

22217

23242

3 Hours / 70 Marks

Seat No.

--	--	--	--	--	--	--	--

- Instructions* – (1) All Questions are *Compulsory*.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
(4) Assume suitable data, if necessary.
(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

- 1. Attempt any FIVE of the following. **10****
- Define resistivity. State its unit.
 - List dielectric materials. (any four)
 - ‘Pentavalent impurity materials are called as Donor impurity.’ Justify your answer.
 - Give the classification of magnetic materials.
 - List any two applications of micro-relays.
 - Draw energy level diagram of conductor and insulator.
 - Give the material composition for obtaining Red and Yellow colour LED.

P.T.O.

- 2. Attempt any THREE of the following. 12**
- a) Describe the concept of piezoelectricity. State its applications.
 - b) Describe the effect of temperature on the conductivity of metals.
 - c) Explain the process of diffusion (current) in semiconductor material.
 - d) Differentiate between anti-ferromagnetism and ferrimagnetism.
- 3. Attempt any THREE of the following. 12**
- a) Describe superconductivity. State its applications.
 - b) Explain the characteristics of good insulating materials.
 - c) Describe the principle of stimulated emission and radiation in LASER.
 - d) Explain the concept of magnetostriction effect. State its applications.
- 4. Attempt any THREE of the following. 12**
- a) Suggest relevant materials used in flexible and wearable antenna.
 - b) Describe the effect on the capacitance of the dielectric material on the basis of factors polarizability and permittivity.
 - c) State and explain factors affecting permeability and hysteresis loss of magnetic materials.
 - d) State and explain thermoelectric effect.
 - e) Compare P-type semiconductor with N-type semiconductor on the basis of:
 - i) Majority charge carrier
 - ii) Minority charge carrier
 - iii) Impurity material
 - iv) Fermi-level position in energy band diagram.

5. Attempt any TWO of the following.**12**

- a) Draw and explain the typical magnetization curve (B-H Curve) for a ferromagnetic material. State the applications of ferromagnetic materials.
- b) The resistivity of pure copper is $1.56 \mu\Omega\text{-cm}$. An alloy of copper containing 1 atomic percent nickel has a resistivity of $2.81 \mu\Omega\text{-cm}$. Copper-alloy containing 3 atomic percent silver has a resistivity of $1.98 \mu\Omega\text{-cm}$. Calculate the resistivity of copper alloy containing 2 atomic percent nickel and 2 atomic percent silver.
- c) State applications for the given dielectric material.
 - i) Polyvinyl carbide
 - ii) Silk
 - iii) Glass
 - iv) Backelite
 - v) Porcelain
 - vi) Mica

6. Attempt any TWO of the following.**12**

- a) Classify following material as diamagnetic, paramagnetic, ferromagnetic and antiferromagnetic
 - i) Platinum
 - ii) Iron
 - iii) Glass
 - iv) Nickeloxide
 - v) Quartz
 - vi) Silicon Ironalloy
 - b) State the different modes of electron emission in metal. Explain any two modes of emission.
 - c) Explain the following materials used for fabrication of semiconductors
 - i) Substrate
 - ii) Metals
 - iii) Capacitance materials
-