Shri Vaishnav Vidyapeeth Vishwavidyalaya

M.Sc. (Chemistry)

Choice Based Credit System (CBCS)(Batch 2018-2020)

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MSCHE 301	PG	Spectroscopic method structure determination	4	0	4	6	60	20	20	60	40

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
*__Teacher Assessment__ shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

1. To give basic knowledge of concept of Spectroscopic methods.
2. To develop the understanding of Spectroscopic methods.

Course Outcomes:

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The student will demonstrate capability of

CO1. Theoretical understanding of concept concept of Spectroscopic methods.

CO2. Became aware of Spectroscopic methods.

Syllabus:

UNIT I

Introduction to spectroscopic methods – Nuclear magnetic resonance spectroscopy (NMR), spin ½ nuclei, 1H and 13C-NMR spectroscopy, FT-NMR method. Chemical shifts, spin spin coupling, spin-spin splitting pattern recognition for structure elucidation, coupling constants.

UNIT II

1H NMR spectroscopy, Second order effects in NMR spectrum, AB and AA'BB',ABC spin systems. Solving simple structure elucidation problems with 1H and13C NMR spectroscopy.

UNIT III

Stereochemistry determination using NMR techniques. Study of dynamic processes by NMR spectroscopy – examples from organic and organometallic chemistry.

UNIT IV

Mass Spectrometry – various ionization methods – EI, CI, ESI and MALDI methods, fragmentation patterns of simple organic molecules, Use of HRMS. Mass spectrometry – fragmentation patterns of simple organic molecules(continued), solving structure elucidation problems using mass spectrometry

UNIT V

Infra-red spectroscopy – basic concepts, experimental methods, functional group analysis and identification using IR spectroscopy, structural effects on vibrational frequency. UV-Vis spectroscopy, electronic transitions in organic molecules, selection rules, application of Beer Lambert law, qualitative and quantitative analysis by UV-Vis spectroscopy.

Text Books:

1. Spectroscopy, D. L.Pavia, G. M.Lampman, G. S. Kriz,J. R. Vyvyan,Cengage Learning(Indian Edition),2007.
2. OrganicSpectroscopy,William Kemp, 3rdEdition, 1991,Macmillan (IndianEdition).
3. NMR Spectroscopy,H. Gnther, secondedition, John Wileyand sons, 1998.

List of Practical's: (If Practical Credit Shown in Syllabus)

Guidelines for Practical:

A two credit lab is to be conducted by covering the most relevant and useful topics from mentioned syllabus.

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							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MSCHE 302	PG	Surfactants and Macromolecules	4	0	4	6	60	20	20	60	40

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*__Teacher Assessment__ shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

1. To give basic knowledge of concept of Surface Chemistry.
3. To develop the understanding of Surface Chemistry.

Course Outcomes:

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The student will demonstrate capability of

CO1. Theoretical understanding of concept concept of Surface Chemistry

CO2. Became aware of Surface Chemistry.

Syllabus:

UNIT I

Surface tension and its determination, thermodynamics of liquid interface, surface energy and free energy of liquids, Adhesion and cohesion, surface tension of solution. Binary systems: Gibbs equation.
Monomolecular films: Gibbs monolayer, Traube's rule. Langmuir Blodgett films. Spreading.

UNIT II

Insoluble spread monolayer. Surface pressure, potential and viscosity. Uses of monolayer. Forces : long and short range, contact angle, Young's equation, wetting,. Adsorption of nonelectrolytes. Langmuir (statistical Thermodynamical) and BET equation. Adsorption of electrolytes. Lubrication and foams. Emulsions. HLB number. The ageing and inversion of emulsions. Ellipsometry.

UNIT III

Recapitulations, morphologies, aggregation number and its determination(SANS and DLS), Kinetics in Micellar media, reverse micellar solutions and their applications, Physico-chemical characterization of micro-emulsions, interfacial compositions.

UNIT IV

Block co-polymers: Pluronics, Clouding phenomenon and effect of additives. Clouding in ionic surfactant solutions: Cloud point extraction methodologies, mechanism and variation. Bio-surfactants and drug delivery systems. Surfactant polymer interactions, phase behaviour, PIT and HLB.

UNIT V

Enzymes (continued) Enzyme mechanisms, Nucleic acids, Lipids and Membranes, Vitamins and Coenzymes, Carbohydrates, Bioenergetics Metabolism.

Text Books:

1. Non-ionic surfactants by M. J. Schick, Surfactant Science Series, (1985)
2. Colloids and Interface Science by P. Ghosh, PHI learning Pvt. Ltd. New Delhi (2009).
3. Surfactants and Interfacial Phenomena by M. J. Rosen, John Wiley, New Jersey (2004).
4. Handbook of surfactants, M. R. Porter, Chapman and Hall, London (1994).
5. The Hydrophobic Effect by C. Tanford, John Wiley, New York (1980).
6. Physical Chemistry of Surface, A.W. Adamson, John Wiley (1976).
7. Physics and Chemistry of Surfaces , J. Oudar, Blackie & Sons (1975)

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							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MSCHE303	PG	ORGANIC CHEMISTRY	4	0	4	6	60	20	20	60	40

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

1. To give basic knowledge of concept of Organic Chemistry.
4. To develop the understanding of Organic Chemistry.

Course Outcomes:

1. Theoretical understanding of concept concept of Organic Chemistry.
2. Became aware of Organic Chemistry.

Syllabus:

Unit I : Electron Displacement

Introduction to Reaction Mechanism and Aromaticity Electron Displacement : Inductive and field effects - Bond distances - Bond energies- Delocalised bonds - Cross conjugation - Rules of resonance - The resonance effect - Steric inhibition of resonance - Hyperconjugation - Hydrogen bonding - Effect of structure on the dissociation consants of acids and bases. Introduction to Reaction Mechanisms : Reactive Intermediates - Carbocations, cabanions, free radicals, carbenes and nitrenes - formation and stability of reactive intermetiates - Methods of determination of reaction mechanisms - Kinetic and non - kinetic methods. Aromaticity : Concept of aromaticiy - Huckels and Criag' rules - Concept of homo - and anti - aromaticity - cyclopentadienyl anion, fulvene, ferrocene azulene, tropolones, sydnone and annulenes - Alternant and nonalternant hydrocarbons.

Unit: II Reaction Mechanisms I

Substitution Reactions Aliphatic Nucleophilic Substituion : SN1 andSN2 mechanisms - Effect of substrate structure, attacking nucleophile, leaving group and reaction medium -Ambient nucleophiles and substrates - Neighbouring group participation -SNi mechanism - Nucleophilic substitution at allytic, vinylic and aliphatic trigonal carbons-Mechanism of esterification and hydrolysis. Aliphatic Electrophilic Substitution : Electrophilic substitution at aliphatic saturated carbon - SE1 SE2 and SEi mechanisms Aromatic Electrophilic Substitution : Orientation - Reactivity - Mechanisms of Friedel - Craft reaction, Sulphonation and Gattermann - Koch formylation. Aromatic Nucleophilic Substitution : SNAr, SN1 mechanisms - Benzyne mechanism

Unit: III Reaction Mechanism II

Elimation and Addition ReactionsElimination Reactions : Alpha and beta eliminations - El, E2 and El CB mechanisms - Sterochemistry of elimination - Orientation of the double bond - Effects of the changes in the substrate, base, leaving group and reaction medium on El, E2 andE1CB reactions - Elimination versus substitution - Pyrolytic cis eliminaitons and their stereochemistry Bredt's rule. Addition to carbon - carbon multiple bonds : Electrophilic, nucleophilic and free radical additions . Addition to alpha, beta unsaturated carbonyl groups - Michael addition - of Grignard reagents and lithium dimethyl cuprate - Diels Alder addition. Addition to carbonyl groups : Mechanisms of Aldol, Benzoin, Claisen and Dieckmann condensations - Perkin, Knoevenagel, Mannich, Cannizaro, Reformatsky and Darzen's reactions - Wittig reaction and its modifications.

Unit: IV Stereochemistry and Free Radical Reactions

:Optical Isomerism : Elements of symmetry - Newmann, Sawhorse and Fischer projection formulae - Concept of Chirality - Cahn Prelog - Ingold system of nomenclature - Enantiotopic and diastereotopic atoms, Optical activity of biphenyl, allenes and spiranes - Stereospecific and Stereoselective synthesis - Resolution, recemisation and asymmetric synthesis - Crams' and prelog's rules. Geometrical Isomerism : E, Z nomenclature - Determination of configuration of geometrical Free Radical Reactions : Formation, detection and stability of free radicals - Free radical reactions - Halogenation, addition, oxidation, reduction and rearrangement reactions - Barton, Sandmeyer, Gomberg - Bachmann, Ullmann, and Hunsdiecker reactions.

Unit: V Heterocyclic compounds

Structure, Nomenclature, synthesis and reactions of indole, carbozole, oxazole, imidazole and thiazole Pyrimidines - Generai chemistry and detailed study of uracil, thymine and cytosine. Purines - General chemistry and detailed study of uric acid and caffeine. Coumarins - General chemistry and detailed study of umbelliferone

Text Books:

1. March,J (2000): Advanced Organic Chemistry: Reactions, Mechanisms and Structure, 5thedition, Wiley.
2. Morrison, R.Tand Boyd, R.N (1992): Organic Chemistry, 6thedition, Pearson.

References

1. Nasipuri, D (2002): Stereochemistry of organic compounds-Principles and applications,, 2nd edition, New Age International.
2. Bansal,R.K (1975): Organic Reaction Mechanisms, Tata McGraw Hill.

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							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MSCHE304(I)	PG	Electrochemistry and Molecular reaction dynamics	4	0	4	6	60	20	20	60	40

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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

1. To give basic knowledge of concept of Electrochemistry.
5. To develop the understanding of Electrochemistry.

Course Outcomes:

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The student will demonstrate capability of

CO1. Theoretical understanding of concept concept of Electrochemistry.

CO2. Became aware of Electrochemistry.

Syllabus:

Unit I :

Ion-solvent interactions: Non structural treatment, Born-model, modification of Born model, thermodynamics of Ion-solvent interaction.

Structural treatment: Structure of water, structure of water near an ion. Ion-dipole model of ion solvent interaction, ion-quadrupole model of ion-solvent interaction. Solvation number: Static and dynamic picture of ion-solvent molecules interaction.

Unit II:

Surface excess, electrocapillary phenomena, Lippmann theory, electrochemical kinetics, Butler-Volmer treatment, rate of electrode processes (stoichiometric numbers). Different electrochemical reactions; rapid Electrochemical reactions, organic electrode processes, Bio-chemical reactions, Electrocatalysis.

UNIT III

Introduction, importance of entropy in irreversible thermodynamics, postulates of irreversible thermodynamics, Flux and forces,. Caretheodory principle, general conservation equation for matter and Energy at the local equilibrium,. Curie-Prigogine principle, Diffusion in binary solution: Diffusion in free solution under concentration, pressure and electrostatic potential gradient, sedimentation and centrifugation. Electrochemical systems: Chemical reaction, Peltier and Seebeek effects. Uses of irreversible thermodynamics in membrane and soil science.

UNIT IV

Differential and integrated rate laws, reaction mechanism, temperature dependence, Collision theory and cross-section, thermal averages, threshold and activation energy, transition-state

theory. Intermolecular forces, potential energy surfaces, centrifugal barrier, molecular trajectories, Polanyi rules, scattering, transition-state spectroscopy.

UNIT V

Internal vibrational redistribution, intermolecular energy transfer, Landau-Teller model, Landau-Zener curve crossing, Cage effect, diffusion control, solvation energy, Marcus theory of electron transfer, Kramer's theory.

Text Books:

1. Modern Electrochemistry Vol. I & II , J.O.M Bockris & A. K. N. Reddy, Plenum Press (1998)

List of Practical's: (If Practical Credit Shown in Syllabus)

Guidelines for Practical:

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Shri Vaishnav Vidyapeeth Vishwavidyalaya

M.Sc. (Chemistry)

Choice Based Credit System (CBCS)(Batch 2018-2020)

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MSCHE304(II)	PG	Applied Dairy Chemistry and Technology	4	0	4	6	60	20	20	60	40

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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

1. To give basic knowledge of concept of Dairy Chemistry.
6. To develop the understanding of Dairy Chemistry.

Course Outcomes:

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The student will demonstrate capability of

CO1. Theoretical understanding of concept concept of Dairy Chemistry

CO2. Became aware of Dairy Chemistry.

Syllabus:

UNIT I

Use of bio-protective factors for preservation of raw milk: effects on physicochemical, microbial and nutritional properties of milk and milk products, present status of preservation of raw milk by chemical preservatives; thermal processing for preservation.

UNIT II

Methods of determining lethality of thermal processing, UHT processed milk products, their properties and prospects, types of UHT plants, aseptic fillers, heat stability and deposit formation aspects, effect on milk quality; techno- economic considerations; retort processing.

UNIT III

Principles and equipment for bactofugation and Bactotherm processes, Microfluidization of milk: Principle, equipment, effects and applications, Homogenization and their applications in dairy industry.

UNIT IV

Dehydration: advances in drying of milk and milk products; freeze concentration, freeze dehydration: physicochemical changes during freeze drying and industrial developments.

UNIT V

Water activity; sorption behaviour of foods, energy of binding water, control of water activity of different milk products in relation to their chemical; microbiological and textural properties; hurdle technology and its application in development of shelf-stable and intermediate-moisture foods, Use of carbonation in extending the shelf life of dairy products.

Text Books:

1. Burton H. 1998. Ultra-high Temperature Processing of Milk and Milk Products. Elsevier. Fellow P. 1988.
2 Food Processing Technology. Elliss Horwood Ltd. Gould GW. 1995.
3 New Methods of Food Preservation. Blackie. IDF Bulletin 1981. New Monograph on UHT Milk. Document No. 133, Intern. Dairy Fed., Brussels. Smit G. 2003.
4. Dairy Processing – Improving Quality. CRC-Woodhead Publ. Troller JA& Christian HB. 1978.
5. Water Activity and Food, Food Science and Technology. A Series of Monograph Academic Press, London. Walstra P, Geurts TJ, Noomen A, Jellema A & Van Boekel MAJS. 1999.
6. Dairy Technology – Principles of Milk Properties and Processes. Marcel Dekker.

List of Practical's: (If Practical Credit Shown in Syllabus)

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M.Sc. (Chemistry)

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							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MSCHE304(III)	PG	Pharmaceuticals Chemistry	4	0	4	6	60	20	20	60	40

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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

1. Understand the Various types of pharmaceutical excipients.
2. Understand the process of manufacture of the following bulk drugs.

Course Outcomes:

1. The graduates will become familiar with fundamentals of pharmaceuticals.

Syllabus:

Unit- I

Historical background and development of pharmaceutical industry in India, Introduction to pharmacopoeias. Types of formulations and roots of administration. Aseptic conditions, need for sterilization, Method of sterilization.

Unit-II

Various types of pharmaceutical excipients – their chemistry, process of manufacture and quality specifications – Glidants, lubricants, diluents, preservatives, antioxidants, emulsifying agents, coating agents, binders, coloring agents, flavouring agents, gelatin and other additives, sorbitol, mannitol, viscosity builders.

Unit-III

Evaluation of crude drugs – moisture contents, extractive value, volatile oil content, foreign organic matter. Quantitative microscopic exercises including of starch, crude fiber content. Various isolation procedures for active ingredients.

Unit-IV

Pharmaceutical Quality Control – sterility testing, pyrogenic testing, glass testing, bulk density of powders.

Antimalarial drugs, Anticancerous drugs, AntiAIDS vaccines

Unit-V

Raw materials, process of manufacture of the following bulk drugs –

Sulpha drugs, Antimicrobial drugs, Analgesic-anti-inflammatory, Steroidal hormones, Antibiotics drugs

Text Books:

1. "Textbook of Pharmaceutical Chemistry-I (Inorganic)" by Mohammed Ali
2. "Pharmaceutical Chemistry-1" by Dr Kasture Dr Wadodkar
3. "Practical Pharmaceutical Chemistry: v. 2" by A H Beckett

Reference Books:

1. "Medicinal and Pharmaceutical Chemistry" by V K Kapoor & Harkishan Singh
2. "Concise Organic Pharmaceutical Chemistry" by Deshmukh and Kuchekar

List of Practical's: (If Practical Credit Shown in Syllabus)

Guidelines for Practical:
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