subtractor.	2hrs
13	Design and verify full subtractor.	2hrs
14	Design and verify the operation of flip-flops using logic gates.	2hrs
15	Implementation of digits using seven segment displays.	2hrs

Indian Knowledge System (Credit 2)

Course Description: B.Sc. (Information Technology)	
Semester	I
Course Name	History of Evolution and growth of IT in India
Course Code	UIT1HET
Credit	2
Hours	2 Hrs per week

Course Objectives	The objective of this course is to promote and introduce evolution and growth of information technology over the period.
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Course Outcomes	After completing the course, Student will be able to:
	1) Define Indian Knowledge System.
	2) Demonstrate History of IT in India.
	3) Determine growth of IT education in India.
	4) Elaborate challenges and future aspects of Indian IT industry.

Module/Unit	Course Description	Hrs.
I	Introduction to Indian Knowledge System, Relevance of Indian knowledge system in the context of IT, History of IT in India, Philosophical Foundation: Philosophical schools like Navya and their impact on logical reasoning, Connection between ancient Indian philosophy and modern IT & AI. Ancient language in relevance with natural language processing.	15hrs
II	Growth of IT Education in India, Integration of traditional Indian knowledge system with modern concepts: Ayurveda and Modern Medicine, Yoga and Mental Health, Vedic Mathematics and Education, Environmental Sustainability and Vastu Shastra, Philosophy and Ethics, Integration of Art and Technology, Astronomy and Space Research, Holistic Wellness and Wellness Tourism, Key player companies in Growth of IT Sector, Contribution of Pioneers in Indian Computing, Challenges and Future Prospects: Challenges faced by the Indian IT industry, Future trends and prospects of IT in India	15 hrs

Reference books:

- 1) Fundamental of Information Technology, Deepak Bharihoke
- 2) Information Technology: History, Practice and Implications for Development, Kyle Eischen, November 2000.

Vocational Skill Course (Credit 1+1)

Course Description: B.Sc. (Information Technology)	
Semester	I
Course Name	Introduction to Statistics
Course Code	UIT1IST
Credit	1
Hours	1 Hr per week

Course Objectives	The objective of this course is to provide an understanding for the learners of statistical concepts to include measures of dispersion, probability distribution.
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Course Outcomes	After completing the course, Student will be able to:
	1) Recall measures of central tendency.
	2) Describe the measures of dispersion.
	3) Classify discrete and continuous probability distribution.
	4) Solve various problems with help of probability

Module/Unit	Course Description	Hrs.
I	<p>Measures of central tendency and dispersion: Averages, Arithmetic Mean, Median, Mode, Empirical Relation Between the Mean, Median, and Mode, Geometric Mean, Harmonic Mean, Relation Between the Arithmetic, Geometric, and Harmonic Means, Quartiles, deciles and percentiles.</p> <p>Standard Deviation and Other Measures of Dispersion: Dispersion, or Variation, Range, Mean Deviation, Semi-Interquartile Range, 10–90 Percentile Range, Standard Deviation, Variance.</p> <p>Elementary Probability Theory: Definitions of Probability, Conditional Probability; Independent and Dependent Events, Mutually Exclusive Events, Mathematical Expectation, Discrete and continuous Probability distribution.</p>	15hrs

Course Description: B.Sc.(Information Technology)	
Semester	I
Course Name	Introduction to Statistics Practical
Course Code	UIT1ISP
Credit	1
Hours	2 Hrs per week

Course Objectives	The objective of this course is to introduce statistical programming skills through R studio.
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Course Outcomes	After completing the course, Student will be able to:
	1) Make use of basic commands of R programming.
	2) Analyse the concepts of various descriptive statistical functions.
	3) Analyse the concepts of various Graphical functions.
	4) Explain the probability using programming.

Module/ Unit	Course Description	Hrs
1	Using R execute the basic commands, array, list and frames, sequences and repetition.	2 hrs
2	Executing basics commands of R to solve the problems.	2 hrs
3	Create a Matrix using R and Perform the operations: addition, multiplication	2 hrs
4	Create a Matrix using R and Perform the operations inverse Transpose.	2 hrs
5	Create Graph: scatter plot, line plots, multiple lines	2 hrs
6	Create Graph: Bar plot, Histogram, Box plot, pie chart	2 hrs
7	Using R Execute the statistical function: mean, median. Mode.	2 hrs
8	Using R Execute the statistical functions: quartiles.	2 hrs
9	Using R Execute the statistical functions: range.	2 hrs
10	Using R Execute the statistical function: inter quartile range histogram.	2 hrs
11	Using R import the data from Excel / .CSV file and perform the above functions	2 hrs

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12	Using R import the data from Excel / .CSV file and calculate the standard deviation.	2 hrs
13	Using R import the data from Excel / .CSV file and calculate the variance, co-variance.	2 hrs
14	Using R, compute the probability.	2 hrs
15	Using R, compute the conditional probability.	2 hrs

Reference Books:

1. STATISTICS, Murray R Spiegel, Larry J. Stephens, Mcgraw –Hill International, Fourth Edition.
2. Fundamental of Mathematical Statistics S.C. GUPTA and V.K. Kapoor, Sultan Chand and Sons, Eleventh Edition.
3. A Practical Approach using R, R.B. Patil, H.J. Dand and R. Bhavsar, SPD publication, First edition.

Skill Enhancement Course (Credit 1+1)

Course Description: B.Sc. (Information Technology)	
Semester	I
Course Name	Introduction to Web Designing
Course Code	UIT1IWT
Credit	1
Hours	1 Hr per week

Course Objectives	To develop web pages using web technologies. Learners will gain the skills and project-based experience needed for entry into web application and development careers.
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Course Outcomes	After completing the course, Student will be able to:
	1) Define fundamentals of Internet, and the principles of web design.
	2) Build semantic, HTML and CSS web page.
	3) Code a handful and useful HTML & CSS examples.
	4) To understand implementation of Hyperlink.

Module/ Unit	Course Description	Hrs.
I	<p>HTML5: Introduction, Why HTML5? HTML Tags and Attributes, Formatting text by using tags, using lists and backgrounds, Creating hyperlinks and anchors. Style sheets.</p> <p>Lists: Unordered Lists, Ordered Lists, Definition list, Image: Image and Image mapping.</p> <p>CSS : Introduction, Features and benefits of CSS, CSS Syntax, External style sheet using <link>, Basic CSS Properties, Multiple Style Sheets.</p> <p>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.</p> <p>Creating user forms: creating basic form, using check boxes and option buttons, creating lists, additional input types in HTML5.</p>	15hrs

Reference Books:

1. Jon Duckett, HTML and CSS : Design And Build Websites , Wiley.
2. Jennifer Niderst Robbins, Learning Web Design : A Beginner's Guide To HTML, CSS, JavaScript, And Web Graphics O'reilly.
3. Thomas A powell, The Complete Refrence To HTML.

Course Description: B.Sc. (Information Technology)	
Semester	I
Course Name	Introduction to Web Designing Practical
Course Code	UIT1IWP
Credit	1
Hours	2 Hrs per week

Course Objectives	To learn how to combine basic HTML elements to create Web pages. Understand how to use HTML tags and tag attributes to control a Web page's appearance.
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Course Outcomes	After completing the course, Student will be able to:
	1. Explain head tag and body tag in the give web page.
	2. Creating static web pages using HTML5 and CSS
	3. Design a responsive website using HTML5 and CSS.
	4. Describe the procedure to organize display as per given screen layout using frames.

Module/Unit	Course Description	Hrs
1	Design a home page which displays information about your college department using headings, HTML entities and paragraphs.	2 hrs.
2	Implement different types of list tags in the college departmental homepage.	2 hrs.
3	Create a webpage for any clinic using Marquee and HTML formatting tags.	2 hrs.
4	Create 3 Hyperlink in home page connecting it to 3 different pages.	2 hrs.
5	Create 3 Hyperlink in a page, which jumps to 3 different heading on same page.	2 hrs.
6	Create a web page having two links .When link is clicked appropriate content should be displayed in another tab.	2 hrs.
7	Design a timetable and display it in tabular format.	2 hrs.
8	Create a HTML form with the use of cascading style sheet.	2 hrs.
9	Create a sample code to illustrate the Inline style sheet for your web page.	2 hrs.
10	Create a sample code to illustrate the External style sheet for your web page.	2 hrs.
11	Design a web page by using different CSS border styles.	2 hrs.

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12	Design an admission form for any course in your college with text, password field, drop-down list, check-boxes, radio button, submit and reset button.	2 hrs.
13	Demonstrate difference between “get” and “post” method of form tag in a form with name and password text fields.	2 hrs.
14	Insert image on the webpage as an hyperlink.	2 hrs.
15	Design a web of your Home town with a attractive background color, text color, and image, font face by using Internal CSS formatting.	2 hrs.

Open Elective to be offered to other Department (Credit 2)
Open Elective - I

Course Description: B.Sc. (Information Technology)	
Semester	I
Course Name	Introduction to Photoshop
Course Code	UOE1IPT
Credit	2
Hours	2 Hrs per week

Course Objectives	Enhance images using advance editing tools to create magazine covers. Work with the Type tools and panels to type, insert and manage text.
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Course Outcomes	After completing the course, Student will be able to:
	1) Understand the basics of Adobe Photoshop to create and edit images.
	2) Develop images using Photoshop tools.
	3) Demonstrate the models and layers in images.
	4) Design RGB, 3d objects using models and layers.

Module/Unit	Course Description	Hrs.
I	<p>Introduction: Introduction Variations in Photoshop applications, About Photoshop, Photoshop Features, Key Board practice, Editing Photo in camera raw, Creating Web Galleries, PDF converts, Opening and Importing images, Creating Documents with different sizes.</p> <p>Tools: Rectangular Marquee Tool & Elliptical marquee tool & single row marquee tool ,single column marquee tool, Move tool, magic wand tool, quick selection tool, lasso tool, polygonal lasso tool, magnetic lasso tool, Crop tool, slice tool, slice select tool, eyedropper tool, colour sampler tool, ruler tool, note tool, count tool, Spot healing brush tool, healing brush tool, patch tool, red eye tool, brush tool, pencil tool, colour replacement tool, mixer brush tool, Clone stamp tool, pattern tool, history brush tool, art history tool, Eraser tool, background eraser tool magic eraser, gradient tool paint bucket tool, Pen tool, freeform</p>	15hrs

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	pen tool, add anchor point tool, delete anchor point tool, convert to point tool, horizontal type tool, vertical type tool, horizontal type mask tool, vertical type mask tool, Path selection tool, direct selection tool, custom shape tools, hand tool, zoom tool, Blur tool, sharpen tool, smudge tool, dodge tool, burn tool, sponge tool	
II	<p>Modes & Layers:</p> <p>About colour information, Colour Modes, Working with layers & layer styles, Create Droplet & Conditional Mode Change, Fit Image, Picture Package, Web Photo Gallery in Bridge cs5, Use the Merge To HDR command to combine multiple images & Export Layers To Files, About Copy Merged, Paste in to, Clear, Fill, Stroke, Define Brush Preset , Define Pattern, Define Custom Shape, Free Transform, Scale, Rotate, Distort, Skew, Content-Aware Scale, Perspective, Auto Blend Layers, Auto Align layers, RGB or grayscale images, Adjustments, Exposure, Curves Colour Balance, Black & White Selective Colour, Match colour Desaturate, Replace colour, Channel Mixer, Gradient Map Photo Filter Shadow/Highlight Invert, Equalize, Variations, Canvas, Size Calculations, Apply Image, Layer Mask, Vector Mask Merge Layers, Flatten all layers Matting, Colour Range, Grow, Similar Blur Filters, 3d object creation</p>	15hrs

Reference Books:

1. Adobe Photoshop Elements 2021 User Guide
2. Basics Of Adobe Photoshop Make Photo Manipulation , Photo Editing Technique

Open Elective - II

Course Description: B.Sc. (Information Technology)	
Semester	I
Course Name	Multimedia Applications
Course Code	UOE1MAT
Credit	2
Hours	2 Hrs per week

Course Objectives	This course aims to introduce the fundamental elements of multimedia. It will provide an understanding of the fundamental elements in multimedia. The emphasis will be on learning the representations, perceptions and applications of multimedia. Software skills and hands on work on digital media will also be emphasized.
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Course Outcomes	After completing the course, Student will be able to:
	1) Summarize the key concepts in current multimedia technology.
	2) Find different Image Format and study it.
	3) List the different types of audio and video format.
	4) Create quality multimedia software titles.

Module/Unit	Course Description	Hrs.
I	<p>Introduction to Multimedia : What is multimedia, Components of multimedia, Web and Internet multimedia applications, Transition from conventional media to digital media.</p> <p>Audio fundamentals and representations : Digitization of sound, frequency and bandwidth, decibel system, data rate, audio file format, Sound synthesis, MIDI, wavetable, Compression and transmission of audio on Internet, Adding sound to your multimedia project, Audio software and hardware.</p>	15hrs
II	<p>Image fundamentals and representations : Colour Science, Colour, Colour Models, Colour palettes, Dithering, 2D Graphics, Image Compression and File Formats: GIF, JPEG, JPEG 2000, PNG, TIFF, EXIF, PS, PDF, Basic Image Processing [Can Use Photoshop], Use of image editing software, White balance correction, Dynamic</p>	15hrs

	range correction, Gamma correction, Photo Retouching. Video and Animation : Video Basics , How Video Works, Broadcast Video Standards, Analog video, Digital video, Video Recording and Tape formats, Shooting and Editing Video (Use Adobe Premier for editing), Video Compression and File Formats. Video compression based on motion compensation, MPEG-1, MPEG-2, MPEG-4, MPEG-7, MPEG-21, Animation: Cell Animation, Computer Animation, Morphing.	
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Reference Books:

- 1) Tay Vaughan, “Multimedia making it works”, Tata McGraw-Hill, 2008.
- 2) Rajneesh Aggarwal & B. B Tiwari, “Multimedia Systems”, Excel Publication, New Delhi, 2007.
- 3) Li & Drew, “Fundamentals of Multimedia”, Pearson Education, 2009.

Value Education Course (Credit 2)

Course Description: B.Sc. (Information Technology)	
Semester	I
Course Name	Foundation Course in Digital and Technology Solutions
Course Code	UVEC1DTS
Credit	2
Hours	2 Hrs per week

Course Objectives	<ul style="list-style-type: none"> • To gain familiarity with digital paradigms. • To sensitize about role & significance of digital technology. • To provide a knowledge of major technological trends. • To bring awareness about the e-governance and Digital India initiatives.
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Course Outcomes	After completing the course, Student will be able to:
	1) Build knowledge about digital paradigm.
	2) Elaborate the importance of digital technology, digital financial tools, e-commerce.
	3) List the e-governance and Digital India initiatives
	4) Explain use & applications of digital technology

Module/Unit	Course Description	Hrs.
I	<p>Introduction & Evolution of Digital Systems: Introduction, Fundamental components of Digital System, Role & Significance of Digital Technology. Information & Communication Technology & Tools: Advantages & Disadvantages, Importance of ICT in Education.</p> <p>Major technological trends: Internet of Things, Artificial Intelligence, Blockchain Technologies, Cloud Adoption, and Data Security & Cyber Protection.</p> <p>Communication Systems: Principles, Model & Transmission Media. Computer Networks.</p> <p>Internet Concept & Applications: WWW, Web Browsers, Search Engines, Messaging, Email, Social Networking.</p> <p>Computer Based Information System: Significance & Types. E-commerce & Digital Marketing: Basic Concepts, Benefits & Challenges.</p>	15 hrs

II	<p>Digital India & e-Governance: Initiatives, Infrastructure, Services and Empowerment.</p> <p>Application of Digital Financial Services: Savings and its future needs, Bank and banking products, Banking Service Delivery Channels –I, Banking Service Delivery Channels –II.</p> <p>Digital Financial Tools: OTP, QR Code, Unified Payment Interface, Aadhar Enabled Payment System, USSD, Credit/Debit Cards, e-Wallets.</p>	15 hrs
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Reference Books:

1. Digital Systems Engineering William J. Dally, John W. Poulton Cambridge University Press
2. Principles of Digital Communication – Robert G. Gallager
3. E-Governance in India: The Progress Status Sunil K. Muttoo, Rajan Gupta, Saibal K. Pal · 2019

Choice Based Credit System (CBCS)
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To be implemented from the Academic year 2023-2024
SEMESTER II

Course Code	Course Type	Course Title	Credit
UIT2PPT	Major Subject I	Programming Fundamentals Using Python	02
UIT2PPP	Major Subject I Practical	Programming Fundamentals Using Python Practical	01
UIT2DMT	Major Subject II	Database Management System	02
UIT2DMP	Major Subject II Practical	Database Management System Practical	01
UIT2EST	Minor	Introduction to Embedded System	01
UIT2ESP	Minor Practical	Introduction to Embedded System Practical	01
UIT2LAT	VSC2	Linear Algebra	01
UIT2LAP	VSC2 Practical	Linear Algebra Practical	01
UIT2AWT	SEC2	Advanced Web Programming	01
UIT2AWP	SEC2 Practical	Advanced Web Programming Practical	01
Total Credits			12

Open Elective Courses

Course Code	Course Type	Course Title	Credit
UOE2PSO	Open Elective 3	Privacy and Security in Online Social Media	02
UOE2GDC	Open Elective 4	Introduction to Game Designing and Cartoon Animation	02
Total Credits			04

Value Added Courses

Course Code	Course Type	Course Title	Credit
UVEC2DTS	VAC	Digital Technology and Solutions	02
Total Credits			02

Semester- II
Major I (Credit 2+1)

Course Description: B.Sc. (Information Technology)	
Semester	II
Course Name	Fundamentals of Python Programming
Course Code	UIT2PPT
Credit	2
Hours	2 Hrs per week

Course Objectives	<ul style="list-style-type: none"> • Understand Python syntax and basic programming concepts. • Learn control flow statements (if-else, loops) for program control and logic. • Acquire knowledge of built-in data structures like lists, tuples, and dictionaries. • Understand and utilize data types, variables, and operators in Python.
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Course Outcomes	After completing the course, Student will be able to:
	1. Understand Python syntax and basic programming concepts.
	2. Understand and utilize data types, variables, and operators in Python.
	3. Learn control flow statements (if-else, loops) for program control and logic.
	4. Acquire knowledge of built-in data structures like lists, tuples, and dictionaries.

Module/Unit	Course Description	Hrs.
I	<p>Introduction to Features and Applications of Python; Python Versions; Installation of Python; Python Command Line mode and Python IDEs; Simple Python Program.</p> <p>Python Basics: Identifiers; Keywords; Statements and Expressions; Variables; Operators; Precedence and Association; Data Types; Indentation; Comments; Built-in Functions- Console Input and Console Output, Type Conversions; Python Libraries; Importing Libraries with Examples.</p> <p>Python Control Flow: Types of Control Flow; Control Flow Statements- if, else, elif, while loop, break, continue statements, for loop Statement; range () and exit () functions.</p>	15 hrs

	<p>Exception Handling: Types of Errors; Exceptions; Exception Handling using try, except and finally.</p> <p>File Handling: File Types; Operations on Files– Create, Open, Read, Write, Close Files; File Names and Paths; Format Operator.</p>	
II	<p>Python Functions: Types of Functions; Function Definition-Syntax, Function Calling, Passing Parameters/arguments, the return statement; Default Parameters; Command line Arguments; Key Word Arguments; Recursive Functions; Scope and Lifetime of Variables in Functions. Strings: Creating and Storing Strings; Accessing Sting Characters; the str() function; Operations on Strings- Concatenation, Comparison, Slicing and Joining, Traversing;</p> <p>Lists: Creating Lists; Operations on Lists; Built-in Functions on Lists; Implementation of Stacks and Queues using Lists; Nested Lists.</p> <p>Dictionaries: Creating Dictionaries; Operations on Dictionaries; Built-in Functions on Dictionaries; Dictionary Methods; Populating and Traversing Dictionaries.</p> <p>Tuples and Sets: Creating Tuples; Operations on Tuples; Built-in Functions on Tuples; Tuple Methods; Creating Sets; Operations on Sets; Built-in Functions on Sets; Set Methods.</p>	15 hrs

Reference Books:

1. Think Python How to Think Like a Computer Scientist, Allen Downey et al., 2nd Edition, Green Tea Press. Freely available online @ <https://www.greenteapress.com/thinkpython/thinkCSPy.pdf>, 2015.
2. Introduction to Python Programming, Gowrishankar S et al., CRC Press, 2019.
3. Core PYTHON Applications Programming, Wesley J. Chun, 3rd Edition, Prentice Hall 2012.

Course Description: B.Sc.(Information Technology)	
Semester	II
Course Name	Fundamentals of Python Programming Practical
Course Code	UIT2PPP
Credit	1
Hours	2 Hrs per week

Course Objectives	To introduce learners with fundamentals of python programming language.
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Course Outcomes	After completing the course, Student will be able to:
	1) Understanding the Scripting and Automation in python
	2) Implement the Handling of User Input
	3) Implement Programming Concepts like structure, pattern , etc.
	4) Identify the methods to create and manipulate programs.

Module/Unit	Course Description	Hrs
1	Demonstrate a keyboard input program.	2 hrs
2	Check if a number belongs to the Fibonacci Sequence	2 hrs
3	Solve Quadratic Equations	2 hrs
4	Find the sum of n natural numbers	2 hrs
5	Display Multiplication Tables	2 hrs
6	Check if a given number is a Prime Number or not	2 hrs
7	Create a calculator program	2hrs
8	Explore string functions	2 hrs
9	Implement Selection Sort	2 hrs
10	Read and write into a file	2 hrs
11	Demonstrate usage of basic regular expression	2 hrs
12	Demonstrate use of List	2 hrs
13	Demonstrate use of Dictionaries	2hrs
14	Demonstrate Exceptions in Python	2 hrs
15	Demonstrate use of Tuple	2 hrs

Major II
(Credit 2+1)

Course Description: B.Sc. (Information Technology)	
Semester	II
Course Name	Database Management System
Course Code	UIT2DMT
Credit	2
Hours	2 Hrs 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.
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Course Outcomes	After completing the course, Student will be able to:
	1. Design E-R model to represent normalized database.
	2. Explain the fundamental of RDBMS.
	3. Explain the transactions of database.
	4. Elaborate the View in DBMS.

Module/Unit	Course Description	Hrs.
I	<p>Introduction: What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management,</p> <p>Data Models: The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction.</p> <p>Database Design, ER-Diagram Database design and ER Model: overview, ER-Model, ER Diagrams, ERD Issues, weak entity sets, Codd's rules, Constraints, Relational Schemas, Introduction to Logical view of data, keys, integrity rules, normalization.</p>	15Hrs
II	<p>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</p> <p>SQL: SQL Commands, Null Values, Joins (Displaying Data from Multiple Tables) Transaction management and Concurrency control: Transaction management: ACID</p>	15Hrs

	properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management.	
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Reference Books:

1. “Database System Concepts” by Silberschatz, Korth, Sudarshan, 4th Edition, McGraw Hill Publication.
2. Fundamentals of Database System “By Elmasri Ramez and Navathe Shamkant”.

Course Description: B.Sc.(Information Technology)	
Semester	II
Course Name	Database Management System Practical
Course Code	UIT2DMP
Credit	1
Hours	2 Hrs per week

Course Objective	To specify the functional and data requirements for a typical database application and to understand creation, manipulation and querying of data in databases.
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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
1	Design E-R diagram for college management system and Railway Reservation System.	2Hrs
2	Design E-R diagram for ATM system and Hospital Management System	
3	Convert college management system E-R diagram into relational database.	
4	Convert Bank management system E-R diagram into relational database.	
5	Design a Database and create required tables. Creating Bank database	
6	Writing Basic SQL SELECT Statements a) Restricting data b) Sorting Data	

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7	Applying the constraints Table Level	
8	Applying the constraints Column Level	
9	Manipulating Data a) Using INSERT b) Using UPDATE c) Using DELETE	
10	Write a SQL statement for Creating and Managing Tables a) Alter b) Drop	
11	Write the query to create the database objects Views	
12	Write the query to create the database objects Views	

Minor (Credit 1)

Course Description: B.Sc. (Information Technology)	
Semester	II
Course Name	Introduction to Embedded System
Course Code	UIT2EST
Credit	1
Hours	1 Hr per week

Course Objectives	To introduce learners with the core components of embedded system, 8085 microprocessor and 8051 microcontroller.
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Course Outcomes	After completing the course, Student will be able to:
	1) Explain Microprocessor, Microcontroller.
	2) Make use of Assembly Language Programming
	3) Define core components of embedded system.
	4) Elaborate 8051 embedded c.

Module/Unit	Course Description	Hrs.
I	<p>Microprocessor, Microcontrollers and Assembly Language: Microprocessor, overview of 8085 Instruction Set, 8085 microprocessor architecture Writing and Assembling Program, Overview of 8051 microcontroller family.</p> <p>Introduction to Embedded System: Embedded Systems and general purpose computer systems, embedded firmware, 8051 Programming in C- Data Types and time delay in 8051 C, I/O Programming, Data conversion Programs, structure of embedded program, compiling, linking and debugging, difference between C and embedded C.</p>	15Hrs

Reference Books:

1. Introduction to embedded systems ,Shibu K V, First, Tata Mcgraw-Hill
2. Embedded Systems Rajkamal Tata Mcgraw-Hill
3. Microprocessors Architecture, Programming and Applications with the 8085, Ramesh Gaonkar, Fifth Edition, PENRAM

Course Description: B.Sc.(Information Technology)	
Semester	II
Course Name	Introduction to Embedded System Practical
Course Code	UIT2ESP
Credit	1
Hours	2 Hrs per week

Course Objectives	To introduce learners with the assembly language programme and 8051 programming in embedded C.
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Course Outcomes	After completing the course, Student will be able to:
	1. Create simple Assembly Language Program.
	2. Evaluate Operations on Memory Locations.
	3. Design a reprogrammable embedded computer using 8051 microcontroller.
	4. Make use of components like seven-segment display, Oscilloscope, Stepper motor and create traffic signals.

Module/Unit	Course Description	Hrs
1	Store the data byte 32H into memory location C000H.	2 hrs
2	Exchange the content of memory location C200 and C300.	2 hrs
3	Subtract the contents of memory location 4001H from the memory location 2000H and place the result in memory location 4002H.	2 hrs
4	Subtract any two 8-bit number.	2 hrs
5	Write a program to sort given 5 numbers from memory location C220H in the ascending order.	2 hrs
6	Find the square of the given number from the memory location C200 and store the result in memory location C300.	2 hrs
7	Write a program to shift an eight bit data four bits right. assume that the data is in memory location C300H.	2hrs
8	Design and develop a reprogrammable embedded computer using 8051 microcontrollers and to show the following aspects. a. Programming	2 hrs

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	b. Execution c. Debugging	
9	Configure timer control registers of 8051 and develop a program to generate given time delay.	2 hrs
10	To demonstrate use of general purpose port i.e. Input/ output port of two controllers for data transfer between them.	2 hrs
11	Port I / O: Use one of the four ports of 8051 for O/P interfaced to eight LED's. Simulate binary counter (8 bit) on LED's	2 hrs
12	To interface 8 LEDs at Input-output port and create different patterns.	2 hrs
13	To demonstrate interfacing of seven-segment LED display and generate counting from 0 to 99 with fixed time delay.	2hrs
14	Interface stepper motor with 8051 and write a program to move the motor through a given angle in clock wise or counter clock wise direction.	2 hrs
15	Generate traffic signal.	2 hrs

Vocational Skill Course- 2 Credit (1+1)

Course Description: B.Sc. (Information Technology)	
Semester	II
Course Name	Linear Algebra
Course Code	UIT2LAT
Credit	1
Hours	1 Hr per week

Course Objectives	The objective of this course is to provide an understanding of vector spaces and linear transformation to the learners.
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Course Outcomes	After completing the course, Student will be able to:
	1. Define vector spaces and subspaces.
	2. Relate matrices and linear transformation.
	3. Find kernel and image of linear transformation.
	4. Evaluate matrix representation.

Module/Unit	Course Description	Hrs.
I	Vector Spaces: Vector Spaces: Definition and examples, Subspaces: Definition and examples. Matrices and Linear transformations: Matrices, properties of matrices, Transpose of a matrix and its properties, Type of matrices, determinant, inverse of a matrix, echelon form, rank of a matrix, Linear transformation: definition and examples, kernel and image of a linear transformation: definition and examples, Rank-Nullity Theorem (only statement) and examples, Matrix representation of a linear Transformation.	15 hrs

Reference Books:

1. Serge Lang, Introduction to Linear Algebra, Second Edition, Springer.
2. S. Kumaresan, Linear Algebra, A Geometric Approach, Prentice Hall of India, Pvt. Ltd, 2000.
3. K. Hoffman and R. Kunze: Linear Algebra, Tata McGraw-Hill, New Delhi, 1971.
4. Vikas Bisht and Vivek Sahai, Linear Algebra, Alpha Science International Limited, 2002.

Course Description: B.Sc.(Information Technology)	
Semester	II
Course Name	Linear Algebra Practical
Course Code	UIT2LAP
Credit	1
Hours	2 Hrs per week

Course Objectives	The objective of this course is to introduce mathematical programming skills through python.
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Course Outcomes	After completing the course, Student will be able to:
	1) Make use of basic commands of python programming.
	2) Explain properties of vector spaces.
	3) Analyse the concept of properties of linear transformation.
	4) Evaluate determinant and inverse of matrix.

Module/Unit	Course Description	Hrs
1	Write a program to do the following: a. Enter an r by c matrix M (r and c being positive integers) b. Display M in matrix format.	2 hrs
2	Write a program to do the following: a. Display the rows and columns of the matrix M	2hrs
3	Write a program to do the following: a. Find the scalar multiplication of M for a given scalar.	2 hrs
4	Write a program to do the following: Find the transpose of the matrix M.	2 hrs
5	Write a program to do the following: a)Find the vector –matrix multiplication of a r by c matrix M with a c-vector u.	2 hrs
6	Write a program to do the following: a)Find the matrix-matrix product of M with a c by p matrix N.	2 hrs
7	Write a program to do the following: a)Enter a vector u as a n-list b) Enter another vector v as a n-list	2 hrs
8	Enter two distinct faces as vectors u and v.	2 hrs

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9	Write a program to do the following: a) Find the vector $au+bv$ for different values of a and b .	2 hrs
10	Write a program to do the following: a) Find the vector $au+bv$ for different values of a and b .	2 hrs
11	Write a program to do the following: a) find determinant of a matrix	2 hrs
12	Write a program to enter a matrix and check if it is invertible. If the inverse exists, find the inverse.	2 hrs
13	Write a program to convert a matrix into its row echelon form.	2 hrs
14	To determine linearity.	2 hrs
15	To find matrix representation of a linear transformation.	2 hrs

Reference Books:

1. Davis, Ernest - Linear Algebra and Probability for Computer Science Applications- CRC Press (2012)
2. PHILIP N. KLEIN, Coding the Matrix Linear Algebra through Applications to Computer Science Edition 1, Newtonian Press (2013)

Skill Enhancement Course (Credit 2)

Course Description: B.Sc. (Information Technology)	
Semester	II
Course Name	Advanced Web Programming
Course Code	UIT2AWT
Credit	1
Hours	1 Hr per week

Course Objectives	To develop dynamic and interactive web pages using PHP as server side scripting language. To create well-formed documents using XML and JQuery.
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Course Outcomes	After completing the course, Student will be able to:
	1) Elaborate the creation of dynamic web pages using server side PHP programming.
	2) Explain use of advanced technologies such as JQuery to create attractive interactive web pages.
	3) Make use of MySQL to integrate web forms and databases.
	4) Explain the basics of XML markup Language.

Module/ Unit	Course Description	Hrs.
I	<p>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.</p> <p>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</p> <p>Introduction to JQuery: Fundamentals, Selectors, Methods to access HTML attributes.</p> <p>XML: Comparing XML with HTML, Advantages and Disadvantages of XML, Structure of an XML Document, XML entity references, DTD, XSLT.</p>	15 Hrs.

Reference Books:

1. Steven Holzner, The Complete Reference PHP, McGraw Hill, Indian Edition
2. David Hunter Jeff Rafter, Beginning XML, Wiley India, 4th Edition

Course Description: B.Sc. (Information Technology)	
Semester	II
Course Name	Advanced Web Programming Practical
Course Code	UIT2AWP
Credit	1
Hours	2 Hrs per week

Course Objectives	To develop dynamic and interactive web pages using PHP as server side scripting language. To create well-formed documents using XML and JQuery.
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Course Outcomes	After completing the course, Student will be able to:
	1) Use PHP to create dynamic web pages.
	2) Create responsive web pages to interact with databases.
	3) Develop attractive web pages using advanced technologies such as JQuery and XML.

Module/Unit	Course Description	Hrs																
1	Write a PHP Program to accept a number from the user and print it factorial.	2 hrs																
2	Write a PHP program to accept a number from the user and print whether it is prime or not.	2 hrs																
3	Write a PHP code to find the greater of 2 numbers. Accept the no. from the user.	2 hrs																
4	Write a PHP program to accept a number from the user and display whether it is odd or even.	2 hrs																
5	Write a PHP program to display the following Binary Pyramid: <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <tbody> <tr> <td>1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>0</td> <td>1</td> <td></td> <td></td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td></td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>1</td> </tr> </tbody> </table>	1				0	1			1	0	1		0	1	0	1	2 hrs
1																		
0	1																	
1	0	1																
0	1	0	1															
6	Write a PHP program to demonstrate different string functions.	2 hrs																

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7	Write a PHP program to create one dimensional array.	2 hrs
8	Write a PHP code to create a database College and create a table Department (Dname, Dno, Number_Of_faculty)	2 hrs
9	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 format.	2 hrs
10	Write a program using JQuery to select all the elements whose class is demo and change the background color of those elements.	2 hrs
11	Write a jQuery program to get href and title attributes of an anchor <a> element.	2 hrs
12	Write a jQuery program to get author-name and year attributes of a <div> element.	2 hrs
13	Write an XML program to demonstrate the structure of a simple XML document.	2 hrs
14	Create a well formed XML document using DTD.	2 hrs
15	Create a web page demonstrating use of AJAX.	2 hrs

Open Elective III (Credit 2)

Course Description: B.Sc. (Information Technology)	
Semester	II
Course Name	Privacy and Security in Online Social Media
Course Code	UOE2PSO
Credit	2
Hours	2 Hrs per week

Course Objectives	To understand the importance of privacy and security in online social media and explore measures to protect personal information and ensure a safe digital environment
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Course Outcomes	After completing the course, Student will be able to:
	1. Understand the importance of privacy in the digital age.
	2. Identify common security threats in online social media.
	3. Implement measures to protect privacy and enhance security.
	4. Understand online social media policy and privacy.

Module/Unit	Course Description	Hrs.
I	Introduction: Security threats - Sources of security threats- Motives - Target Assets and vulnerabilities – Consequences of threats- E-mail threats - Web-threats - Intruders and Hackers, Insider threats, Cyber-crimes. Network Threats: Active/ Passive – Interference – Interception – Impersonation – Worms – Virus – Spam’s – Ad ware - Spy ware – Trojans and covert channels – Backdoors – Bots – IP, Spoofing - ARP spoofing - Session Hijacking - Sabotage-Internal treats Environmental threats - Threats to Server security	15hrs
II	Introduction to Online Social Networks, data collection from social networks, challenges, opportunities, and pitfalls in online social networks, APIs Collecting data from Online Social Media. Online social Media and Policing Privacy in OSM, Information privacy disclosure, revelation and its effects in OSM and online social networks Phishing in OSM & Identifying fraudulent entities in online social networks	15hrs

Reference Books:

1. Swiderski, Frank and Syndex, “Threat Modeling”, Microsoft Press, 2004.
2. William Stallings and Lawrie Brown, “Computer Security: Principles and Practice”, Prentice Hall, 2008.
3. Online Privacy and Social Media, Privacy in the online world Carla Mooney, ReferencePoint Press, 2015.
4. Security and privacy in social networks, Yaniv Altshuler, Alex Pentland, Springer Science & Business Media, Aug-2012.

Open Elective IV (Credit 2)

Course Description: B.Sc. (Information Technology)	
Semester	II
Course Name	Introduction to Game Designing and Cartoon Animation
Course Code	UOE2GDC
Credit	2
Hours	2 Hrs per week

Course Objectives	To explore a new programming environment, to identify the objects in a Scratch project (sprites, backdrops), explain that objects in Scratch have attributes (linked to), recognise that commands in Scratch are represented as blocks.
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Course Outcomes	After completing the course, Student will be able to:
	1) Summarize Scratch Interfaces
	2) Create the Scratch mini Projects
	3) Discuss advanced Programming in Scratch
	4) Elaborate Planning and Designing of Games

Module/Unit	Course Description	Hrs.
I	Introduction to Scratch Programming: Introduction to Scratch Interface, Coding: The First Steps., Placing Sounds in a Script, Making the Sprite Walk Better, Multi-Coloured Sprites, Changing the Backdrop (Stage), Barking Dog Chases Cat, Creating a Sprite, Cursor-controlled Sprites, The Psychedelic Sprite, Sprite Interaction, Two Sprites having a Chat, Creating a Coral Reef, Target Ball, Dancing Sprites	15hrs
II	Advanced Programming: - Drawing Shapes, Bouncing Ball, Drawing Free Hand, Walking the Dog, Planning & Designing A Game, Game: Shark Attack!, Shark Attack Advanced, Tennis Solitaire, Adventure Games: The Amazing Maze!, Demon Chaser, Extending the Demon Chaser Game, Shooter Games: Asteroids, Two Player Games, Two Player Games: Tennis for Two, Geography Quiz: Travelling across a Continent	15hrs

References Books:

1. An Introduction to the Scratch Programming Language by Brendan Smith, Camden Education Trust, Ireland
2. Scratch Programming for Teens Jerry Lee Ford, Jr. Course Technology PTR
3. Sean McManus updated for Scratch 3 Scratch Programming in easy steps.

Value Education Course (Credit 2)

Course Description: B.Sc. (Information Technology)	
Semester	II
Course Name	Foundation Course in Digital and Technology Solutions
Course Code	UVEC2DTS
Credit	2
Hours	2 Hrs per week

Course Objectives	<ul style="list-style-type: none"> • To gain familiarity with digital paradigms. • To sensitize about role & significance of digital technology. • To provide a knowledge of major technological trends.
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Course Outcomes	After completing the course, Student will be able to:
	1) Knowledge about digital paradigm.
	2) Realization of importance of digital technology, digital financial tools, e-commerce.
	3) Familiarity with the e-governance and Digital India initiatives
	4) An understanding of use & applications of digital technology.

Module/Unit	Course Description	Hrs.
I	<p>Cybersecurity: Fundamental concepts of Cybersecurity including threats, vulnerabilities, encryption, network security.</p> <p>Ethical and Legal Considerations: Ethical and legal aspects of digital and technology solutions, Privacy, data protection regulations, intellectual property rights, and ethical considerations in technology development and usage.</p> <p>Data Privacy and Security: Importance of data privacy and security in e-governance initiatives like encryption techniques, the confidentiality, integrity, and availability of data.</p>	15 hrs

II	<p>Government-to-Citizen (G2C) Services: The digital services provided by the government to citizens like online portals, mobile applications, and other digital platforms to access government services.</p> <p>Government-to-Business (G2B) Services: The digital services and platforms provided by the government to businesses such as e-filing of taxes, online business registration, and digital procurement systems.</p> <p>Government-to-Government (G2G) Services: The digital platforms and systems that facilitate interactions between government departments and agencies like e-office, e-procurement, and data sharing frameworks</p> <p>Digital Identity and Authentication: Digital identity management systems, such as Aadhaar in India, and the use of biometrics or unique identification numbers for secure authentication of citizens accessing government services.</p>	15 hrs
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Reference Books:

1. Digital Systems Engineering William J. Dally, John W. Poulton Cambridge University Press
2. Principles of Digital Communication – Robert G. Gallager
3. E-Governance in India: The Progress Status Sunil K. Muttoo, Rajan Gupta, Saibal K. Pal · 2019