

**B.Tech. - VIEP - ELECTRICAL ENGINEERING
(BTELVI)**

Term-End Examination

June, 2019

00525

**BIEE-013 : ELECTRICAL AND ELECTRONICS
ENGINEERING MATERIALS**

Time : 3 hours

Maximum Marks : 70

Note : Attempt any seven questions. All questions carry equal marks. Symbols used have their usual meanings. Use of scientific calculator is allowed.

1. (a) What is meant by imperfections in crystal ?
Explain edge dislocation. 5
- (b) Draw the (112) and (111) planes in simple cubic cell. 5
2. What is Hall effect ? Derive relation between Hall coefficient and Carrier density. Assume the presence of only one type of charge carrier. 10
3. (a) Derive the expression for heat development in a current carrying conductor. 5
- (b) Explain superconductivity. Name some of the important superconductivity alloys and elements and give their applications in brief. 5

4. Explain the working principle of FET. Draw the V-I characteristics of FET, showing different regions of operation. Also discuss the advantages of FET over BJT. 10
5. (a) Why is silicon a preferred material for IC fabrication? 5
- (b) Enlist the steps used in single silicon crystal growth. 5
6. (a) Explain the origin of permanent magnet dipoles in materials. 5
- (b) The saturation induction of nickel is 0.65 Tesla. If the density of nickel is 8906 kg/m^3 and the atomic weight is 58.7, calculate the magnetic moment of nickel atom. Avogadro number is $6.23 \times 10^{26}/\text{mole}$. 5
7. (a) Explain Bragg's law of X-ray diffraction. Show that the condition for reflection is given by $2d \sin \theta = \lambda$. 5
- (b) Discuss the type I and type II superconductors with relevant diagram. 5
8. (a) Discuss magnetostriction effect with suitable example. 5
- (b) State and prove Wiedemann-Franz-Lorenz relation. 5

9. (a) Find the diffusion coefficient of electron and hole of Si at 27°C, if the mobilities of electron and hole are 0.17 and 0.25 m²/V-s respectively at 27°C. 5
- (b) Explain Seebeck effect. 5

10. Write short notes on any *two* of the following :

2×5=10

- (a) IGFET
- (b) Drift and Diffusion
- (c) Mechanical Properties of Metals
- (d) Paramagnetism
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