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10EE666

Sixth Semester B.E. Degree Examination, Dec.2017/Jan,2018

Electrical Engineering Materials

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART - A

- 1 a. Define :
i) Resistivity ii) Conductivity ii) Temperature co-efficient of resistance. (03 Marks)
b. With usual notations prove that $R_t = R_o (1 + \alpha_o t)$ (05 Marks)
c. Explain Fermi Dirac distribution. (06 Marks)
d. A coil is made of copper wire. At 15°C the resistance of the coil is 250 ohms. What will be the temperature of the same coil if the resistance is 300 ohms? Take $\alpha_o = 0.0038$ ohm per degree C at 0°C. (06 Marks)
- 2 a. Define Hall effect. With necessary sketches, explain the concept of Hall effect and derive equation for Hall voltage V_H ? What will be the Hall co-efficient when electrons and holes both are considered as density carries? (10 Marks)
b. Classify magnetic materials and explain each type with necessary sketches. (10 Marks)
- 3 a. Explain dielectric strength and mention factors influencing dielectric strength. Briefly explain each factor. (05 Marks)
b. Explain Electronic polarization and prove that $\epsilon_r = 1 + 4\pi n^3 N$. (10 Marks)
c. Calculate the capacitance in micro-farads of a capacitor having 9 parallel plates separated by mica sheets 0.2mm thick. The area of one side of each plate is 12cm² and dielectric constant of mica is 5. (05 Marks)
- 4 a. Explain the following dielectric gases with applications : i) SF₆ ii) Nitrogen. (10 Marks)
b. What is the function of oil which is used in transformer? (05 Marks)
c. Explain ageing of insulators by mentioning few adverse effects after ageing. (05 Marks)

PART - B

- 5 a. Briefly explain semi conductor materials used for solar cells? (08 Marks)
b. Mention different types of fuel cells and explain Alkaline fuel cells. (08 Marks)
c. Briefly explain solar selective coatings. (04 Marks)
- 6 a. With the help of neat sketches explain photo electron spectroscopy. (07 Marks)
b. Explain Magnetic Resonance Phenomena. (06 Marks)
c. Explain working and parts of atomic absorption spectroscopy. (07 Marks)
- 7 a. Explain different applications of Piezoelectric materials. (08 Marks)
b. Define Hydrogels. How hydrogels are classified on basis of route, ionic charge and physical structure. Mention few properties and applications. (12 Marks)
- 8 a. Explain the following plastics with examples: i) Thermo plastics ii) Rubber. (12 Marks)
b. Explain different applications of ceramics to conductors and insulators. (08 Marks)

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