EX- 402 ELECTRICAL AND ELECTRONICS MATERIAL

Unit I

Classes of Engineering Materials – Metals & alloys, ceramics, organic polymers and composite material. Classification of solids from electrical Engineering point of view. Conducting material – properties of conductors, characteristics of good conductor material, commonly used conducting materials, conductor materials for overhead lines, types of conductors, conductor for underground cables, conductor materials used for electrical machines winding, resistor materials,types of resistors, materials for bus bar. Thermal conductivity of matter, super conductivity. Materials of MHD generator, Fuel cells, Thermoelectric generators, Thermonic conductors

Unit II

Dielectric Materials: Dielectric strength, factors affecting dielectric strength, dielectric loss, dissipation factor, factors affecting dielectric loss, permittivity & polarization, charging and discharging of dielectric, conduction through dielectric. Application of dielectric, different types of capacitors and materials used for them.Insulating materials, their properties – thermal, chemical, mechanical & electrical. Insulating materials like ceramic, mica, glass, rubber, resins, wax varnishes, Class of Insulation. Transformer oils & their testing. Piezoelectricity & Ferro electricity.

Unit III

Applications of semi conductor materials: type of semi conductors, working and applications of semiconductors, Temperature sensitive elements, photoconductive cells, photo voltaic cells; Varistor, Hall effect generator, LCD, Light dependent registors, LEDs, piezo electric materials, semiconductor laser and its characteristics, photo conductors photo diodes, avalanche photo diode, photo transistors.

Unit IV

Classification of magnetic materials: Dia-magnetism, Para magnetism, Ferro- magnetism, magnetisation curve, hysterisis loop, Magnetostriction, Factors affecting permeability and hysterisis, Anti – ferromagnetism, Ferrimagnetism, Magnetic resonance, B-H curve for different magnetic materials, loss of magnetism, impurities in ferromagnetic materials, soft and hard magnetic materials, ferrites. Fiber optic materials, lasers Special Purpose materials – Thermo couple, soldering, fuse, contact, refractory, fluorescent & phosphorescent, galvanizing and impregnation.

Unit V

IC Fabrication: planar process – Fabrication of BJT, FET, & CMOS devices, Monolithic diodes Contacts – IC resistor & Capacitors - IC packaging – characteristic of IC components.

References:

1. TTI Madras; Electrical Engineering Materials; TMH.
2. C. S. Indulkar and S. Thruvengadem; Electrical Engineering Materials; S. Chand.
3. A.J. Dekkor; Electrical Engineering Materials; PHI.
4. John Allison; Electrical Engineering Material s & Devices; TMH.
5. Kasap; Electronic Materials and devices; TMH
6. V. Raghvan; Material Science & Engineering; PHI.
7. Milman & Grabe; Micro Electronics; TMH
8.S.P. Seth & P.V. Gupta; Electrical Engineering Materials; Dhanpat Rai.