



॥ विद्या विनयेन शोभते ॥

Janardan Bhagat Shikshan Prasarak Sanstha's

**CHANGU KANA THAKUR**

**Arts, Commerce and Science College, New Panvel  
(Autonomous)**

**Department: Chemistry**

**Academic Year 2024-25**

**List of programmes**

Sr.No.	Name of the Programme	Programme Code	Year of Establishment
1	B.Sc. Chemistry	BSCCH1014	1997-1998
2	M. Sc. Organic Chemistry (By Paper)	MSCOC1018	2004-2005
3	M. Sc. Analytical Chemistry (By Paper)	MSCAC1019	2012-2013
4	M. Sc. Organic Chemistry (By Research)	MSCOCR1018	2008-2009
5	Ph. D. (Science) in Organic Chemistry	PHD1003OC	2009-2010
6	Ph. D. (Science) in Physical Chemistry	PHD1003PC	2009-2010
7	Ph. D. (Science) in Inorganic Chemistry	PHD1003IC	2015-2016
8	Post Graduate Diploma in Analytical Instrumentation	PGDAI1021	2022-2023

Janardan Bhagat Shikshan Prasarak Sanstha's  
**Changu Kana Thakur**  
**Arts, Commerce and Science College, New Panvel (Autonomous)**  
**Syllabus for the F.Y.B.Sc.**  
**To be implemented from the academic year 2024-25**  
**SEMESTER I**

Course Code	Unit	Topics	Credits	L/Week
USC1CH1 Discipline Specific course	I	Chemical Thermodynamics, Chemical Calculations	03	1
	II	Atomic structure, Periodic Table and Periodicity		1
	III	Classification and Nomenclature of organic compounds, Bonding and Structure of Organic compounds, Fundamentals of organic reaction mechanism, Introduction to polymer chemistry		1
USC1CHP Chemistry practical		Physical Chemistry/ Inorganic Chemistry Organic Chemistry	01	2
USEC1TEP Skill Enhancement Course		Water analysis	02	4
UVEC1EVS Environmental studies	I	Environment and Ecosystem	02	2
	II	Biodiversity, its conservation and Pollution		

**SEMESTER II**

Course Code	Unit	Topics	Credits	L/Week
USC2CH2 Discipline Specific course	I	Chemical Kinetics, Mathematical Concept in Chemistry,	03	1
	II	Comparative Chemistry of Main Group Elements, Chemistry of Noble Gases ,		1
	III	Stereochemistry		1
USC2CHP Chemistry practical		Physical Chemistry/ Inorganic Chemistry Organic Chemistry	01	2
USEC1TEP Skill Enhancement Course		Soil analysis	02	4
UVEC2EVS Environmental studies	I	Climate Change and Waste management	02	2
	II	Environmental Management and Sustainable Development		

**Syllabus for the S.Y.B.Sc.**  
**To be implemented from the academic year 2024-25**  
**SEMESTER III**

Course Code	Unit	Topics	Credits	L/Week
USC3GCH3 Major-I	I	Chemical Thermodynamics, Electrochemistry-I	03	1
	II	Chemical Bonding		1
	III	Chemistry of Alcohols, phenols and epoxides		1
USC3GCH4 Major-II	I	Chemistry of Carbonyl Compounds, Stereochemistry	03	1
	II	Classical methods of Analysis		1
	III	Chemistry of Boron Compounds		1
USC3CHP Practical	I	Physical Chemistry/ Inorganic Chemistry	02	04
	II	Organic Chemistry		
	III	Analytical Chemistry		
UVSC3CSD Vocational Skill Course Practical	I	Soaps and detergents	02	04
UOE3MOL	I	Chemistry of Water		
Open Elective- OE-I	II	Carbohydrates	02	02
USC3GCHM	I	Gaseous State, Liquid State, Thermodynamics, Periodic Table and Periodicity	02	02
Minor Chemistry	II	Nomenclature of Organic Compounds		
USC3CHPM Minor Chemistry Practical		Physical Chemistry/ Inorganic Chemistry Organic Chemistry/Analytical Chemistry	02	04

## SEMESTER IV

Course Code	Unit	Topics	Credits	L/Week
USC4GCH3 Major-I	I	Electrochemistry -II, Phase Equilibria, Catalysis	03	1
	II	Chemistry of the transition metals, Coordination Chemistry		1
	III	Carboxylic Acids and their Derivatives, An Introduction to Analytical Separations, Chromatography, Planar Chromatography		1
USC4GCH4 Major-II	I	Chemistry of nitrogen containing compounds, Heterocyclic Compounds	03	1
	II	Basic concept of Analytical Instrument		1
	III	Uses and Environmental Chemistry of volatile Oxides and oxo-acids		1
USC4CHP Practical	I	Physical Chemistry/ Inorganic Chemistry	02	04
	II	Organic Chemistry		
	III	Analytical Chemistry		
USEC4FCP Skill Enhancement Course Practical	I	Chemistry of Food, Cosmetics and Perfumes	02	04
UOE4EC Open Elective-OE-II	I	Water pollution	02	02
	II	Air Pollution, Soil Pollution		
USC4BCHM Minor Chemistry -II	I	Solid State, Comparative chemistry of Main Group Elements, Comparative Chemistry of Compounds of Group I and Group II Elements	02	02
	II	Stereochemistry, Classical methods of Analysis		
USC4CHPM Minor Chemistry -II <b>Practical</b>	I	Physical Chemistry/ Inorganic Chemistry Organic Chemistry/Analytical Chemistry	02	04
	II			

## Syllabus for the T.Y.B. Sc. Chemistry

### SEMESTER V

Course	Course Type	Course code	Hrs/week	Internal assessment	Semester-end examination	Total	Credits
Physical Chemistry	Core	USC5CH1	3	40	60	100	3
Inorganic Chemistry	Core	USC5CH2	3	40	60	100	3
Organic Chemistry	Core	USC5CH3	3	40	60	100	3
Analytical Chemistry	Core	USC5CH4	3	40	60	100	3
Drugs and dyes	Applied	USC5CH5	3	40	60	100	3
Practical I	Core	USC5CP1	3	40	60	100	4
Practical II	Core	USC5CP2	3	40	60	100	4
Practical III	Applied	USC5CP3	3	40	60	100	4

### SEMESTER VI

Course	Course Type	Course code	Hrs/week	Internal assessment	Semester-end examination	Total	Credits
Physical Chemistry	Core	USC6CH1	3	40	60	100	3
Inorganic Chemistry	Core	USC6CH2	3	40	60	100	3
Organic Chemistry	Core	USC6CH3	3	40	60	100	3
Analytical Chemistry	Core	USC6CH4	3	40	60	100	3
Drugs and dyes	Applied	USC6CH5	3	40	60	100	3
Practical I	Core	USC6CP1	3	40	60	100	4
Practical II	Core	USC6CP2	3	40	60	100	4
Practical III	Applied	USC6CP3	3	40	60	100	4

**Syllabus for the M. Sc. Part I Analytical Chemistry**  
**w.e.f. 2023-24 as per NEP 2020**

**SEMESTER I**

Course Code	Unit	Topics	Credits	L / Week
PSC1PC1	I	Thermodynamics-I	4	1
	II	Quantum Chemistry		1
	III	Chemical Dynamics-I		1
	IV	Electrochemistry		1
PSC1OC1	I	Addition reactions	4	1
	II	Nucleophilic substitution reactions and Aromaticity		1
	III	Stereochemistry		1
	IV	Oxidation and Reduction		1
PSC1AC1	I	Language of Analytical Chemistry	4	1
	II	Quality in Analytical Chemistry		1
	III	Optical Methods		1
	IV	Thermal Methods		1
PSC1PCP + PSC1ACP	-	Practical Course Practical (Physical Chemistry + Analytical Chemistry)	8	16
PSC1IC2 Elective-I	I	Chemical Bonding	2	1
	II	Molecular Symmetry and Group Theory		1
PSC1IC2 Elective-2	III	Materials Chemistry and Nanomaterials	2	1
	IV	Characterization of Coordination Compounds		
PSC1ICP + PSC1OCP		Practical's of	2	8

		Practical's (Inorganic Chemistry + Organic Chemistry)		
PSC1RM	I	Research and Literature Survey	4	1
	II	Data Analysis		1
	III	Methods of Scientific Research and Writing		1
	IV	Chemical Safety and Ethical handling of Chemicals		1

## SEMESTER II

Course Code	Unit	Topics	Credits	L / Week
PSC2PC2	I	Chemical Thermodynamics II	4	1
	II	Quantum Chemistry II		1
	III	Chemical Kinetics and Molecular Reaction Dynamics		1
	IV	Solid State Chemistry and Phase Equilibria		1
PSC2OC2	I	Alkylation of Nucleophilic Carbon Intermediates Reaction of carbon nucleophiles with carbonyl groups	4	1
	II	Reactions and Rearrangements		1
	III	Eliminations Reactions and Organometallic Chemistry		1
	IV	NMR spectroscopy and Mass spectrometry		1
PSC2CH4	I	Chromatography	4	1
	II	X-ray spectroscopy, Mass spectrometry, Radioanalytical Methods		1
	III	<ul style="list-style-type: none"> <li>• Surface Analytical Techniques</li> <li>• Atomic Spectroscopy</li> </ul>		1
	IV	Electroanalytical Methods		1
PSC1PCP + PSC1ACP	-	Practical Course Practical (Physical Chemistry + Analytical Chemistry)	8	16
	I	Inorganic Reaction Mechanism		1

PSC2IC2 Elective-I	II	Organometallic Chemistry of Transition metals	4	1
PSC2IC2 Elective-I	III	Environmental Chemistry		1
	IV	Bioinorganic Chemistry		1
PSC1ICP + PSC1OCP		Practical's Course Practical's (Inorganic Chemistry + Organic Chemistry)		8
	OJT	On Job Training		60



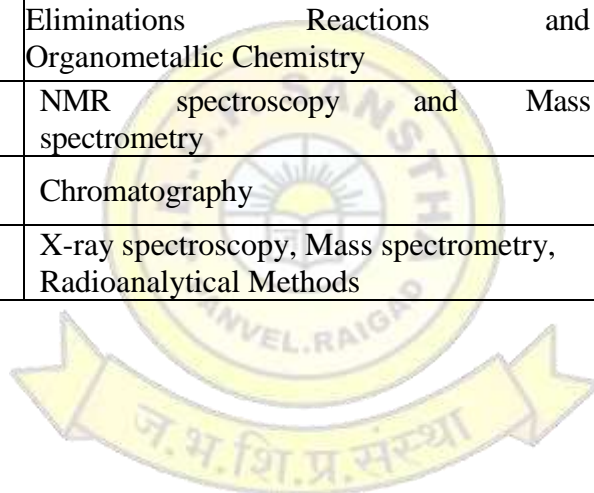
**Syllabus for the M. Sc. Part I Organic Chemistry**  
**SEMESTER I**

Course Code	Unit	Topics	Credits	L / Week
PSC1IC1	I	Chemical Bonding	4	1
	II	Molecular Symmetry and Group Theory		1
	III	Materials Chemistry and Nanomaterials		1
	IV	Characterization of Coordination Compounds		1
PSC1OC1	I	Addition reactions	4	1
	II	Nucleophilic substitution reactions and Aromaticity		1
	III	Stereochemistry		1
	IV	Oxidation and Reduction		1
PSC1AC1	I	Language of Analytical Chemistry	4	1
	II	Quality in Analytical Chemistry		1
	III	Optical Methods		1
	IV	Thermal Methods		1
PSC1RM	I	Print: Primary, Secondary and Tertiary sources	4	1
	II	DATA ANALYSIS		1
	III	Methods Of Scientific Research and Writing		1
	IV	Chemical Safety & Ethical Handling of Chemicals		1
PSC1OCP + PSC1ACP	-	Practical Course Organic chemistry Practical's + Analytical Chemistry Practical's	2	8
PSC1PC1	I	Thermodynamics-I	2	2

Elective-I	II	Quantum Chemistry		
PSC1PC2 Elective-II	III	Chemical Dynamics-I	2	2
	IV	Electrochemistry		
PSC1PCP + PSC1HCP	-	Practical Course Physical chemistry Practical's + Inorganic Chemistry Practical's	2	8
PSC1RM	I	Research and Literature Survey	4	1
	II	Data Analysis		1
	III	Methods of Scientific Research and Writing		1
	IV	Chemical Safety and Ethical handling of Chemicals		1

## SEMESTER II

Course Code	Unit	Topics	Credits	L / Week
PSC2IC2	I	Inorganic Reaction Mechanism	4	1
	II	Organometallic Chemistry of Transition metals		1
	III	Environmental Chemistry		1
	IV	Bioinorganic Chemistry		1
PSC2OC2	I	Alkylation of Nucleophilic Carbon Intermediates Reaction of carbon nucleophiles with carbonyl groups	4	1
	II	Reactions and Rearrangements		1
	III	Eliminations Reactions and Organometallic Chemistry		1
	IV	NMR spectroscopy and Mass spectrometry		1
	I	Chromatography		1
	II	X-ray spectroscopy, Mass spectrometry, Radioanalytical Methods		1



PSC2AC2			4	
	III	<ul style="list-style-type: none"> <li>• Surface Analytical Techniques</li> <li>• Atomic Spectroscopy</li> </ul>		1
	IV	Electroanalytical Methods		1
PSC2OCP + PSC2ACP	-	Practical Course Organic chemistry Practical's + Analytical Chemistry Practical's	2	8
PSC2PC1 Elective-I		Chemical Thermodynamics II	2	1
		Quantum Chemistry II		
PSC2PC Elective-II		Chemical Kinetics and Molecular Reaction Dynamics	2	1
		Solid State Chemistry and Phase Equilibria		
PSC1PCP + PSC1ICP	-	Practical Course Physical chemistry Practical's + Inorganic Chemistry Practical's	2	8
--	OJT	On Job training	4	

**Syllabus for the M.Sc. Part II Organic Chemistry**  
**Credit Based Semester and Grading System**  
**To be implemented from the academic year 2024-25**  
**SEMESTER III**

Course Name & Course Code	Unit	Topics	Credits	L/Week
Theoretical Organic Chemistry-I PSC3TOC (Major-I)	I	Pericyclic Reactions	4	1
	II	Organic Reaction Mechanisms		1
	III	Stereochemistry-I		1
	IV	Photochemistry		1
Synthetic Organic Chemistry-I PSC3SOC (Major-II)	I	Name reactions with mechanism and Application	4	1
	II	Radicals in Organic Synthesis		1
	III	Enamines, Ylides and $\alpha$ -C-H functionalization		1
	IV	Metals / Non-metals in organic synthesis		1
Natural products, Heterocyclic chemistry and Spectroscopy-I PSC3NHS (Major-III)	I	Natural products-I	4	1
	II	Natural products-II		1
	III	Heterocyclic compounds-I		1
	IV	Advanced Spectroscopic Techniques -I		1
Practical in Organic Chemistry-I PSC3POC1 (Major-IV)		Two steps preparations	2	4
Drug discovery, design, development and Synthesis PSC3DDS (Elective-I)	I	Drug discovery, design and development	2	1
	II	Drug design, development and synthesis		1
Biomolecules PSC3BIC (Elective-II)	I	Biomolecules-I	2	1
	II	Biomolecules-II		1
Practical in Organic Chemistry-II PSC3POC2		Single step preparation and purification	2	4
Research Project-I PSC3RP1		Research Project-I	4	

## SEMESTER IV

Course Name & Course Code	Unit	Topics	Credits	L/Week
Theoretical Organic Chemistry-I PSC4TOC (Major-I)	I	Physical Organic Chemistry	4	1
	II	Supramolecular Chemistry		1
	III	Stereochemistry-II		1
	IV	Asymmetric Synthesis		1
Synthetic Organic Chemistry-II PSC4SOC (Major-II)	I	Designing Organic Synthesis-I	4	1
	II	Designing Organic Synthesis-II		1
	III	Electro-organic chemistry and selected methods of organic synthesis		1
	IV	Transition and rare earth metals in organic synthesis		1
Natural products, Heterocyclic chemistry and Spectroscopy-II PSC4NHS (Major-III)	I	Natural products-III	4	1
	II	Natural products-IV		1
	III	Heterocyclic compounds-II		1
	IV	Advanced Spectroscopic Techniques -II		1
Green Chemistry PSC4GC (Elective-I)	I	Introduction to Green Chemistry	2	1
	II	Green Synthesis		1
Intellectual Property Rights PSC4IPR (Elective-II)	I	Intellectual Property Rights-I	2	1
	II	Intellectual Property Rights-II		1
Practical in Organic Chemistry-III PSC4POC3		Separation of Ternary mixture and Spectral analysis	2	4
Research Project-II PSC4RP2		Research Project-II	6	

**Syllabus for the M.Sc. Part II Analytical Chemistry**  
**Credit Based Semester and Grading System**  
**To be implemented from the academic year 2024-25**  
**SEMESTER III**

<b>Course Name and Code</b>	<b>Unit</b>	<b>Topics</b>	<b>Credits</b>	<b>L / Week</b>
Quality in Analytical Chemistry (PSC3QAC)	I	Quality in Analytical Chemistry	4	1
	II	Sample Management system		1
	III	Laboratory Accreditation-I		1
	IV	Uncertainty in Measurement and Calibration of Instrument-II		1
Advanced Instrumental Techniques (PSC3AIT)	I	Spectral Methods –I	4	1
	II	Spectral Methods –II		1
	III	Electroanalytical Methods		1
	IV	Miscellaneous Techniques		1
Bio Analytical and Food Analysis (PSC3BCFA)	I	Bio-analytical Chemistry-I	4	1
	II	Bio-analytical Chemistry-II		1
	III	Food analysis-I		1
	IV	Food analysis-II		1
Practical in Analytical chemistry-I(PSC3PAC1)	-	Practical in Analytical chemistry-I	2	4
Pharmaceutical Analysis Elective I (PSC3PA1)	I	Introduction to Pharmaceutical Analysis	2	1
	II	Pharmaceutical testing		1
Forensic & Cosmetics	I	Forensic Analysis	2	1

Analysis Elective II (PSC3FCA)				
	II	Cosmetics Analysis		1
Practical in Analytical chemistry-I(PSC3PAC2)	-	Practical in Analytical chemistry-II	2	8
Research Project (PSC3RP)	-	Research Project	4	60

### SEMESTER IV

Course Name and Code	Unit	Topics	Credits	L / Week
Separation Techniques (PSC4QAC)	I	Separation Techniques-I	4	1
	II	Separation Techniques-II		1
	III	Separation ,Analysis and Standardization ofHerbal based products		1
	IV	Advanced Separation Techniques		1
Advanced Instrumental Techniques (PSC4AIT)	I	Spectral Methods –III	4	1
	II	Spectral Methods –IV		1
	III	Radio Chemical and Thermal Methods		1
	IV	Hyphenated Techniques		1
Environmental Analysis and Its Management	I	Effluent Treatment	4	1
	II	Solid Waste Management		1
	III	Water quality Monitoring		1

(PSC4EAM)	IV	Monitoring of air pollution and Environmental legislation		1
Intellectual Property Rights (PSC4IPR)	I	Introduction to Intellectual Property Rights-I	2	1
	II	Introduction to Intellectual Property Rights-II		1
Analysis of selected materials (PSC4ASM)	I	Plastics and Polymers	2	1
	II	Metallurgical Analysis		1
Practical in Analytical chemistry-I (PSC4PAC1)	-	Practical in Analytical chemistry-I	2	8
Research Project (PSC4RP)	RP	Research Project	6	60