

Printed Pages : 3



EEE403

(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 : **5×3=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  $(a = 3.57\text{Å})$  crystal are exposed to X-range (wavelength is  $1.57\text{Å}$  ).
- (c) Explain with simple sketches the following :
- Edge dislocation
  - 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 : **5×3=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

(i) Seeback effect

(ii) Peltier effect

(iii) Conduction effect

3 Attempt any two parts of the followings : **5×2=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  $0.48 \text{ wb/m}^2$ .

(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.

(i) Zener diode

(ii) Tunnel diode.

4 Attempt any two parts of the followings : **5×2=10**

- (a) Explain briefly any three of the following magnetic hard materials :
- (i) Tungsten steel
  - (ii) Cobalt steel
  - (iii) Chromium steel
  - (iv) 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  $255 \text{ joules/m}^3$  of iron. Find the loss of energy per hour at the rate of 50 c/s. Assume the density of iron as  $7500 \text{ kg/m}^3$ .

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