**CURRICULUM PLAN 2024-25**

Odd Semester: I, III, V

**Dr. Savita Sharma**

Department of Physics

**DSE Paper: Physics of Materials**

**B.Sc. (H) Physics – III year, V Sem**

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| Content | Allocation of Lectures | Month-wise Schedule followed | Tutorial/assignment/  presentation etc |
| **Heat & Thermodynamics** | | |  |
| **Unit – I – Semiconductors:**  Basic concept of mobility and conductivity, density of states, determination of electron and  hole concentration in doped semiconductor, Fermi level, Fermi energy, Fermi temperature,  Fermi wavelength, Fermi surface | 4 | 2-Aug to 12 August | Syllabus Overview  Reference books  Derivations and Numericals |
| Unit – II - Dielectric and magnetic materials:  Dielectrics, Ferroelectric, Piezoelectric and Pyroelectric materials, applications of  ferroelectrics in capacitors and memory device, Piezoelectrics in micro positioner and actuator,  Pyroelectrics in radiation detectors and thermometry  Classification and applications of soft and hard magnetic materials, application in transformers,  memory device, introduction of spintronics based systems (spin transport) | 9 | 13-Aug to 30 August | Derivations and  Numericals  Discussion of  Important questions |
| **Unit – III – Polymers:**  Chemical structure of polymers of few thermoplastic (polyethylene, PVC, PTFE, PMMA,  Polyester, Nylons) and thermosetting (Epoxy resin) polymers, conducting polymersapplication  in organicelectronics | 3 | 2 Sep to 09-Sep | Derivations and  Numericals  Discussion of  Important questions  Home Register Checking |
| **Unit – IV – Liquid crystals:**  Classification of liquid crystals, structural and orientational ordering (isotropic to Nematic),  thermotropic liquid crystals, Phases and phase transitions; anisotropic; Birefringence and  display devices | 3 | 10 Sept- to 16-Sept | Derivations and  Numericals |
| **Unit – V – Carbon based materials:**  Structure and properties of Fullerenes, C60, single walled and multi walled CNTs, Graphene  and their energy band diagram. | 03 | 17-Sept to 30-Sept | Derivations and  Numericals |
| **Unit – VI – Synthesis of materials:**  Ceramic (Calcination, Sintering, Grain), thin films (general idea of vacuum, thermal  evaporation, molecular beam epitaxy, pulsed laser deposition), Crystals (qualitative idea of  zone refining and Czochralski method), Polymers (Polymerizatio**n mechanism)** | 08 | 1 October to 27 November | Derivations,  Numericals, revisions and discussions on previous year question papers |