

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

00562 Term-End Examination

December, 2017

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

Time : 3 hours

Maximum Marks : 70

Note : Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is allowed. Missing data may be suitably assumed.

1. (a) Explain the phenomenon of X-ray diffraction and draw the 'Laue's patterns'. 5
(b) What are the different X-ray diffraction techniques ? Explain the rotating crystal method in detail. 5
2. Using Bragg's equation, determine the interplanar spacing when a beam of X-rays of wavelength $1.54 \text{ \AA}$ is directed towards the crystal at an angle 20.3° to the atomic plane. 10

3. (a) What are the factors affecting electrical resistance of the conducting materials ? 5
- (b) Explain the phenomenon of Thermal Conductivity in metals. 5
4. A conductor rail has a cross-section of 20 cm^2 and a specific resistance of $7.6 \mu\Omega \text{ cm}$ at 0°C . If the temperature coefficient of the material is $0.005 \text{ per } ^\circ\text{C}$, estimate its resistance per kilometre when the temperature is 50°C . 10
5. Explain the construction and operation of a p-n junction diode. Define drift and diffusion currents. Derive the expression for diode current. 10
6. What is an Extrinsic Semiconductor ? Derive the expression for current carriers in an extrinsic semiconductor. 10
7. (a) Describe the principles of Ferromagnetism and Antiferromagnetism with suitable diagrams. 5
- (b) Explain Magnetostriction for ferromagnetic materials. 5

8. With the help of hysteresis loop, describe the phenomenon of energy loss in permanent magnetic materials. 10

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

- (a) Atomic Packing Factor
 - (b) Thermoelectric Effect
 - (c) IGFET
 - (d) Hard Magnetic Materials
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