

Th-4 Electrical Engineering Material

Full Marks: 80

Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10
 - a. Mention the factors which affect the value of resistivity of a material.
 - b. Of what material is high voltage overhead lines for power transmission made? Give reasons.
 - c. Name the conducting material which is generally used in plug points, socket outlets, switches and lamp holders. State 2 properties of this material should possess for such applications.
 - d. Mention what number of electrons in the valence ring makes the best conductor and the best insulator.
 - e. State the use of semiconductor in industrial applications.
 - f. State the factors which affect the dielectric loss of an insulating material.
 - g. State the difference between a dielectric material and an insulating material as regards their functions.
 - h. Name the special type of steel used for cores of power transformers. Give reasons.
 - i. Explain magnetostriction and eddy current loss.
 - j. What are bimetals? Where are these used?

2. Answer **Any Six** Questions 6 x 5
 - a. What is resistivity of conductor materials? A resistance wire of length 1 meter and diameter 0.08 mm has a resistance of 95.5 ohms. Calculate the resistivity of the wire material.
 - b. Explain with the help of energy diagram n-type and p-type semiconductors.
 - c. Name the different classes of varnishes available. Describe what are epoxy resin varnishes and silicone resin varnishes.
 - d. Explain the following:
 - (i) Permittivity (ii) Dielectric strength (iii) Dielectric constant (iv) Breakdown voltage (v) Loss angle
 - e. What are ferrites? What are their advantages over other magnetic materials?
 - f. Describe briefly the Hall effect and Hall effect generator.
 - g. What is superconductivity? Explain the applications of superconducting materials.

3. What insulating material would you select for the following? Also Mention 10 reasons for the selection: 10
 - (a) Flexible wire (b) High Voltage cable (c) Low voltage cable
 - (d) Fuse Holder (e) Commutator in D.C machines

4. Explain the process of polarisation of a dielectric material. 10
5. Explain the hysteresis loop for different magnetic material with suitable diagram. 10
6. Write short notes on (a) Soldering material (b) Silica gel 10
7. Discuss the physical, electrical and mechanical properties of copper and its use as an engineering material. Where it can be substituted by aluminium and with what limitations? 10