



(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 121407

Roll No.

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B. Tech.

(SEM. IV) THEORY EXAMINATION, 2014-15 ELECTRICAL & ELECTRONICS ENGINEERING MATERIALS

Time : 2 Hours]

[Total Marks : *50

1 Attempt any three parts of the followings : $5 \times 3 = 15$

(a) What is Atomic Packing factor ? Calculate its value for simple cube and body centered cube.

(b) Show in diagram the (III) planes of a cubic lattice. Calculate their interplanar distance. And also calculate the Bragg angle if (III) planes of a cubic

$(a = 3.57 \text{ \AA})$ crystal are exposed to X-range

(wavelength is 1.57 \AA).

(c) Explain with simple sketches the following :

(i) Edge dislocation

(ii) Screw dislocation

(d) What is Forbidden energy gap ? Classify insulators, semiconductors and conductors on the basis of energy band diagram.

2 Attempt any three parts of the followings : $5 \times 3 = 15$

- (a) Explain super conductivity.
Determine the temperature coefficient of resistance of material used in resistor if the resistance at 25°C is 50 ohms and at 70°C is 57.2 ohms.
- (b) Explain thermal conductivity and obtain an expression for coefficient of thermal conductivity.
- (c) Explain in brief the zone theory of solids.
- (d) State the following thermo-electric effects
- Seeback effect
 - Peltier effect
 - Conduction effect

3 Attempt any two parts of the followings : $5 \times 2 = 10$

- (a) What is Hall effect ?
The resistivity of semiconductor material was known to be $0.0082 \Omega m$ at room temperature. The flux density in the Hall model was 0.48 wb/m^2 .
- (b) Explain the working principle of a MOSFET. Discuss also the types of MOSFET and their working.
- (c) Discuss the volt-ampere characteristics and the application of the following semiconductors.
- Zener diode
 - Tunnel diode.

4 Attempt any two parts of the followings : $5 \times 2 = 10$

- (a) Explain briefly any three of the following magnetic hard materials :
- Tungsten steel
 - Cobalt steel
 - Chromium steel
 - Alnico.
- (b) Explain the phenomenon of magnetostriction with particular reference to iron and nickel. Mention major application of magnetostrictive materials.
- (c) Explain the Ferromagnetism.

The hysteresis loop of a specimen of iron weighing 10 kg is equivalent in area of 255 joules/m^3 of iron. Find the loss of energy per hour at the rate of 50 c/s. Assume the density of iron as 7500 kg/m^3 .