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BIEE-013

B.Tech. – VIEP – ELECTRICAL ENGINEERING (BTELVI)

Term-End Examination

00843

December, 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 meaning.*

(iv) *Use of scientific calculator is allowed.*

1. (a) Differentiate between Schottky and Frenkel defects. *5*

   (b) Find the Miller indices of a plane that makes intercepts 3 on x-axis, 1 on y-axis and 5 on z-axis. *5*

2. (a) What is Bragg's law ? Define Bragg's planes. *5*

   (b) Define forbidden gap and differentiate the forbidden energy gap in case of a conductor, an insulator and a semiconductor. *5*

3. (a) Enumerate the various factors affecting resistivity of conductors. Deduce the relationship among these factors. *5*

(b) What is thermionic emission ? Discuss thermoelectric effect. *5*

4. (a) Explain the phenomenon of superconductivity and name any one superconducting material. *5*

(b) Deduce the conductivity relationship for a p-type semiconductor. *5*

5. Describe the construction and working of a p-n junction diode and explain drift and diffusion currents. Give the expression for diode current (I). *10*

6. Discuss Hall effect in detail. How do we identify an unknown piece of semiconductor to be n-type or p-type, with the help of a multimeter ? *10*

7. Compare between soft and hard magnetic materials. Draw a typical hysteresis curve for a soft magnetic material. *10*

8. (a) Explain magnetostriction effect in brief. *5*

(b) The resistivity of Ge at room temperature is 0·47 Ω-m. Find the carrier density of Ge at room temperature for electron mobility (μ_e) = 0·42 m^2/volt-sec and hole mobility (μ_H) = 0·20 m^2/volt-sec. *5*

9. Explain the working mechanism of the following : *10*

(a) p-n junction diode

(b) FET

10. Write short notes on any ***two*** of the following : *2×5=10*

(a) Energy Band in Solids

(b) Continuity Equation

(c) Permanent Magnetic Material

(d) Crystal Growth Techniques