K. S. Rangasamy College of Arts and Science (Autonomous),

Tiruchengode – 637 215

## Department of Chemistry

### Elective Course

- Elective I: Polymer Chemistry I
- Elective I: Bio-inorganic chemistry I
- Elective I:Principles and applications of drug design and discovery
- Elective II: Photochemistry
- Elective II: Bio-inorganic chemistry II
- Elective II: Polymer Chemistry II

**Encls:**

1. Copy of Scheme of Examination
2. Syllabus copy of courses highlighting the Elective along with course outcomes
3. Mapping of courses to Elective

HoD – Chemistry

CONTROLLER OF EXAMINATIONS

CoE

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## M.Sc., SCHEME OF EXAMINATION

| Subject Code | Subject | Hours of Instruction | Exam Duration (Hours) | Max Marks | | | Credit Points |
|---|---|---|---|---|---|---|---|
| | | | | CA | CE | Total | |
| **FIRST SEMESTER** | | | | | | | |
| **Part A** | | | | | | | |
| 18PCHM101 | Core I: Organic Chemistry I | 5 | 3 | 25 | 75 | 100 | 5 |
| 18PCHM102 | Core II: Inorganic Chemistry I | 5 | 3 | 25 | 75 | 100 | 5 |
| 18PCHM103 | Core III: Physical Chemistry I | 5 | 3 | 25 | 75 | 100 | 4 |
| 18PCHM104 | Core IV: Spectroscopy | 4 | 3 | 25 | 75 | 100 | 4 |
| 18PCHMP101 | Core Practical I: Organic Chemistry Practical I | 5 | 6 | 40 | 60 | 100 | 3 |
| 18PCHMP102 | Core Practical II: Inorganic Chemistry Practical I | 5 | 6 | 40 | 60 | 100 | 3 |
| **Non Credit** | | | | | | | |
| 18PLS101 | Career Competency Skills I | 1 | - | - | - | - | - |
| **Total** | | **30** | | | | **600** | **24** |
| **SECOND SEMESTER** | | | | | | | |
| **Part A** | | | | | | | |
| 18PCHM201 | Core V: Organic Chemistry II | 5 | 3 | 25 | 75 | 100 | 5 |
| 18PCHM202 | Core VI: Inorganic Chemistry II | 5 | 3 | 25 | 75 | 100 | 5 |
| 18PCHM203 | Core VII: Physical Chemistry II | 4 | 3 | 25 | 75 | 100 | 4 |
| | Elective I | 4 | 3 | 25 | 75 | 100 | 4 |
| 18PCHMP201 | Core Practical III: Organic Chemistry Practical II | 5 | 6 | 40 | 60 | 100 | 3 |
| 18PCHMP202 | Core Practical IV: Physical Chemistry Practical I | 4 | 6 | 40 | 60 | 100 | 3 |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Part B** | | | | | | | |
| 18PVE201 | Value Education: Human Rights | 2 | 3 | 25 | 75 | 100 | 2 |
| **Non-Credit** | | | | | | | |
| 18PLS201 | Career Competency Skills II | 1 | - | - | - | - | - |
| | **Total** | **30** | | | | **700** | **26** |
| **THIRD SEMESTER** | | | | | | | |
| **PART – A** | | | | | | | |
| 18PCHM301 | Core VIII: Organic Chemistry III | 6 | 3 | 25 | 75 | 100 | 5 |
| 18PCHM302 | Core IX: Inorganic Chemistry III | 6 | 3 | 25 | 75 | 100 | 5 |
| | Elective II | 4 | 3 | 25 | 75 | 100 | 4 |
| 18PCHMP301 | Core Practical V: Inorganic Chemistry Practical II | 5 | 6 | 40 | 60 | 100 | 3 |
| 18PCHMP302 | Core Practical VI: Physical Chemistry Practical II | 5 | 6 | 40 | 60 | 100 | 3 |
| 18PPHCHI301 | IDC I: Solid State Physics | 4 | 3 | 25 | 75 | 100 | 4 |
| | **Total** | **30** | | | | **600** | **24** |
| **FOURTH SEMESTER** | | | | | | | |
| **PART – A** | | | | | | | |
| 18PCHM401 | Core X: Analytical Chemistry | 5 | 3 | 25 | 75 | 100 | 5 |
| 18PCHM402 | Core XI: Physical Chemistry III | 5 | 3 | 25 | 75 | 100 | 5 |
| 18PCHPR401 | Project & Viva –Voce | 5 | - | 50 | 150 | 200 | 6 |
| | **Total** | **15** | | | | **400** | **16** |
| | | | | | **Grand Total** | **2300** | **90** |

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## Elective I

The department offers the following three subjects as elective courses for second semester

| Paper code | Semester | Paper name |
|---|---|---|
| 18PCHEL201 | II | Elective I: Polymer Chemistry I |
| 18PCHEL202 | II | Elective I: Bio-inorganic chemistry I |
| 18PCHEL203 | II | Elective I:Principles and applications of drug design and discovery |

## Elective II

The department offers the following three subjects as elective courses for third semester

| Paper code | Semester | Paper name |
|---|---|---|
| 18PCHEL301 | III | Elective II: Photochemistry |
| 18PCHEL302 | III | Elective II: Bio-inorganic chemistry II |
| 18PCHEL303 | III | Elective II: Polymer Chemistry II |

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| 18PCHEL201 | ELECTIVE I: POLYMER CHEMISTRY I | SEMESTER - II |
|---|---|---|

**COURSE OBJECTIVE:**

The course aims

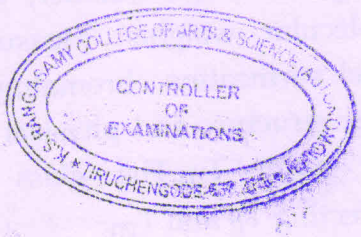
- To know the basic concepts of polymer, coordination in polymer, properties of commercial polymers and polymer processing
- To gain knowledge about Coordination polymerization and the catalysts that enhances
- To recognize the properties of polymer and its measurements
- To understand the processing of polymers and its types
- To provide the knowledgeabout properties and chemistry behind commercial polymers

**Credits: 4** **Total hours: 40**

| UNIT | CONTENTS | Hrs | CO |
|---|---|---|---|
| I | **Basic Concepts**: Monomers, functionality of monomers and polymers, degree of polymerization, Linear, branched and network Polymers. Condensation Polymerization: Mechanism of stepwise polymerization. Kinetics and statistics of linear stepwise polymerization. Addition polymerization: Free radical, cationic and anionic polymerization. Polymerization conditions. Polymerization in homogeneous and heterogeneous systems. | 8 | CO1 |
| II | **Co-ordination Polymerization:** Zeigler-natta catalyst-kinetics, mono and bi metallic mechanism of co-ordination polymers. Co-polymerization: Block and graft co-polymers, kinetics of co polymerization. Types of co-polymerization. Evaluation of monomer. Monomer Reactivity ratio. Rate of co-polymerization. | 8 | CO2 |
| III | **Molecular Weight and Properties**: Poly dispersion – average molecular weight concept, number, weight and viscosity average molecular weights. Measurement of molecular weights - Gel permeation chromatography and light scattering. Polymer structure and physical properties – crystalline melting point $T_m$.The glass transition temperature. Factors affecting $T_g$ and $T_m$. | 8 | CO3 |

| | | | |
|---|---|---|---|
| IV | **Polymer Processing:** Plastics, elastomers, resins and fibres. Compounding processing technique, calendaring, die-casting, rotational casting, film casting, injection moulding, blow moulding extrusion, moulding, thermo forming, foaming, reinforcing and fibre spinning. | 8 | CO4 |
| V | **Properties of Commercial Polymers**: Polyethylene, polyvinylchloride, polyamides, polyesters, polyurethane, polycarbonate, phenolic resins, epoxy resins. Contact lens, dental polymers, artificial heart, volve, kidney, skin and blood cells. | 8 | CO5 |

| **Text Books:** | |
|---|---|
| 1 | *Billmeyer, F.W.* 2003. **Text Book of Polymer Science**. [Third Edition]. John Wiley &Sons, New York. |
| 2 | *Gowariker, V.R. Viswanathan, N.V* and *Sreedha J.* 2015. **Polymer Science**. [Second Edition]. New Age International Ltd, New Delhi. |
| **Reference Books:** | |
| 1 | *Allcock, H. R* and *Lamber, F.W. 2004.* **Contemporary Polymer Chemistry.** [Third Edition]. Prentice Hall, New Delhi. |
| 2 | *Flory, P. J.* 1995. **Principles of Polymer Chemistry**. [First edition-16th reprint].Cornell University press, New York. |
| 3 | *Odian, G. 2007.* **Principles of Polymerization**. [Fourth Edition]. John Wiley & Sons, New York. |

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## COURSE OUTCOMES (CO)

After completion of the course, the students will be able to

| | |
|---|---|
| CO1 | Recall the basic concepts and types of polymers |
| CO2 | Understand the role of catalyst and techniques of polymerization |
| CO3 | Know about the properties and measurement of molecular weights |
| CO4 | Estimate the processing techniques of polymer |
| CO5 | Demonstrate the properties of commercial polymers |

## MAPPING:

| PSO / CO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | H | L | M | H | L |
| CO2 | H | M | H | M | L |
| CO3 | L | H | M | L | M |
| CO4 | M | L | H | H | L |
| CO5 | M | H | L | M | H |

H-High M-Medium L-Low

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| 18PCHEL202 | ELECTIVE I:BIO-INORGANIC CHEMISTRY I | SEMESTER - II |
|---|---|---|

**COURSE OBJECTIVE:**

The course aims

- To understand the role of various elements in the living systems.
- To acquire basic knowledge about the structure and functions of certain metallo-enzymes.
- To get an insight on the use of several spectroscopic and analytical techniques for structural investigation of bioinorganic compounds.
- To know about the mechanism of binding interactions of metal complexes with biomolecules and metal based drug action.

**Credits: 4** **Total hours: 40**

| UNIT | CONTENTS | Hrs | CO |
|---|---|---|---|
| I | **Metals and Non-metals in biological systems**-Essential and trace elements - Role of different metal ions in biological systems – Sodium – Potassium pump - Phorphyrin system - Structure and functions of Hemoglobin and Myoglobin -Dioxygen binding, transport and utilization-Structure and functions of Chlorophyll. | 8 | CO1 |
| II | **Metallo enzymes** - Definition - Examples –Structure and functions of - Carboxy peptidase-A and Carbonic anhydrase - Superoxide dismutase (SOD) - Xanthine oxidase – Nitrogenase - Vitamin$B_{12}$ co-enzyme- Non-Hemeiron – sulphur proteins – Ferridoxins - Rubredoxins - Cytochrome *C* - Blue copper proteins-Plastocyanin. | 8 | CO2 |
| III | **Applications of physical methods to bioinorganic chemistry:** (Exclusive of Instrumentation) - X-ray absorption spectroscopy (XAS) and Extended X-ray absorption fine structure (EXAFS) -Nuclear magnetic resonance spectroscopy(NMR) and Electron paramagnetic resonance method (EPR)-Mossbauer spectroscopy-Circular dichroism (CD) – Electronic spectroscopy(UV-visible and fluorescence emission) | 8 | CO3 |
| IV | **Binding of metal ions and complexes to biomolecules:** | 8 | CO4 |

| | | | |
|---|---|---|---|
| | Types of binding – Nucleic acid structures - Fundamental interactions with nucleic acids – Binding interactions of tris-phenanthroline metal complexes with DNA-Techniques to monitor binding. Chemotherapy-Radio diagnostic agents- MRI scanning – Chelating Agents (with special reference to EDTA) and therapy based on *in vivo* chelation of radio nucleotides-Dosage and toxicity. | | |
| V | **Drug discovery and design** – Therapeutic index and chemotherapeutic index - Structure- activity relationship-Factors governing drug design – Computer aided drug design - Cancer chemotherapy - Bioinorganic chemistry of platinum and ruthenium anticancer drugs – Mechanism of action of cis-platin - Clinical trials and their significance - Applications of Coordination complexes in medicine and agriculture | 8 | CO5 |

| **Text Books:** | |
|---|---|
| 1 | *Artherden, L.M.Bentley* and *Driver's*, 2003. **Textbook of Pharmaceutical Chemistry**, [Eighth edition]. Oxford University Press, New Delhi. 2003. |
| 2 | *Block, J.H.Roche, Soine, E.T.O.* and *Wilson, C.O.* 1986. **Inorganic Medicinal & Pharmaceutical Chemistry,** [First edition], Varghese publishing house, Mumbai. |
| 3 | *Rao, K.S.* and *Suresh, C.V.* 2011. **Pharmaceutical Inorganic Chemistry**, Pharma Med Press. |
| 4 | *Kasture, A.V. Wadodkar, S.G.* 2008. **Pharmaceutical Chemistry-I**, [Twenty Fifth edition]. Nirali Prkashan. |
| 5 | *Rajasekaran, V. N.* 2005. **Text Book of Pharmaceutical Inorganic Chemistry Theory and Practical**, [Second edition]. Sun Publication, Chennai. |
| **Reference Books:** | |
| 1 | I. Bertini, H.B. Gray, S.J. Lippard and J.S. Valentine, 1994.**Bioinorganic Chemistry**, University Science Books. |
| 2 | Dr Asim K Dass, 2015. **Bioinorganic Chemistry**, Books and Allied (P)Limited. |

| | |
|---|---|
| 3 | Lawrence Que,Jr, 2000. **Physical Methods in Bioinorganic Chemistry-Spectroscopy and Magnetism**, University Science books. |
| 4 | J.E. Huheey, E.A. Kieter, R.L. Keiter, 1997. **Inorganic Chemistry** [Fourth Edition], Addision Wesely Publishing Company. |

**COURSE OUTCOMES (CO)**

After completion of the course, the students will be able to

| | |
|---|---|
| CO1 | Recall the essential and trace elements in biological systems |
| CO2 | Estimate the topical agents and its role in biological system |
| CO3 | Demonstrate the chemical compounds as gastro intestinal agents |
| CO4 | Predict the role of chemical compounds as electrolytes |
| CO5 | Assess the utilization of inorganic Radio-Pharmaceuticals |

**MAPPING:**

| PSO / CO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | H | M | L | L | M |
| CO2 | M | L | H | M | H |
| CO3 | H | H | M | L | L |
| CO4 | L | M | L | H | M |
| CO5 | M | L | M | M | H |

H-High M-Medium L-Low

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| 18PCHEL203 | ELECTIVE I:PRINCIPLES AND APPLICATIONS OF DRUG DESIGN AND DISCOVERY | SEMESTER - II |
|---|---|---|

**COURSE OBJECTIVES:**

The course aims

- To enable students to identify compounds in biological system
- To describe the various drug – receptor interactions
- To provide information the drug molecules and its chemistry
- To enumerate steps to synthesize a drug molecule by various methods
- To know about drug Identification and Validation Steps in drug discovery

**Credits: 4** **Total hours: 40**

| UNIT | CONTENTS | Hrs | CO |
|---|---|---|---|
| I | **Drug Design and Discovery:** Historical background - drug targets: lipids, carbohydrates, proteins, enzymes, and nucleic acids as drug targets and receptors. Receptor Pharmocology – Agonists and Antagonists (partial and full) - Allosteric Modulators – Pharmacokinetics and pharmacodynamics: administration, absorption, distribution, metabolism, elimination of drugs - bioavailability of drugs - side effects - Case study: serotonin and dopamine receptors and transferring drugs. | 8 | CO1 |
| II | **Drug Identification and Validation Steps in drug discovery:** Leads identification – Hits - Drug validation - Natural products as drugs – molecular recognition in drug design – thermodynamic considerations – physical basis and inter molecular interactions between drugs and targets like electrostatic interactions – ionic bonds - hydrogen bonds – Inductive interactions – dispersive forces. Stereochemistry in drug designing – stereospecificity of drug targets – Eudesmic ratio – Examples of Eutomers and Distomers. | 8 | CO2 |
| III | **Retrosynthetic strategies for Drug Synthesis:** Introduction to retrosynthetic analysis and disconnection approach – synthons acceptor and donor – synthetic equivalents- umpolungs – planning a synthesis – relay and convergent routes - Guidelines for disconnection – one group C-X and C-C disconnections – Chemoselectivity. Two group C-C disconnections in dicarbonyls – Case Study: Synthesis of | 8 | CO3 |

| | | | |
|---|---|---|---|
| | Amelfolide. | | |
| IV | **Computer Aided Drug Design:** Molecular modeling in drug design - Energy Minimization methods - both Molecular Mechanics and Quantum mechanical Methods - Energy minimization - Conformational analysis -Structure based and Ligand based Drug design - QSAR - parameters - Quantitative models of QSAR - Hansch methods - free Wilson model - 3D pharmacophore modeling - Docking - rigid and flexible methods of docking - Prediction of Binding modes - Protein Ligand binding free energies - Docking Score - validation. | 8 | CO4 |
| V | **Quantum Mechanical Methods:** Electronic structure calculations - Geometry Optimization - Potential Energy Surface - Global and Local Minima - Identification of Transition states - Semiemperical and Density Functional Methods - Calculation of atomic Charges, Electrostatic Potential Maps. | 8 | CO5 |
| **Text Books:** | | | |
| 1 | Andrew, *R.Leach, Valerie J Gillet*, 2007. **An Introduction to Cheminformatics**, Revised Edition, Springer, Netherland. | | |
| **Reference Books:** | | | |
| 1 | *Larsen* et al, 2004. **Text book of Drug design and Discovery**, [Fourth Edition]. London and New york, Taylor and Francis. | | |
| 2 | *Graham L. Patrick*, 2009. **An Introduction to Medicinal Chemistry**, [Fourth Edition]. Oxford University Press. | | |

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**COURSE OUTCOMES (CO)**

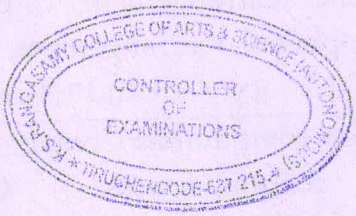
After completion of the course, the students will be able to

| | |
|---|---|
| CO1 | Know the concepts of drug design and discovery |
| CO2 | Assess the prediction of drug identification and validation steps in drug discovery |
| CO3 | Recall the retrosynthetic strategies for drug synthesis |
| CO4 | Predict the processes in computer aided drug design |
| CO5 | Cognize the quantum mechanical methods in principles and applications of drug design and discovery |

**MAPPING:**

| PSO / CO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | H | L | M | M | L |
| CO2 | H | M | L | H | H |
| CO3 | M | L | H | L | M |
| CO4 | L | M | H | L | M |
| CO5 | L | H | L | M | H |

H-High M-Medium L-Low

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| 18PCHEL301 | ELECTIVE II : PHOTO CHEMISTRY | SEMESTER - III |
|---|---|---|

**COURSE OBJECTIVES:**

The course aims

- To learn about the principles of photochemistry in various field like organic, inorganic and physical chemistry.
- To recognize the quantum yield of some important chemical compounds
- To acquire knowledge about photochemistry about carbonyl compounds
- To understand reactions of alkenes through photochemistry
- To recognize the reactions in aromatic compounds

**Credits: 4** **Total hours: 40**

| UNIT | CONTENTS | Hrs. | CO |
|---|---|---|---|
| I | Basics of photochemistry – Energy of molecules –spin multiplicity and Quantum yield, Laws of photochemistry – Grotthus-Draper law – Beer-Lambert's law – Stark-Einstein Law.Jablonski diagram – Fluorescence and its life time-Phosphoresence and its life time, Photochemical process – Primary and Secondary process – Energy transfer – Quenching and defining its terms, Excimer, Exciplex – Inter and Intramolecular energy transfer – Photosensitisation. | 8 | CO1 |
| II | Quantum Yield – Experimental Determination – Light soruces – Physical actinometers – Chemical actinometers – Stermvolmer equation and its derivation – Quantum yield in photochemical reaction – Hydrogen bromide, Hydrogen iodide, Hydrogen chloride. Chemiluminescence – Photolysis – Gas phase photolysis. | 8 | CO2 |
| III | **Photochemistry of carbonyl compounds** – Electronic transition – Franck Condon principle – Types of excitation – Molecular orbital view of excitation – Norrish Type I and Norrish Type II– Cycloadditionreaction -Paterno-Buchi reaction, [2+2] cycloaddition. Rearrangement of carbonyl compound – Lumiketone rearrangement, di-pi-methane rearrangement, dienone-phenol rearrangement, oxa-di-pi-methane rearrangement -1,2 -acyl shift and 1,3-acyl shift. | 8 | CO3 |
| IV | **Photochemistry of olefins compounds:** Conjugated olefins – Isomerisation and rearrangements – Cis trans isomerisation – valence isomerisation – rearrangement of | 8 | CO4 |

| | | | |
|---|---|---|---|
| | 1,4 and 1,5 dienes – Rearrangement - Cope and Claisen and*p*-Claisen – cycloaddition reactions – Sigmatropic rearrangement. | | |
| V | **Photochemistry of Aromatic compounds** – Arene photo isomerisation – Photo dimerisation –Cycloaddition reactions – 1, 2 cycloadditions – Photooxygenation – ene reaction - Photosensitization. | 8 | CO5 |
| **Text Books:** | | | |
| 1 | *Rohatgi, K.K. Mukherjee*. 2002. **Fundamentals of Photochemistry**. [Revised edition] | | |
| 2 | *Coyle. J.D.* 1986. **Photochemistry in Organic Synthesis**. Royal Society of chemistry. | | |
| **Reference Books:** | | | |
| 1 | *Robert A. Alberty* 1997. **Physical Chemistry**. [6th Edition]. Wiley Eastern Limited | | |
| 2 | Ole*Buchard, T* 1976.**Photochemistry of heterocyclic compounds**. Wiley International press. | | |
| 3 | *Charles H. Depuy, Orville, S Chapman*.1988. **Molecular Reactions and Photochemistry,** Pearson Education, Limited. | | |

**COURSE OUTCOMES (CO)**

After completion of the course, the students will be able to

| | |
|---|---|
| CO1 | Know the Outline of photochemistry |
| CO2 | Illustrate the quantum yield of photochemical reaction |
| CO3 | Predict the photochemistry of carbonyl and alkene compounds |
| CO4 | Discuss the inorganic photochemistry reactions. |
| CO5 | Recall the photochemistry of Aromatic compounds |

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**MAPPING:**

| PSO / CO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | H | M | H | H | L |
| CO2 | L | H | M | M | H |
| CO3 | M | L | H | H | M |
| CO4 | M | M | L | L | H |
| CO5 | L | L | L | M | H |

H-High M-Medium L-Low


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| 18PCHEL302 | ELECTIVE II:BIO-INORGANIC CHEMISTRY II | SEMESTER - III |
|---|---|---|

**COURSE OBJECTIVES:**

The course aims

- To understand the importance of inorganic compounds in medicinal chemistry
- To gain knowledge about essential trace elements in biological systems
- To estimate the vitality of chemicals in gastro intestinal tracks
- To know about chemicals that are important as electrolytes
- To evaluate the chemistry of radioactive chemicals in dosimetry

**Credits: 4** **Total hours: 40**

| UNIT | CONTENTS | Hrs | CO |
|---|---|---|---|
| I | **Essential and trace Elements in Biological Systems**: Structure and functions, effect of metal deficiency. Toxicity: mercury, cadmium, lead, beryllium, selenium and arsenic. Chelation therapy: Metals used for diagnosis and chemotherapy. Crown ether complexes of Na+ and K+ - ATP and ADP. Platinum complexes as anticancer drugs.Pt-DNA binding, complexes of gold, copper, zinc, mercury, arsenic and antimony as drugs. | 8 | CO1 |
| II | **Topical Agents:** Protectives - Calamine, Talc, Zinc Oxide, Zinc Stearate, Titanium dioxide, Silicon Polymers and Dimethicone. Astringents - Zinc sulphate, Alum. Anti-infectives - Boric acid, Hydrogen peroxide, Iodine, Potassium permanganate, Chlorinated Lime.Dental Products - Anti-caries Agents -Role of Fluorides as anti-caries agents, Sodium fluoride. Dentifrices - Calcium carbonate, dibasic calcium phosphate, Zinc chloride. | 8 | CO2 |
| III | **Gastro-intestinal agents:** Acidifiers and Antacids - Dilute hydrochloric acid, sodium acid phosphate, sodium bicarbonate, aluminium hydroxide gel, dried aluminium hydroxide gel, magnesium oxide (Magnesia), magnesium hydroxide mixture, magnesium trisilicate. Adsorbents and related drugs - Light kaolin, heavy kaolin, and activated charcoal. Laxatives - Magnesium sulphate, sodium phosphate. | 8 | CO3 |
| IV | **Electrolytes**: Major intra and extra cellular electrolytes - | 8 | CO4 |

| | | | |
|---|---|---|---|
| | Physiological role of Chloride, Phosphate, Bicarbonate, Sodium, Potassium, Calcium and Magnesium. Electrolytes used for replacement therapy - Sodium chloride, Potassium chloride, Calcium chloride, Calcium lactate, Tribasic calcium phosphate; Physiological acid-base balance: Sodium dihydrogen phosphate, Sodium acetate, Sodium bicarbonate and their importance; Dialysis fluids - Haemodialysis fluids. | | |
| V | **Inorganic Radio-Pharmaceuticals:** Radioactivity, Units of radioactivity, radiation dosimetry, Measurement of radioactivity, Hazards and precautions in handling of radiopharmaceuticals, storage, radio pharmaceutical preparations and standards of radioactive material iodine-131 ($I^{131}$), Cobalt -58 ($Co^{58}$). Radio opaque contrast medium -barium sulphate. | 8 | CO5 |

**Text Books:**


| | |
|---|---|
| 1 | *Artherden, L.M. Bentley* and *Driver's*, 2003. **Textbook of Pharmaceutical Chemistry**, [Eighth edition]. Oxford University Press, New Delhi. 2003. |
| 2 | *Block, J.H. Roche, Soine, E.T.O.* and *Wilson, C.O.* 1986. **Inorganic Medicinal & Pharmaceutical Chemistry,** [First edition], Varghese publishing house, Mumbai. |
| 3 | *Rao, K.S.* and *Suresh, C.V.* 2011. **Pharmaceutical Inorganic Chemistry**, Pharma Med Press. |
| 4 | *Kasture, A.V. Wadodkar, S.G.* 2008. **Pharmaceutical Chemistry-I**, [Twenty Fifth edition]. Nirali Prkashan. |
| 5 | *Rajasekaran, V. N.* 2005. **Text Book of Pharmaceutical Inorganic Chemistry Theory and Practical**, [Second edition]. Sun Publication, Chennai. |


**Reference Books:**


| | |
|---|---|
| 1 | *Chatwal*, 2007. **Pharmaceutical Chemistry Inorganic,** [Third edition]. Himalaya publishing house, Mumbai. |
| 2 | *Miessler, G.L.* and *Tarr, D.A.* 2005. Inorganic Chemistry, Pearson Education. |
| 3 | *Cowan, J. A.*1997. **Inorganic biochemistry,**Wiley-VCH, New York. |
| 4 | *Chenchu Lakshmi, N.V.*, 2012.**"Pharmaceutical Inorganic Chemistry: Theory and Practice"**[first edition]. Pearson Education, Dorling Kindersley (India) Pvt. Ltd. |

**COURSE OUTCOMES (CO)**

After completion of the course, the students will be able to

| | |
|---|---|
| CO1 | Recall the essential and trace elements in biological systems |
| CO2 | Estimate the topical agents and its role in biological system |
| CO3 | Demonstrate the chemical compounds as gastro intestinal agents |
| CO4 | Predict the role of chemical compounds as electrolytes |
| CO5 | Assess the utilization of inorganic Radio-Pharmaceuticals |

**MAPPING:**

| PSO / CO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | H | M | L | L | M |
| CO2 | M | L | H | M | L |
| CO3 | L | M | M | H | L |
| CO4 | M | H | H | H | H |
| CO5 | H | L | M | L | M |

H-High M-Medium L-Low

K.S. RANGASAMY COLLEGE OF ARTS & SCIENCE (AUTONOMOUS) CONTROLLER OF EXAMINATIONS TIRUCHENGODE-637 215.

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Tiruchengode - 637 215. Tamilnadu, India.

| 18PCHEL303 | ELECTIVE II: POLYMER CHEMISTRY II | SEMESTER - II |
|---|---|---|

**COURSE OBJECTIVES:**

The course aims

- To know the basic concepts of polymer, coordination in polymer, properties of commercial polymers and polymer processing
- To gain knowledge about Coordination polymerization and the catalysts that enhances
- To recognize the properties of polymer and its measurements
- To understand the processing of polymers and its types
- To cognize the properties and chemistry behind commercial polymers

**Credits: 4** **Total hours: 40**

| UNIT | CONTENTS | Hrs | CO |
|---|---|---|---|
| I | **Dendrimers and hyper branched polymers:** Properties of Dendrimers and Hyper branched Polymers and their Blends: Dendrimers and their structure, synthesis of Dendrimers, Hyper branched Polymers and their structure. Synthesis of hyper branched polymers, branching and polydispersity, conformation, general concepts of polymer blends. Blends of Dendritic polymers with thermoplastics. | 8 | CO1 |
| II | Polymer nano composites Polyamide/clay nano composites- Synthesis, characterization and properties of Nylon 6-clayhybrid. Polystyrene/clay nano composites- Surface initiated polymerization, syndiotactic polystyrene/ clay nano composites, properties. Poly(butylenes terephthalate) (PBT) based nano composites, Epoxynano composites on layered silicates. Polypropyelene layered silicate nano composites. | 8 | CO2 |
| III | Synthesis of Biomedical polymers for drug delivery Polymers as biomaterials, biomedical applications of synthetic polymers, synthetic polymers for biomedical applications, poly(α-hydroxyesters), poly(lactic acid), poly(anhydrides), poly(phosphazenes), controlled drug delivery, methods of drug delivery | 8 | CO3 |

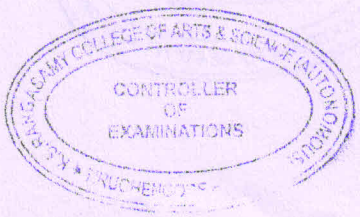
| | | | |
|---|---|---|---|
| IV | Conducting polymers Correlation of chemical structure and electrical conductivity. Structure of conducting polymers Polyacetylene, polypyrrole, polythiophene, polyanilines, p-phenylene sulphide, polyphenylene vinylene. Different methods of synthesis of polyaniline. solution polymerization, interfacial polymerization, electrochemical systhesis, enzyme synthesis and photo induced polymerization of aniline. Applications of conducting polymers: Membranes and ion exchanger, corrosion protection, gas sensors, biosensors, electrocatalysis. | 8 | CO4 |
| V | **Engineering plastics** Acrylonitrile butadiene styrene (ABS), Polycarbonates (PC), Polyamides (PA), Polybutylene terephthalate (PBT), Polyethylene terephthalate (PET), Polyphenylene oxide (PPO), Polysulphone (PSU), Polyetherether ketone (PEEK). Polyimides, Polyphenylene Sulphide (PPS), Syntheticroute, structure, properties and uses. | 8 | CO5 |

**Text Book:**

| | |
|---|---|
| 1 | Gabriel, O. Shonaike & Suresh G. Advani, 2003.**Advanced polymeric materials**, CRC press. |

**Reference Books:**

| | |
|---|---|
| 1 | *Allcock, H. R* and*Lamber, F.W. 2004.* **Contemporary Polymer Chemistry.** [Third Edition]. Prentice Hall, New Delhi. |
| 2 | *Flory, P. J.* 1995. **Principles of Polymer Chemistry**. [First edition-16th reprint].Cornell University press, NewYork. |
| 3 | *Odian, G. 2007.* **Principles of Polymerization**. [Fourth Edition]. John Wiley & Sons, New York. |

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**COURSE OUTCOMES (CO)**

After completion of the course, the students will be able to

| | |
|---|---|
| CO1 | Recall the basic concepts and types of polymers |
| CO2 | Understand the role of catalyst and techniques of polymerization |
| CO3 | Know about the properties and measurement of molecular weights |
| CO4 | Estimate the processing techniques of polymer |
| CO5 | Demonstrate the properties of commercial polymers |

**MAPPING:**

| PSO / CO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|
| CO1 | H | L | M | H | L |
| CO2 | L | M | H | M | L |
| CO3 | L | H | M | L | M |
| CO4 | M | L | H | H | L |
| CO5 | M | H | L | M | L |

H-High M-Medium L-Low


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