**School of Chemical Sciences**

**Devi Ahilya Vishwavidyalaya, Indore**

**M.Sc. Chemistry**

**SEMESTER III**

**MCH-306: CHEMISTRY OF POLYMERS**

**Credits 3**

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| **Unit I** | [A]Introduction to polymers: Important terminologies and definitions used in polymer chemistry such as monomers, repeat units, degree of polymerization, molecular weight, size, glass transition temperature and morphology. Nomenclature of polymers and their classification, Types of polymers- linear, branched, crosslinked, ladder, thermoplastic, thermosetting, fibres, elastomers, natural polymers, addition and condensation polymers. Stereoregular polymers- atactic, syndiotactic and isotactic.  [B]Polymerization mechanism**:** condensation, addition, radical chain, ionic and co-ordination and co-polymerization and their mechanisms. Methods of polymerisation in homogeneous and heterogeneous systems |
| **Unit II** | [A] Polydispersion-average molecular weight concept: Number, weight and viscosity average molecular weights. Polydispersity and molecular weight distribution. The practical significance of molecular weight. Measurement of molecular-weights. End-group, viscosity, light scattering, osmotic and ultracentrifugation methods.  [B] Polymerization conditions and polymer reactions.. 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 esistance, Hardness and abrasion resistance. |
| **Unit III** | Polymer Processing  Plastics, elastomers, fibers. Compounding. Processing techniques. Clendering, die casting, rotational casting, film casting, injection moulding, blow moulding, extrusion moulding, thermoforming, foaming, reinforcing and fire spining |
| **Unit IV** | Structure, Properties and Application of Polymers:  [A] Functional polymers: Fire retarding polymers and Electrically conducting polymers.  [B] Biomedical polymers: Contact lens, dental polymers, artificial heart and kidney,  [C] Polymers based on boron-borazines, boranes , carboranes,  [D] Polymers based on Silicon, silicone's polymetalloxanes and  polymetallosiloxanes,  [E] Polymers based on Phosphorous-Phosphazenes, Polyphosphates |