Shri Vaishnav Vidyapeeth Vishwavidyalaya

M.Sc. (Chemistry)

Choice Based Credit System (CBCS)(Batch 2019-2021)

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*
MSCHE201	**PG**	**Main Group Chemistry and Inorganic Photochemistry**	**4**	**0**	**4**	**6**	**60**	**20**	**20**	**30**	**20**

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 knowledge of Main group elements.
2. To develop the understanding of Kinetics and photochemistry.

Course Outcomes:

1. Theoretical understanding of main group elements.
2. Became aware of Kinetics and photochemistry

Syllabus:

UNIT I

Non-transition Metal Chemistry: Synthesis, Properties, Structure and Bonding of: Nitrogen, Phosphorous, Sulfur, Pseudohalogen, Interhalogen and Xenon Compounds; Boranes, Carboranes, Metallocarboranes, Borazines, Phosphazenes, Sulfur-Nitrogen compounds, silicates, silicones. Iso- and Hetero-poly anions. Redox Reactions: Latimer diagram, Electrochemical Series. Acids and Bases: Lewis acids and bases; HSAB concept.

UNIT II

Transition Metal Chemistry: Nomenclature, Isomerism, Chelate effect, Macrocyclic ligands. Bonding in Coordination Complexes: Crystal-Field theory, d-orbital Splitting in Octahedral, Tetrahedral, Square Planar geometries; Molecular Orbital Theory, p-bonding; Jahn-Teller effect, Spectrochemical series, nephelauxetic series. Electronic Spectra: d-d transitions, Orgel and Tanabe-Sugano diagrams, charge-transfer spectra. Magnetism: Types, determination of magnetic susceptibility, spin-only formula, spin-orbit coupling, spin crossover.

UNIT III

Group Theory: Definition of group, symmetry, point groups, representation of group, orthogonality theorem, irreducible representation, character table, direct sum, direct product, derivation of projection operator. Spectroscopy: Electromagnetic radiation and its interaction with matter. Uncertainty principle: Natural line width and broadening.

UNIT IV

Collision theory (detailed treatment); outline of Transition State theory. Primary kinetic salt

effect. Lindemann theory of unimolecular reaction. Potential energy curves (diatomic molecules), Frank-Condon principle and vibrational structure of electronic spectra. Bond dissociation and principle of determination of dissociation energy (ground state). Decay of excited states by radiative and non-radiative paths. Fluorescence and phosphorescence, Jablonsky diagram.

UNIT V

Laws of photochemistry: Grotthus-Draper law, Stark-Einstein law of photochemical equivalence and Lambert-Beer's law; quantum yield and its measurement for a photochemical process, actinometry. Photo stationary state. Photosensitized reactions. Kinetics of HI decomposition, H2-Br2 reaction, dimerisation of anthracene

Text Books:

1. Lee, J. D. Concise Inorganic Chemistry, ELBS, 1991.
2. Douglas, B.E. and McDaniel, D.H., Concepts & Models of Inorganic Chemistry, Oxford, 1970
3. Atkins, P.W. & Paula, J. Physical Chemistry, Oxford Press, 2006.
4. Chemical Applications of Group Theory by F.A. Cotton, Wiley Interscience, 1990, 3rd Ed.
5. Fundamentals of Molecular Spectroscopy by C. N. Banwell and E. M. McCash, Tata McGraw Hill, 1994.

Reference Books:

1. Day, M.C. and Selbin, J.Theoretical Inorganic Chemistry, ACS Publications 1962.
2. Laidler, K.J. Chemical Kinetics, Pearson Education:New Delhi 2004
3. Group Theory and Quantum Mechanics by M. Tinkham, McGraw Hill, 1964.
4. Introduction to Molecular Spectroscopy by G. M. Barrow, McGraw Hill

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.

Shri Vaishnav Vidyapeeth Vishwavidyalaya

M.Sc. (Chemistry)

Choice Based Credit System (CBCS)(Batch 2019-2021)

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*
MSCHE202	PG	Physical Organic Chemistry	4	0	4	6	60	20	20	30	20

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 physical chemistry and organic chemistry.
2. To develop the understanding of organic reaction mechanism with physical aspect.

Course Outcomes:

1. This course on Physical Organic Chemistry will provide the conceptual understanding of chemical bonding, aromaticity, anti- and homo aromaticity, structure and stereochemistry, steric and conformational properties
2. The influence of stereoelectronic properties of molecule on its reactivity and became aware of mechanistic aspect of organic chemistry and thermodynamic, kinetic aspect of physical chemistry.

Syllabus:

UNIT I Chemical kinetics and its significance

Recapitulation Complex Reactions : Reactions approaching equilibrium, steady state approximation, Rate laws for consecutive, opposing and parallel reactions, explosive reactions. Techniques to study gas phase reactions. Fast reactions; relaxation, stop flow and flash photolysis. Kinetics of enzyme reactions. Harpoon mechanism (Molecular Beam method). Activated complex theory: Reaction coordinate and the transition state, potential energy surface, concentration of activated complex and rate constant.

UNIT II: Surface phenomena and catalysis

Heat of adsorption, Langmuir and BET isotherms, estimation of surface thermodynamics of chemisorption. Adsorption in liquid systems and surface films. General features of homogeneous and heterogeneous catalysis, catalytic activity and strength of chemisorption, sticking probability, kinetics of adsorption and desorption, promoters and poisons, catalyst support, methods of preparation of heterogeneous catalysts, catalyst characterization, Important industrial catalysts (three), phase transfer catalysis.

UNIT III: Coordination chemistry, structure and reactions

Coordination Chemistry–Reaction Mechanism: Kinetics and mechanism of reactions in

solution– labile and inert complexes, Ligand displacement reactions in octahedral and square planar complexes ,acid hydrolysis, base hydrolysis and anation reactions , trans effect , theory and applications. Electron transfer reactions, electron exchange reactions – complementary and non-complementary types – inner sphere and outer sphere processes, isomerization and racemization reactions of complexes.

UNIT IV: Structure, conformations of organic molecules and concept of aromaticity

Structure and reactivity of organic molecules with respect to chemical bonding, and correlation of structure with reactivity. Concept of aromaticity, antiaromaticity example and structure of molecules. Different types of reactive intermediates and their importance in different reactions, fundamental concepts of chemical and biochemical catalysis. Conformational analysis, introduction to molecular mechanics and quantum chemical calculations. Symmetry operations, stereochemisry and Stereoelectronic effects. Non-covalent interactions and solvent effects.

UNIT V: Huckel theory and LFE

Hückel theory for conjugated hydrocarbons, Different forms of conjugation and aromaticity. Construction of molecular orbitals for important organic molecules and functional groups. Molecular recognition and supramolecular chemistry. Kinetic isotope effects. Linear free energy relationships. Acidity, nucleophilicity, electrophilicity. Reactive intermediates (cationic, anionic, radical, carbene and nitrene) and reaction mechanisms. Apply different techniques for the determination of mechanisms of organic reactions.

Text Books:

1. Chakrabarty, D. K. (Reprint 2007), Adsorption and Catalysis by Solids, New Age International Publishers, New Delhi.
2. Bond, G. C. (1974), Heterogeneous catalysis: Principles and applications Clarendon Press, Oxford .
3. Laidler,K. J., (1987)Chemical Kinetics, Third Edition, Pearson Education, Noida (India).
4. Levine, R.D., Molecular reaction Dynamics, (2009), Cambridge University Press, NY. (Paperback Edition)
5. Raja Ram J. and Kuriacose J.C., (1993).Kinetics and Mechanism of Chemical Transformations, MacMillan Indian Ltd., New Delhi
6. Rakshit,P.C.,(2004) Physical Chemistry, 7th Edition, Sarat Book Distributors, Kolkata.
7. Day, M.C and Selbin,J (1985): Theoretical Inorganic Chemistry, 2nd Edition , Affiliated East West Press Pvt.Ltd.

Reference Books:

1. Basolo, F. and Pearson, R.G (1967): Mechanism of Inorganic Reactions, John Wiley, New York.
2. Carey F.A., and Sundberg R.A., (2007): Advanced Organic Chemistry, Part A: Structure and Mechanisms, 5th Edition, Springer, New York.
3. Isaacs N., Physical Organic Chemistry, 2nd Edition, Addison-Wesley-Longman, 1995.
4. March J., and Smith B. M., (2013): Advanced Organic Chemistry: Reactions,

Mechanisms, and Structure, 7th Edition; John-WileyISBN: 978-0-470-46259-1; April, 2080 pages.
5. Eliel, E. L.; Wilen, S. H. (1994): Stereochemistry of Organic Compounds. Wiley.

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.

Shri Vaishnav Vidyapeeth Vishwavidyalaya

M.Sc. (Chemistry)

Choice Based Credit System (CBCS)(Batch 2019-2021)

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*
MSCHE203	PG	Medicinal Chemistry	4	0	4	6	60	20	20	30	20

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 knowledge of Medicinal Chemistry.
2. To develop the understanding of SAR of old and new drugs.

Course Outcomes:

1. Theoretical understanding of Medicinal Chemistry.
2. Became aware of SAR of old and new drugs

Syllabus:

UNIT I

Introduction to Medicinal Chemistry, History of Medicinal Chemistry, Classification of drugs, Important Terminology used in Medicinal Chemistry,

Pharmacokinetics: Introduction to drug absorption, disposition, drug metabolism, elimination , important pharmacokinetic parameters in defining drug disposition and in therapeutics, mention of uses of pharmacokinetics in drug development process, concept of pro drug and soft drug.

Pharmacodynamics: Introduction, principles of drug action,mechanisms of drug action, introduction to the concept of receptors and drug receptor interactions, Dose-response relationships, drug potency and efficacy, combined effect of drugs.

UNIT II

Drug Design & Development, History and development of SAR and QSAR, Physiochemical parameters, Lipophilicity, electronic parameters, steric parameters, Shelton and surface activity parameters and redox potentials, Free Wilson and Hansch analysis, other statistical methods.

UNIT III

Introduction, classification, synthesis and SAR of old and new drugs I:
Antibiotics: Introduction, classification.

a) β-lactam antibiotics: penicillin, Classification (early, resistant, broad spectrum, broad spectrum,adverse effects of penicillins.SAR of penicillin, Synthesis: ampicillin, mode of action
b) Cephalosporin: introduction, classification, SAR, mode of action
c) Tetracyclines: introduction, classification, SAR, mode of action
d) Sulphonamide: introduction, classification, SAR, mode of action

e) Quinolones: introduction, classification, SAR, mode of action
Anasthetics, Antidipressants, Oral anticoagulants.(Introduction, classification, SAR.)

UNIT IV

Introduction, classification, synthesis and SAR of old and new drugs II:
Antihistamines and anti ulcer drugs, Diuretics, Antihypertensive, Cholinergic drugs, Narcotic Analgesics, Sedatives, Hypnotics, Anxiolytics, Antianginal, Oral Hypoglycemic (Introduction, classification & SAR).

UNIT V

Combinatorial Chemistry: Including automation, solid supported and solution phase of synthesis (SPPS & SPOS concept) and related other methodologies, preparation and study of targeted or focused libraries.

Text Books:

1. Medicinal Chemistry, A. Burger Vols. I to V Ed. M. E. Wolff, John Wiley.
2. Goodman & Gilman. Pharmacological Basis of Therapeutics, McGraw-HilI .
3. S. S. Pandeya & J. R. Dimmock. Introduction to Drug Design,New Age International.
4. D. Lednicer. Strategies for Organic Drug Synthesis and Design,John Wiley .
5. Graham & Patrick. Introduction to Medicinal Chemistry (3rd edn.), OUP
6. Medicinal Chemistry — A molecular and Biochemical Approach,Thomas Nogrady and Donald F. Weaver
7. Principles of Medicinal Chemistry, W. O. Foye

Reference Books:

1. Wilson and Gisvolds Text book of Medicinal Chemistry
2. The Organic Chemistry of the Drug Design and Drug Action,Richard B. SilvermanS
3. Analogue based Drug Discovery, János Fischer and C. Robin Ganellin
4. Goodman and Gilmans Text book of Pharmacology.
5. Chemoinformatics - Concepts, Methods, and Tools for Drug Discovery,Jürgen Bajorath
6. A Kar, Textbook of Medicinal Chemistry; Asian Age Publication.
7. Sriram D and Yogeshwari P, Medicinal Chemistry; Pearson Education.
8. Ahluwalia V K, Chopra Madhu, Medicinal Chemistry; Ane Books India.

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.

Shri Vaishnav Vidyapeeth Vishwavidyalaya

M.Sc. (Chemistry)

Choice Based Credit System (CBCS)(Batch 2019-2021)

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*
MSCHE204 (A)	PG	Leather Chemistry & Technology	4	0	4	6	60	20	20	30	20

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 knowledge of Leather Chemistry
2. To develop the understanding of Tanning.

Course Outcomes:

1. Theoretical understanding of Leather Chemistry.

Syllabus:

UNIT I LEATHER CHEMISTRY

Introduction - Constituents of Animal Skin - Preparing skins and hides - leaning and soaking - Liming and degreasing- Manufacture of Leather - Leather Tanning - Vegetable Tanning – Chrome Tanning and Mineral Tanning- Dyeing and Fat liquoring – Leather finishing – oil tanning - byproducts.

UNIT II VEGETABLE TANNING

Classification, identification, physical and chemical properties. Study of vegetable tanning materials, preparation of tanning liquors by leaching and preparation of extracts, types of extracts, sulponation of tan liquors, factors involved in vegetable tanning mechanism of vegetable tanning.

UNIT III OIL TANNING

Types of oils and fats, their properties, mechanism of oil tanning

UNIT IV CHEMICALS IN TANNING

Reactions of formaldehyde with proteins, mechanism of aldehyde tanning, use of glutaraldehyde and dialdehyde in leather manufacture. Alum Tanning – Chemistry of aluminium salts (chlorides, sulphates) hydrolysis, olation, oxolation, basification effect of masking salts, mechanism of Alum tanning. Zirconium Tanning – Zirconium sulphates, chlorides, hydrolysis basification, mechanism of zirconium tanning, use of zirconium salts in tanning

UNIT V COMBINATION TANNAGES

Application of vegetable oils and syntans in combination in the production of semichrome, Alum, chrome, Alum retan, sulphur -oil-vegetable tannage, chrome zirconium tannage, oil aldehyde tannage – their mechanism, application of iron salts and sodium silicate salts in tanning processes

Text Books:

1. An Introduction to Principles of Leather Manufacture by SS Dutta, Indian Leather Technologists Association, Kolkota
2. Theory and Practice of Leather Manufacture by KT Sarkar
3. Leather Technicians Handbook by JH Sharp house, Lather Producers Association, Northampton, UK
4. Chemistry and Technology of Leather by O'Flaherty, Roddy and Lollar, Vol.I and II, Robert E. Krieger Publishing Company, USA

Reference Books:

1. Vegetable Tanning Materials of India by VS Sundara Rao
2. Practical Leather Technology by TC Thorstensen, Robert E. Krieger Publishing Co., Florida

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.

Shri Vaishnav Vidyapeeth Vishwavidyalaya

M.Sc. (Chemistry)

Choice Based Credit System (CBCS)(Batch 2019-2021)

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*
MSCHE204 (B)	PG	Nanomaterials	4	0	4	6	60	20	20	30	20

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 knowledge of Nanomaterials.
2. To develop the understanding of chemical approaches.

Course Outcomes:

1. Student after successful completion of course must possess skills to think critically and analyze chemical problems.
2. They must also feel confident to work in teams as well as independently.
3. Students are also expected to learn solving chemistry problems with a technical purview.
4. Laboratory work is intended for students to learn conducting experiments, and analyze experimental data.

Syllabus:

UNIT I:

Carbon materials – Allotropes of carbon – Structure of carbon nanotubes – Types of CNTs – Electronic properties of CNTs – Band structure of Graphene – Band structure of SWNT from graphene – Electron transport properties of SWNTs – Scattering in SWNTs – Carrier mobility in SWNTs.

UNIT - II:

Preparation methods: Thermal and ultrasound decomposition methods. Reduction methods. Coprecipitation, spray drying, sol-gel and hydrothermal methods. Capped semiconductor nanoparticles. High energy ball milling and mechanical attrition.

UNIT – III:

Thermal evaporation. Sputtering. Laser ablation. Chemical vapour deposition. Molecular beam epitaxy. Thermal spraying. Electro and electroless deposition. Characterization techniques: TEM, SEM, AFM and STM. Optical and vibrational spectroscopy.

Unit-IV:

Properties: Quantum wells, wires and dots. Size and dimensionality effects. Excitons. Single electron tunneling. Applications in infrared detectors and quantum dot lasers. Magnetic properties of nanocrystalline materials. Nanostructured ferroelectric materials and their properties.

Unit-V:

Mechanical properties of nanocrystalline materials and nanocomposites. Nanostructured materials in catalysis and electrocatalysis Carbon clusters compounds, Preparation and properties of carbon nanotubes. Inorganic nanotubes and nanorods, nanoporous materials.

Text Books:

1. Ali Javey and Jing Kong, ―Carbon Nanotube Electronics‖ Springer Science media, (2009).
2. Michael J. O'Connell, ―Carbon nanotubes: Properties and Applications‖, CRC/Taylor & Francis, (2006).

Reference Books:

1. Francois Leonard, ―The Physics of Carbon Nanotube Devices‖, William Andrew Inc., (2009).
2. R. Saito and M. S. Drbselmus, ―Physical properties of Carbon Nanotubes‖ Imperial College Press, (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.

Shri Vaishnav Vidyapeeth Vishwavidyalaya

M.Sc. (Chemistry)

Choice Based Credit System (CBCS)(Batch 2019-2021)

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*
MSCHE204 (C)	PG	Polymer Chemistry	4	0	4	6	60	20	20	30	20

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. Understand the General Chemistry, Technology of Production, Properties and Applications of Polymers
2. Identify polymers and their probable synthetic pathways.

Course Outcomes:

1. The graduates will become familiar with fundamentals of various polymers.

Syllabus:

Unit- I

Concept of macromolecules, Classification, Functionality and principles of polymerization, Different polymerization techniques, Step growth polymerization, Plasma polymerization, Molecular mass average determination, Colligative properties: ebullioscopy, cryoscopy, end group analysis, Membrane Osmometry, Vapour phase osmometry, Light scattering, Ultracentrifugation. Solution viscosity - Intrinsic viscosity, Determination of viscosity average molecular weight, Mark-Howink equation, determination of k and a, Fractionation of polymers-Gel permeation chromatography (GPC).

Unit-II

Chiral polymers, tacticity, conformation of single molecules, freely jointed chain, random flight model, Average chain dimension. End to end distance, Restirction due to bond angles, Conformation in crystal and microconformation. Secondary bond forces, chain configuration, Spectral methods for the investigation of structure and configuration: IR, NMR (1H and 13C) and ESR, UV-VIS, Raman, Fluoresence and Mass spectroscopic techniques. Basic

determination of polymer properties: Ring structure and its significance, chain flexibility and factors affecting it. Property requirements and polymer utilization-Elastomers, fibers and plastics

Unit- III

Importance of polymer blending-Blending techniques. Miscible and immiscible blends, Miscibility through specific interactions. Polymer alloys, Phase diagram of polymers, polymer systems. Blend morphology, characteristics of FTIR, Flourescent spectroscopy, microscopy, Compatibilization of miscible blends, Addition of graft or copolymers. Types of compatibilities: in situ fomerd, separately added polymers. Polymer composites: Role of fiber and matrix in improving composite properties bonding between fiber and matrix. Critical fiber length in short fiber composites. Role of composites in aerospace application. Composite fabrication techniques: Open model process, vacuum bag molding, centrifugal casting, pultrusion. Closed model process-matefed die molding, thermofoaming injection molding.

Unit- IV

Conduction polymers, conduction mechanism applications, Polyacytelene, polyparaphenylenes, polyanilines, polypyrrole, Photoconductive polymers, polymers in nonlinear optics, polymers with piezoelectric, pyroelectric and ferroelectric properties, Polyvinylidine fluoride. Photoresists for semiconductor applications, Negative Photoresists, Positive photoresists, Plasma reversible photoresistors, Electron beam lithography, Liquid crystalline polymers: preparation, properties, and applications, Chiral thermometric liquid crystal polymers, Nematic, liquid crystal polymers, Ionic Polymers: ionic crosslinking, Bound polymers and counter ion.

Unit-V

Compounding: additive for thermoplastic and thermosets, Mastication, vulcanization, compounding of latex, Plasticization-Fillers, thermal stabilizers, with special emphasis to PVC, UV stabilizers, antioxidants, flame retardation, Two roll mixing and extruder mixing - advantage of twin – screw extruder Molding: Extrursion, die swell injection molding of thermoplastics and thermosets, transfer molding of thermosets, Plunger molding, blow molding, thermoforming, vacuum forming, casting, calendering, laminating, film production, Industrial polymers: Polyolefins, polyvinyl carbazides, poly acrylics, PMMA, poly methacrylics, polyacrylonitrile. Flourocarbon polymers: PTFE, PCTFE, surface graft treatment, thermosets, epoxy resins, alkyd

resins, polyimides, unsaturated polyester, epoxy resins as coating materials. Heat resistant polymers: Poly phenylene oxide (PPO), polysulphide, thermoplastic elastomers involving natural, synthetic rubber, butyl rubber, hypalon rubber, EPDM, Neoprene.

Text Books:

1. S. Kobayashi, et. Al. New frontiers in polmersynthesis.
2. J. H. Koo, Polymer nanocomposites-aprocessing, characterization and applications, MacGraw Hill.
3. L. Nicolais, G. Garotenuto, Metal polymer nanocomposites, Wiley Intersceicne.
4. F. Daniels et. al. Experimental physical chemistry, MacGraw Hill.
5. D. L. Nelson, M. M. Cox, Lehninger princliples of biochemistry, W. H. Freeman.
6. G. Odian, principles of polymerization, Wiley. 69
7. C. S. Harper, Handbook of plastics, elastomers,and composites, MacGraw Hill.
8. M. Morron, Rubber Technology, Kluwer.
9. E. W. Madge, Latex foam rubber, Maclaren and Sons.
10. R. W. Dyson, Speciality Polymers, Chapman Hall.
11. A. F. Diar, K. Kanazawa, J. I. Castillo and J. A. Logan, Conducting polymers, Plenum

Reference Books:

1. F. Rodriguez, rinciples of polymer systems, MacGraw Hill.
2. H. G. Elias, Macromolecules, Plenum.
3. P. J. Florey, Principles of polymer chemistry, Cornell Univ.
4. F. A. Bovey, Polymer configuration and conformations, Academic.
5. R. J. Young, Introduction to polymer science, Wiley.
6. G. Odian, Principles of polymerization, Wiley.
7. F. W. Billmayer, Text book of polymer science, Wiley.
8. K. K. Chawla, Composite materials, Springer

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.