

ELECTRONIC MATERIALS & COMPONENTS

1. RATIONALE:

The main objective of this courses is to impart knowledge of different electronics materials and various components used in electronics industries. The courses also describes suitability & characteristics of various electronics components for different applications.

2. SCHEME OF TEACHING AND ASSESSMENT:

Sr. No.	Topics	TH.	PR	TOTAL	% WEIGHTAGE
1.	Conducting Materials	08	---	08	20
2.	Magnetic Materials	08	---	08	20
3.	Insulating Materials	08	---	08	20
4.	Semiconductors	06	---	06	15
5.	Electronics Components	12	---	12	25
	TOTAL	42	---	42	100

3. TOPICS AND SUBTOPIC:

1. CONDUCTING MATERIALS:

- 1.1 Electronic properties of solids, band theory.
- 1.2 Resistivity - factors affecting resistivity.
- 1.3 Temperature co-eff. of resistance.
- 1.4 Thermal conductivity.
- 1.5 Properties and applications of -copper, aluminum, nickel, silver, tungsten, manganese, tantalum , brass & bronze and resistive alloys.
- 1.6 Superconductivity.

2. MAGNETIC MATERIALS:

- 2.1 Introduction of magnetic materials.
- 2.2 Classification of magnetic materials.
- 2.3 Magnetization curve and magnetic properties.
- 2.4 Hysterisys loss and eddy current loss- methods to reduce eddy current losses.
- 2.5 Soft and hard magnetic materials.
- 2.6 Properties and uses of magnetic steel and steel alloys.
- 2.7 Ferrites & powdered core- their construction, characteristics and uses.
- 2.8 Choice of material for transformer core, armature of motors, loud speakers, submarine communication, long distance telephone lines, current, transformers, audio-frequency transformers, moving iron instruments, TV tubes.

3. INSULATING MATERIALS:

- 3.1 Classification of insulating materials on the basis of operating temperatures.
- 3.2 Electrical and chemical properties of insulating materials (Insulation resistance, di-electric strength, di-electric constant, di-electric loss and chemical resistance)
- 3.3 Common insulating material : Ceramic, glass, paper, mica, rubber, plastics- thermosetting and thermoplastic materials, PTFE, FRP (Fiber Reinforced Plastic), their important properties and applications.

4. SEMICONDUCTORS :

- 4.1 Qualitative discussion of semiconductors.
- 4.2 Electrical properties of silicon and germanium.
- 4.3 Intrinsic semiconductors, trivalent and pentavalent impurities.
- 4.4 Extrinsic semiconductors.
- 4.5 Formation of P and N type semiconductors, P-N junction.
- 4.6 Point contact and junction diode.

5. ELECTRONIC COMPONENTS:

- 5.1 Construction and use of common electronic components.
- 5.2 Resistors - carbon composition, carbon film, cracked carbon, metal oxide film, wire-wound, variable resistors.
- 5.3 Capacitors - paper , silvered paper, mica, silvered mica, ceramic plastic foil, electrolytic, variable resistor.
- 5.4 Inductors - fixed and variable inductors.
- 5.5 Relays - electromagnetic and reed relay.
- 5.6 Chokes - A.F and R.F chokes.
- 5.7 Printed circuit board and its fabrication.
- 5.8 Piezo electric crystal - Principle, cat. & applications.

5. REFERENCES:

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|-------------------------------------|----------------------|----------|
| 1. Electronics Engg. Materials | Rains & bhattacharya | Khanna |
| 2. Electrical Engg. Materials. | M.L. Gupta | Khanna |
| 3. Text book of Applied Electronics | R.S. Sedha | S. Chand |