SRI VENKATESWARA UNIVERSITY :: TIRUPATI

SVU COLLEGE OF SCIENCES
Department of Chemistry

Re-Structured P.G. Programme (CBCS) as per NEP 2020, National Higher Education Qualification Frame Work (NHEQF) and Guidelines of APSCHE

(With effect from the batch of Students admitted from the academic year 2024-25)
MASTER OF SCIENCES

SEMESTER – III (Analytical Chemistry)								
S. No	**Course**	**Code**	**Title of the Course**	**H/W**	**C**	**SEE**	**IA**	**Total Marks**
1	CC	301	Core course – 7: Instrumental Methods of Analysis	4	4	70	30	100
2	CC	302	Core Course – 8(A): Quality Control and General Principles Core Course – 8(B): Biotechnology and Environmental Management Laws and Protection	4	3	50	25	75
3	CC	303	Core Course – 9(A): Inorganic Spectroscopy & Thermal Methods of Analysis Core Course – 9(B): Chemistry of Transition and Non-Transition Elements	4	3	50	25	75
4	P	304	Practical V (related to CC 8 & 9)	6	2	35	15	50
5	SOC	305	Skill Oriented Course – 5(A): Fundamentals of Spectroscopy and Applications Skill Oriented Course – 5(B): Bioinorganic, Bioorganic, Biophysical Chemistry	4	3	50	25	75
6	SOC	306	Skill Oriented Course – 6(A): X- Ray Diffraction, Kinetics in Solutions, Electroanalytical Chemistry Skill Oriented Course – 6(B): Inorganic Materials for Electronic Industry	4	3	50	25	75
7	P	307	Practical VI (related to SOC 5 & 6)	6	2	35	15	50
8	OOTC	308	Open Online Transdisciplinary Course – 2	-	2	-	-	100
			(OR) Spectral Techniques (Open Elective)	4	2	70	30	100
*	Seminar / tutorials / remedial classes and Quiz as part of internal assessment			4	-	-	-	-
			Total	**40**	**22**	**410**	**190**	**600**

- **CC (Core Courses) – 7th Core Course is mandatory and 8th & 9th Core Courses Student can choose one from each code**
- ***SOC (Skill Oriented Courses) – Student can choose one from each code**
- ***Open Online Transdisciplinary Course (OOTC) - Students can choose any relevant course of his / her choice from the online courses offered by governmental agencies like SWAYAM, NPTEL, etc.,**
- ***Practical - V relating to 5th & 6th Core Courses and Practical - VI relating to 5th & 6th Skill Oriented Courses (SOC)**

SEMESTER – III (Environmental Chemistry)								
S. No	**Course**	**Code**	**Title of the Course**	**H/W**	**C**	**SEE**	**IA**	**Total Marks**
1	CC	301	Core course – 7: Energy, Environment and Soils	4	4	70	30	100
2		302	Core Course – 8(A): Water Pollution Monitoring And Environment Laws	4	3	50	25	75
			Core Course – 8(B): Quality Control and General Principles					
3		303	Core Course – 9(A): Spectral Techniques in Inorganic Chemistry	4	3	50	25	75
			Core Course – 9(B): Group theory and spectroscopy					
4	P	304	Practical V (related to CC 8 & 9)	6	2	35	15	50
5	SOC	305	Skill Oriented Course – 5(A): Fundamentals of Spectroscopy and Applications	4	3	50	25	75
			Skill Oriented Course – 5(B): Bioinorganic, Bioorganic, Biophysical Chemistry					
6		306	Skill Oriented Course – 6(A): X- Ray Diffraction, Kinetics in Solutions, Electroanalytical Chemistry	4	3	50	25	75
			Skill Oriented Course – 6(B): Inorganic Materials for Electronic Industry					
7	P	307	Practical VI (related to SOC 5 & 6)	6	2	35	15	50
8	OOTC	308	Open Online Transdisciplinary Course – 2	-	2	-	-	100
			(OR)					
			Spectral Techniques (Open Elective)	4	2	70	30	100
*	Seminar / tutorials / remedial classes and Quiz as part of internal assessment			4	-	-	-	-
			Total	**40**	**22**	**410**	**190**	**600**

- **CC (Core Courses) – 7th Core Course is mandatory and 8th & 9th Core Courses Student can choose one from each code**
- ***SOC (Skill Oriented Courses) – Student can choose one from each code**
- ***Open Online Transdisciplinary Course (OOTC) - Students can choose any relevant course of his / her choice from the online courses offered by governmental agencies like SWAYAM, NPTEL, etc.,**
- ***Practical - V relating to 5th & 6th Core Courses and Practical - VI relating to 5th & 6th Skill Oriented Courses (SOC)**

SEMESTER – III (Inorganic Chemistry)								
S. No	**Course**	**Code**	**Title of the Course**	**H/W**	**C**	**SEE**	**IA**	**Total Marks**
1	CC	301	Core course – 7: Inorganic Spectroscopy & Thermal Methods of Analysis	4	4	70	30	100
2	CC	302	Core Course – 8(A): Co-Ordination Compounds, Organometallic Chemistry and Chemistry of Non-Transition Elements	4	3	50	25	75
			Core Course – 8(B): Energy Resources and Green Chemistry					
3	CC	303	Core Course – 9(A): Instrumental Methods of Analysis	4	3	50	25	75
			Core Course – 9(B): Pollution and Control Methods					
4	P	304	Practical V (related to CC 8 & 9)	6	2	35	15	50
5	SOC	305	Skill Oriented Course – 5(A): Fundamentals of Spectroscopy and Applications	4	3	50	25	75
			Skill Oriented Course – 5(B): Bioinorganic, Bioorganic, Biophysical Chemistry					
6	SOC	306	Skill Oriented Course – 6(A): X- Ray Diffraction, Kinetics in Solutions, Electroanalytical Chemistry	4	3	50	25	75
			Skill Oriented Course – 6(B): Inorganic Materials for Electronic Industry					
7	P	307	Practical VI (related to SOC 5 & 6)	6	2	35	15	50
8	OOTC	308	Open Online Transdisciplinary Course – 2	-	2	-	-	100
			(OR)					
			Spectral Techniques (Open Elective)	4	2	70	30	100
*	Seminar / tutorials / remedial classes and Quiz as part of internal assessment			4	-	-	-	-
			Total	**40**	**22**	**410**	**190**	**600**

- **CC (Core Courses) – 7th Core Course is mandatory and 8th & 9th Core Courses Student can choose one from each code**
- ***SOC (Skill Oriented Courses) – Student can choose one from each code**
- ***Open Online Transdisciplinary Course (OOTC) - Students can choose any relevant course of his / her choice from the online courses offered by governmental agencies like SWAYAM, NPTEL, etc.,**
- ***Practical - V relating to 5th & 6th Core Courses and Practical - VI relating to 5th & 6th Skill Oriented Courses (SOC)**

SEMESTER – III (Organic Chemistry)								
S. No	**Course**	**Code**	**Title of the Course**	**H/W**	**C**	**SEE**	**IA**	**Total Marks**
1	CC	301	Core course – 7: Organic Synthesis-I	4	4	70	30	100
2	CC	302	Core Course – 8(A): Organic Synthesis-II Core Course – 8(B): Organic Reagents In Quality Control and Analysis	4	3	50	25	75
3	CC	303	Core Course – 9(A): Inorganic Spectroscopy & Thermal Methods of Analysis Core Course – 9(B): Group Theory and Polymer Chemistry	4	3	50	25	75
4	P	304	Practical V (related to CC 8 & 9)	6	2	35	15	50
5	SOC	305	Skill Oriented Course – 5(A): Fundamentals of Spectroscopy and Applications Skill Oriented Course – 5(B): Bioinorganic, Bioorganic, Biophysical Chemistry	4	3	50	25	75
6	SOC	306	Skill Oriented Course – 6(A): Chemistry of Natural Products Skill Oriented Course – 6(B): X- Ray Diffraction, Kinetics in Solutions, Electroanalytical Chemistry	4	3	50	25	75
7	P	307	Practical VI (related to SOC 5 & 6)	6	2	35	15	50
8	OOTC	308	Open Online Transdisciplinary Course – 2	-	2	-	-	100
			(OR) Spectral Techniques (Open Elective)	4	2	70	30	100
*	Seminar / tutorials / remedial classes and Quiz as part of internal assessment			4	-	-	-	-
			Total	**40**	**22**	**410**	**190**	**600**

- **CC (Core Courses) – 7th Core Course is mandatory and 8th & 9th Core Courses Student can choose one from each code**
- ***SOC (Skill Oriented Courses) – Student can choose one from each code**
- ***Open Online Transdisciplinary Course (OOTC) - Students can choose any relevant course of his / her choice from the online courses offered by governmental agencies like SWAYAM, NPTEL, etc.,**
- ***Practical - V relating to 5th & 6th Core Courses and Practical - VI relating to 5th & 6th Skill Oriented Courses (SOC)**

SEMESTER – III (Physical Chemistry)								
S. No	**Course**	**Code**	**Title of the Course**	**H/W**	**C**	**SEE**	**IA**	**Total Marks**
1	CC	301	Core course – 7: Physical Chemistry-III	4	4	70	30	100
2	CC	302	Core Course – 8(A): Advanced Electrochemistry Core Course – 8(B): Principles in Quality Control And Quality Measurements	4	3	50	25	75
3	CC	303	Core Course – 9(A): Inorganic Spectroscopy & Thermal Methods of Analysis Core Course – 9(B): Natural Resources-Pollution and Green Chemistry	4	3	50	25	75
4	P	304	Practical V (related to CC 8 & 9)	6	2	35	15	50
5	SOC	305	Skill Oriented Course – 5(A): Fundamentals of Spectroscopy and Applications Skill Oriented Course – 5(B): Bioinorganic, Bioorganic, Biophysical Chemistry	4	3	50	25	75
6	SOC	306	Skill Oriented Course – 6(A): X- Ray Diffraction, Kinetics in Solutions, Electroanalytical Chemistry Skill Oriented Course – 6(B):Crystal Structures, Kinetics of Electrodes, Electrode Chemistry	4	3	50	25	75
7	P	307	Practical VI (related to SOC 5 & 6)	6	2	35	15	50
8	OOTC	308	Open Online Transdisciplinary Course – 2	-	2	-	-	100
			(OR) Spectral Techniques (Open Elective)	4	2	70	30	100
*	Seminar / tutorials / remedial classes and Quiz as part of internal assessment			4	-	-	-	-
			Total	**40**	**22**	**410**	**190**	**600**

- **CC (Core Courses) – 7th Core Course is mandatory and 8th & 9th Core Courses Student can choose one from each code**
- ***SOC (Skill Oriented Courses) – Student can choose one from each code**
- ***Open Online Transdisciplinary Course (OOTC) - Students can choose any relevant course of his / her choice from the online courses offered by governmental agencies like SWAYAM, NPTEL, etc.,**
- ***Practical - V relating to 5th & 6th Core Courses and Practical - VI relating to 5th & 6th Skill Oriented Courses (SOC)**

SEMESTER – IV (Analytical Chemistry, Environmental Chemistry, Inorganic Chemistry, Organic Chemistry, Physical Chemistry)								
S. No	**Course**	**Code**	**Title of the Course**	**H/W**	**C**	**SEE**	**IA**	**Total Marks**
1	OOSDC	401	Open Online Skill Development Courses	-	8	-	-	200
			(OR)					
			Industrial Organic Chemistry (Skill Development Course-1)	4	4	70	30	100
			Environmental and Industrial Analytical Chemistry (Skill Development Course-2)	4	4	70	30	100
2	PW	402	Project Work – Orientation classes	24	12	300	0	300
*	Conducting classes for competitive exams, communication skills, UGC / CSIR and NET / SLET examinations			12	-	-	-	-
			Total	**44**	**20**	**440**	**60**	**500**
Total IV Semesters (for each specialisation)				**156**	**84**	**1320**	**880**	**2200**

- Open Online Skill Development Course (OOSDC) - Students can choose any **Two** relevant courses of his / her choice from the online courses offered by governmental agencies like SWAYAM, NPTEL, etc., **to get 8 credits (with 4 credits from each course)**

S.V. UNIVERSITY, TIRUPATI :: SVU COLLEGE OF SCIENCES
M.Sc. CHEMISTRY
NEP – 2020 under CBCS (Effective from Academic year 2024-2025)
THIRD SEMESTER
308 - OPEN ELECTIVE- SPECTRAL TECHNIQUES

UNIT-I: ULTRAVIOLET AND VISIBLE SPECTROSCOPY: 15Hrs

Various electronic transitions (185-800 nm), effect of solvent on electronic transitions, ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugated polyenes. Fisher-Woodward rules for conjugated dienes and carbonyl compounds, ultraviolet spectra of aromatic and heterocyclic compounds. Steric effect in biphenyls.

UNIT – II: INFRARED SPECTROSCOPY 15Hrs

Instrumentation and sample handling. Characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ether, phenols and amines. Detailed study of vibrational frequencies of carbonyl compounds (ketones, aldehydes, esters, amides, acids, anhydrides, lactones, lactams and conjugated carbonyl compounds). Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and fermi resonance, FT-IR

UNIT-III: MASS SPECTROMETRY 15Hrs

Introduction, ion production, type of ionization, EI, CI, FD, and FAB-factors affecting fragmentation, ion analysis, ion abundance. Mass spectral fragmentation of organic compounds, common functional groups, molecular-ion peak, metastable peak, Mc. Lafferty rearrangement. Nitrogen rule, isotope labeling. High resolution mass spectrometry, Examples of mass spectral fragmentation of organic compounds with respect to their structure determination.

UNIT-IV: ATOMIC ABSORPTION SPECTROSCOPY 15Hrs

Atomic Absorption Spectroscopy: Flame AAS: Principle, Instrumentation – Sources of radiation (HCL and EDL), Different types of burners, Interferences- Physical, Chemical, spectral and back ground correction, and methods of minimization

Graphite Furnace AAS: Principle and technique –Comparison between Flame AAS and furnace AAS, Applications of AAS, Comparison between Atomic Absorption & Flame Photometry.

Books suggested:

1. Organic spectroscopy, W. Kemp 5th Ed, ELBS
2. Spectroscopy of organic compounds, RM Silversteen and others, 5th Ed,John Wiley
3. Spectroscopy of organic compounds, P.S. Kalsi, Wiley, 1993.
4. NMR in chemistry-A multi nuclear introduction, William Kemp, Mc Millan, 1986.
5. Spectroscopic methods in Organic chemistry, DH Williams & I Flemmi.

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M.Sc. CHEMISTRY

NEP – 2020 under CBCS (Effective from Academic year 2024-2025)

FOURTH SEMESTER

401-SDC1-INDUSTRIAL ORGANIC CHEMISTRY

UNIT – I: Industrial Organic Syntheses – Petrochemicals 15 Hrs

Introduction; raw material and basic processes; chemical processes used in industrial organic synthesis; petrochemicals; methanol, ethanol, rectified spirit from beer; methylated spirit; proof spirit; preparation of absolute ethanol from rectified spirit; acetaldehyde; acetic acid; isopropanol; ethylene glycol; glycerin; acetone; phenol; ethyl acetate.

UNIT – II: Dyes 15 Hrs

Introduction; sensation of colour; colour and constitution; nomenclature; basic operations in dyeing; classification of dyes according to the mode of application; synthesis, reactions and applications of diphenyl methane dyes, triphenylmethane dyes, phthalein dyes, xanthenes dyes, acridine dyes, sulphur dyes, and cyanine dyes. **Fluorescent Dyes:** synthesis, reactions and applications of Coumarin fluorescent dyes

UNIT – III: Oils, Fats, Waxes and Soaps 15 Hrs

Introduction; distinction between oils and fats; properties and classifications; animal fats and oils; difference between, animal, vegetable and mineral oils; isolation of essential oils and their uses; saponification value; ester value; acid value; iodine value; Wijs method; Reichert meissl value; Henher value; elaiden test; hydrogenation of oils; soap and its manufacture; general consideration in soap making; manufacture of toilet and transparent soaps; oil to be used for soap; cleansing action of soap.

UNIT – IV: Natural and Synthetic Polymers 15 Hrs

Introduction; types of polymerization and their utility; mechanism involved in preparation; thermoplastic and thermosetting polymers; phenolic resins; polyurethanes; epoxy resins; alkyl resins; natural and synthetic rubber; types and their utility; polymer properties and structure.

Books Suggested

[1] Industrial Chemistry (Including Chemical Engineering), B. K. Sharma (10th Ed., 1999).
[2] Outlines of Chemical Technology – For the 21st Century, M. Gopala Rao, M. Sittig (3rd Ed., 1997).

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M.Sc. CHEMISTRY
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FOURTH SEMESTER

401-SDC2-ENVIRONMENTAL AND INDUSTRIAL ANALYTICAL CHEMISTRY

UNIT – I: Water Quality Assessment **15 Hrs**

Determination of pH, EC, TDS, DO, colour, turbidity, total solids, conductivity, acidity, alkalinity hardness, chloride, fluoride, sulphate, nitrite, nitrate, phosphorous (total inorganic and organic), BOD, COD, TOC, pesticides.

UNIT – II: Water Pollutants **15 Hrs**

Sources of water pollution: domestic, industrial, agricultural, soil and radioactive wastes as sources of pollution; c ontamination by inorganic and organic materials: parameters for analysis; impact of heavy metal pollution: assessment of toxic metal ions in water; impact of organic pollutants: assessment of dyes and other organic pollutants in water.

UNIT – III: Chemical Analysis of Soil **15 Hrs**

Soil/sediment analysis: a brief idea of chemistry of soil; trace element analysis in soil-B, Cd, Cu, Fe, Mn, Mo, Zn and Pb; standard specifications for soil.

UNIT – IV: Industrial Pollutants and Prevention **15 Hrs**

Pollutants from pigment and paint, textile industries, tannery, cosmetics, ceramics and glass, chemical and pharmaceutical, explosives, electroplating industries, food processing industries; pollution prevention strategies in industrial processes.

Books Suggested

[1] P. Patnaik, Handbook of Environmental Analysis: Chemical Pollutants in Air, Water, Soil and Solid Wastes, 3rd Edition, CRC Press, Taylor & Francis Group, Boca Raton, FL, 2018.

[2] Timothy J. Sullivan, Alan T. Herlihy and James R. Webb, Air Pollution and Freshwater Ecosystems: Sampling, Analysis, and Quality Assurance, CRC Press, Boca Raton, FL, Taylor & Francis Group, LLC, 2015.

M.Sc. Degree Examination___________________ 2025

THIRD SEMESTER

Branch: M.Sc. Chemistry (for All Branches)

308- OPEN ELECTIVE- SPECTRAL TECHNIQUES

Common Syllabus for SVU and Affiliated Colleges

(w.e.f. 2024-25)

Max. Marks: 70

SECTION-A

Answer any FOUR Questions. All questions carry equal marks **4 × 5 = 20 M**

1. Unit-I
2. Unit-I
3. Unit-II
4. Unit-II
5. Unit-III
6. Unit-III
7. Unit-IV
8. Unit-IV

SECTION-B

Answer ALL the Questions. All questions carry equal marks **4 × 12 $^1/_2$ = 50 M**

9. (a) Unit I (or)

   (b) Unit I

10. (a) Unit II (or)

    (b) Unit II

11. (a) Unit III (or)

    (b) Unit III

12. (a) Unit IV (or)

    (b) Unit IV

M.Sc. Degree Examination___________________ 2025

FOUTH SEMESTER

M.Sc. Chemistry

401-SDC1- INDUSTRIAL ORGANIC CHEMISTRY

Common Syllabus for SVU and Affiliated Colleges

(w.e.f. 2024-25)

Max. Marks: 70

SECTION-A

Answer any FOUR Questions. All questions carry equal marks **4 × 5 = 20 M**

1. Unit-I
2. Unit-I
3. Unit-II
4. Unit-II
5. Unit-III
6. Unit-III
7. Unit-IV
8. Unit-IV

SECTION-B

Answer ALL the Questions. All questions carry equal marks **4 × 12 1/2 = 50 M**

9. (a) Unit I (or)

   (b) Unit I

10. (a) Unit II (or)

    (b) Unit II

11. (a) Unit III (or)

    (b) Unit III

12. (a) Unit IV (or)

    (b) Unit IV

M.Sc. Degree Examination___________________ 2025

<u>FOUTH SEMESTER</u>

<u>M.Sc. Chemistry</u>

401-SDC2- ENVIRONMENTAL AND INDUSTRIAL ANALYTICAL CHEMISTRY

Common Syllabus for SVU and Affiliated Colleges

(w.e.f. 2024-25)

Max. Marks: 70

<u>SECTION-A</u>

Answer any <u>FOUR</u> Questions. All questions carry equal marks **4 × 5 = 20 M**

1. Unit-I
2. Unit-I
3. Unit-II
4. Unit-II
5. Unit-III
6. Unit-III
7. Unit-IV
8. Unit-IV

<u>SECTION-B</u>

Answer <u>ALL</u> the Questions. All questions carry equal marks **4 × 12 $^{1}/_{2}$ = 50 M**

9. (a) Unit I (or)

   (b) Unit I

10. (a) Unit II (or)

    (b) Unit II

11. (a) Unit III (or)

    (b) Unit III

12. (a) Unit IV (or)

    (b) Unit IV