

**Sixth Semester B.E. Degree Examination, Jan./Feb. 2021**  
**Electrical Engineering Materials**

Time: 3 hrs.

Max. Marks: 100

**Note:** Answer any FIVE full questions, selecting atleast TWO questions from each part.

**PART – A**

- 1
  - a. Explain the effect of temperature on resistance and hence derive an expression for temperature coefficient of resistance. (10 Marks)
  - b. The resistance of a Tungsten bulb is  $144\Omega$  under normal working conditions. Find the temperature in degree assuming
    - i) Cold resistance of bulb at  $20^{\circ}\text{C}$  is  $10\Omega$  and
    - ii) Average temperature coefficient for tungsten wire at  $20^{\circ}\text{C}$  as  $5 \times 10^{-3}$ . (05 Marks)
  - c. What is a Fuse? What are the factors affecting fusing current? (05 Marks)
- 2
  - a. The resistivity of pure germanium at room temperature is  $0.47 \Omega - \text{m}$ . Find out the carrier density of germanium at the room temperature for the electron mobility of  $0.42 \text{ m}^2/\text{volt} - \text{sec}$  and hole mobility =  $1.6 \times 10^{-19} \text{ C}$ . (04 Marks)
  - b. Explain the origin of permanent magnetic dipole. (06 Marks)
  - c. Explain Hall effect with figure and derive the expression of Hall co-efficient and also mention the applications of Hall effect. (10 Marks)
- 3
  - a. Explain Ionic polarization and Dipolar polarization. (06 Marks)
  - b. Deduce the expression for loss tangent of a dielectric material and mention the significance of loss tangent. (10 Marks)
  - c. Mention the effect of temperature rise on dipolar polarization. (04 Marks)
- 4
  - a. Explain the procedure for testing the dielectric strength of transformer oil. (06 Marks)
  - b. Write short note on : i) PVC ii)  $\text{SF}_6$ . (10 Marks)
  - c. What are the properties of Asbestos? (04 Marks)

**PART – B**

- 5
  - a. With a neat sketch, explain the working of Solar – Voltaic cell with a figure and write the equivalent circuit and  $V - I$  characteristics. (12 Marks)
  - b. Explain the working of fuel cell with examples. (08 Marks)
- 6
  - a. What is Electron and Pin resonance and what are its applications? (08 Marks)
  - b. Brief the purpose of Optical microscopy. (06 Marks)
  - c. Explain the concept of NMR, with the help of NMR spectrometer. (06 Marks)
- 7
  - a. What is Piezoelectricity? List out the applications of piezoelectric materials. (08 Marks)
  - b. Explain the properties of Ferromagnetic materials. (08 Marks)
  - c. Define Magnetostriction and two practical applications. (04 Marks)
- 8
  - a. Distinguish between Thermosetting and Thermoplastic materials. (05 Marks)
  - b. What is Ceramics? Explain the general properties of ceramic materials and its applications. (10 Marks)
  - c. Briefly explain on Rubber manufacture. (05 Marks)

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