

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

00126

Term-End Examination

June, 2016

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

Time : 3 hours

Maximum Marks : 70

Note :

- (i) *Attempt any seven questions.*
- (ii) *All questions carry equal marks.*
- (iii) *Symbols used have their usual meanings.*
- (iv) *Use of scientific calculator is allowed.*

-
1. What is bond energy ? Discuss the ionic, covalent and metallic bonding in crystals with suitable examples. 10

 2. (a) With reference to crystal structure, define the following terms : 5
 - (i) Crystal lattice
 - (ii) Unit cell
 - (iii) Atomic radius
 - (iv) Co-ordination number

 - (b) Derive the expression of atomic radius of a face centred cubic (FCC) lattice in terms of lattice parameter 'a'. 5

3. (a) What is inter-planar spacing? 5
- (b) Derive the relation between inter-planar spacing and Miller indices. Hence show that for a simple cube system,
- $$d_{100} : d_{110} : d_{111} = \sqrt{6} : \sqrt{3} : \sqrt{2}. \quad 5$$
4. (a) Define thermal conductivity of solids. Mention some features of thermal conductivity of metals. 5
- (b) State and prove Wiedemann-Franz-Lorenz relation. 5
5. (a) Derive the expression for the heat developed per cubic metre per second in a conductor carrying a current density 'J' as a result of an applied field 'E'. 5
- (b) Explain Seebeck effect. 5
6. Distinguish between the following :
- (a) Soft and Hard magnetic materials 5
- (b) Ferromagnetism and Antiferromagnetism 5
7. (a) Discuss p-type and n-type semiconductor materials with examples. 5
- (b) With a relevant diagram derive the expression for Hall coefficient. 5
8. What is diamagnetism ? Using Langevin theory, derive an expression for diamagnetic susceptibility. 10

9. (a) Explain the phenomenon of magnetostriction and give its salient features. 5
- (b) What are ferrites ? Mention their properties and applications. 5
10. Write short notes on any *two* of the following : $2 \times 5 = 10$
- (a) Properties of semi-conducting materials
 - (b) p-n junction diode
 - (c) Structural imperfections
 - (d) Mechanical properties of metals
-