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DEPARTMENTOFCHEMISTRY

GOVT. DIGVIJAY PG AUTONOMOUS COLLEGE, RAJNANDGAON (C.G.)

SYLLABUS

M.Sc. Chemistry
(Approved by Board of Study for 2021-22)
First and Second Semester

Third and Fourth Semester

2021-22

DEPARTMENT OF CHEMISTRY
GOVT. DIGVIJAY PG AUTONOMOUS COLLEGE, RAJNANDGAON

Approved syllabus for M.Sc. Chemistry by the members of Board of Studies for the Session 2021-22

The syllabus with the paper combinations is as under

Semester I:

Paper I: CO-ORDINATION CHEMISTRY	Paper II: BASICS OF ORGANIC CHEMISTRY AND REACTION MECHANISM
Paper III: MATHEMATICS FOR CHEMISTS, QUANTUM CHEMISTRY AND CHEMICAL DYNAMICS	Paper IV: GROUP THEORY, PRINCIPLES OF SPECTROSCOPY AND COMPUTER FOR CHEMISTS
Lab Course I : PHYSICAL CHEMISTRY & COMPUTERS PRACTICAL	Lab Course II : INORGANIC CHEMISTRY PRACTICAL

Semester II:

Paper I: TRANSITION METAL COMPLEXES AND DIFFRACTION METHODS	Paper II: BIOMOLECULES & STEREOCHEMISTRY
Paper III: THERMODYNAMICS, ELECTROCHEMISTRY AND SURFACE CHEMISTRY	Paper IV: SPECTROSCOPY
Lab Course I : ORGANIC CHEMISTRY PRACTICAL	Lab Course II: ANALYTICAL CHEMISTRY PRACTICAL

Semester III:

Paper I : CHROMATOGRAPHIC TECHNIQUES AND APPLICATIONS OF SPECTROSCOPY	Paper II: BIO-CHEMISTRY
Paper III: ORGANOTRANSITION METAL COMPLEXES	Paper IV : PHOTOINORGANIC AND ANALYTICAL CHEMISTRY
Lab Course I : ANALYTICAL CHEMISTRY PRACTICALS	Lab Course II: PROJECT

Semester IV:

Paper I: PHOTOCHEMISTRY AND SOLID STATE CHEMISTRY	Paper II: ENVIRONMENTAL CHEMISTRY
Paper III: BIOINORGANIC AND SUPRAMOLECULAR CHEMISTRY	Paper IV: Elective – A CHEMISTRY OF MATERIAL AND RADIOCHEMISTRY Elective - B POLYMER CHEMISTRY
Lab Course I: PROJECT	Lab Course II: ANALYTICAL CHEMISTRY PRACTICAL

The syllabus for M.Sc. Chemistry is hereby approved for the session 2021-22

10.8.21

10/8/21

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DEPARTMENT OF CHEMISTRY
GOVT. DIGVIJAY PG AUTONOMOUS COLLEGE, RAJNANDGAON
M.Sc. CHEMISTRY

SEMESTER IV

2021-22

PAPER- IV Elective - A PCHCET-404

CHEMISTRY OF MATERIALS & RADIOCHEMISTRY

Max. Marks : 80

Min. Marks : 16

Unit-I **Chemistry of materials**

Multiphase Materials

Ferrous alloys, stainless steels, and nonferrous alloys, properties of ferrous and non-ferrous alloys and their application.

Glasses, ceramics and refractories

Glassy state, glass formers and glass modifiers, application.

Ceramic structures, Mechanical properties clay products.

Refractories, characterizations, properties & application

Unit II **Composites**

Introduction, macroscopic composites and microscopic composites, Dispersion-strengthened and particle reinforced, fiber-reinforced composites.

Nanomaterials

Nanocrystalline phase, Methods of synthesis, sol-gel, hydrothermal, microwave assisted, reverse microemulsion/micelles, special properties, applications, polymer based nanocomposites.

Unit - III **Principle and application of TGA, DTA, & DSC.**

Polarimetry, Optical Rotatory Dispersion and Circular Dichroism

Introduction, polarized light, optical activity, application of polarimetry, ORD and CD, rotator dispersion, instrumentation, cotton effect, anamolous ORD curves, relationship between ORD and CD, Axial haloketone rule, the octant rule, applications of octant rule, applications of ORD and CD, advantages of CD over ORD, limitations of ORD and CD.

Unit - IV **Radiation Chemistry**

Primary radiation effects. Radiation dosimetry, Radio free radicals, Radiochemistry in different media, Radiation in chemical process. Industrial application of radiation.

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Nuclear Models, stability of the nucleus, radio isotopes, application of Radio isotopes in physicochemical investigation.

Radio analytical techniques - isotopic dilution methods, neutron activation analysis (NAA), radiometric titrations, measurement of radioactivity through with special reference to Gieger-Muller counter and application in agricultures and industry in health care in biology.

LIST OF REFERENCE BOOKS:

1 Instrumental Technique of Analytical Chemistry, H. Kour, Pragati Publication
2 Nanoparticles – Nanocomposites, Nanomaterials: An Introduction for beginners, Dieter Volarth, Villey –VCH
3 Composite Materials: Production Properties Testing, K. Shrinivasan, Narosa
4 Composite Materials, Shivanand, Ashian Book Publication
5 PhotoChemistry and Radiation Chemistry, James F. Wishart, Danial G. Nausera

Signature of Member of Board of Studies

1. Mr. Younus Raza Beg (Chairmen) -
2. Dr. Ajay Kumar Singh (Subject Expert) -
3. Dr. Anil Kumar Kashyap (Subject Expert) - online
4. Dr. Anju Jha (Subject Expert) - online
5. Mr. Girivar Prakash Gautam (Industrialist) - online
6. Mr. Sandeep Kumar Jhariya (Alumni) -
7. Dr. Priyanka Singh -
8. Mr. Gokul Ram Nishad -
9. Mrs. Reema Sahu -online
10. Dr. Dakeshwar Kumar Verma -
11. Mr. Vikas Kumar Kande - online
12. Dr. Ashwani Kumar Sharma -

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M.Sc. CHEMISTRY
SEMESTER IV
2021-22
PAPER- IV Elective - B PCHET- 405
POLYMER CHEMISTRY

Max. Marks 80

Min. Marks 16

Unit – I **Mechanism of Polymerization**

Basic concepts- Monomers, repeat units, degree of polymerization. Linear, branched and network polymers. Classification of polymers. Polymerization: Mechanism of condensation polymerization, mechanism of addition polymerization – free radical chain, cationic, anionic, coordination and mechanism of copolymerization. Polymerization conditions and polymer reactions. Polymerization in homogeneous and heterogeneous systems.

Unit - II **Kinetics and Statistics of Polymerization**

Kinetics and statistics of stepwise polymerization – reactivity and molecular size, kinetics and statistics, molecular weight control. Kinetics of free radical chain polymerization, equation for kinetic chain length, degree of polymerization and chain transfer; Kinetics of cationic polymerization; kinetics of anionic polymerization. Kinetics of hetrogeneous polymerization using Ziegler Natta catalysts.

Unit - III **Structure and Properties**

Morphology and order in crystalline polymers - configurations of polymer chains. Crystal structures of polymers. Polymer structure and physical properties- crystalline melting point T_m - melting points of homogenous series, effect of chain flexibility and other steric factors, entropy and heat of fusion. The glass transition temperature , T_g - relationship between T_m and T_g , effects of molecular weight, diluents , chemical structure, chain topology, branching and cross linking.

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Unit - IV **Polymer Processing**

Plastics, elastomers and fibers, compounding. Processing techniques: Calendering, die casting, rotational casting, film casting, injection moulding, blow moulding, extrusion moulding, thermoforming, foaming, reinforcing and fiber spinning.

Polymer Characterization

Polymer solutions – Criteria of polymer solubility, thermodynamics of polymer solution – ideal solution, entropy, heat and free energy of mixing.

Analysis and testing of polymers - chemical, analysis of polymers, spectroscopic methods, X-ray diffraction study, microscopy, thermal analysis and physical testing tensile strength. Fatigue, impact, tear resistance, hardness and abrasion resistance.

LIST OF REFERENCE BOOKS

1. Polymer Science, Gowarikar, Vishwanathan, Sridhar, Willey Eastern.
2. Textbook of Polymer Science, F.W. Billmeyer, Jr. Wiley
3. Contemporary Polymer Chemistry, Alcock and Lambe, Prentice Hall.
4. Physics and Chemistry of Polymers, J.M.G. Cowic, Blackie, Acadand Professional.
5. Funcitonal Monomers and Polymers, K. Takemoto, Y. Inaki and R.M. Ottanbrite.

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