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5E1361

Roll No. _____

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B.Tech. V- Semester (Main) Examination, November - 2019

ESC Electrical Engg.

5EE3-01 Electrical Materials

Time : 2 Hours

Maximum Marks : 80

Min. Passing Marks : 28

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory

(5×2=10)

1. Define and explain magnetic domain in ferromagnetic materials? (2)
2. Define diffusion current in a semiconductor? (2)
3. What is meant by polarisation? (2)
4. What is crystalline state? State their defects. (2)
5. Explain briefly carrier density and energy gap in semi conductor? (2)

PART - B

(Analytical/Problem solving questions)

Attempt any four questions

(4×10=40)

1. Discuss the effects of 'temperature' and 'frequency of applied field' on the dielectric constant of materials. (10)
2. Define piezoelectricity. Explain the uses of any three piezoelectric materials. (10)
3. Explain the effect of critical magnetic field, critical current and isotopic mass on critical temperature of a super conducting material. (10)
4. Enumerate different types of semi conductors show that the fermi level for a pure germanium lies in the middle of its forbidden gap. (10)

5. Define Hall effect with necessary sketch. Explain the concept of Hall effect and arrive at an equation for hall voltage V_H . (10)
6. What is Curie law, Curie temperature and Curie Weiss law explain? (10)

PART - C

(Descriptive/Analytical/Problem Solving/Design Question)

Attempt any two questions

(2×15=30)

1. Draw a typical hysteresis loop for a ferromagnetic material. Show which part is reversible and which is not. Define residual magnetism and coercive force. How are all these properties explained in terms of the microscopic structure of the solid. (15)
2. a) List of characteristics of good insulating material. (5)
- b) A parallel plate capacitor has an area of 8 cm^2 with a separation of 0.08 mm . The space is filled with polystyrene. the real part of relative dielectric constant is 2.56 and the loss tangent 0.7×10^{-14} at a frequency of 1 MHz . Calculate the capacitance and parallel loss resistance. (10)
3. a) What is atomic packing factor? Calculate its value for simple cube and body centered cube. (7)
- b) Describe in brief the basic seven crystal system? What is meant by imperfections in a crystal? (8)

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