D 30967 (Pages : 2) Name.....

Reg. No.....

FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, OCTOBER 2012

EE 09 506—ELECTRICAL MATERIAL SCIENCE

(2009 Scheme)

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. Name the material used for :
   (a) Electric resistor.
   (b) Brushes of electrical machines.
   (c) Filament of incandescent lamp.
   (d) Fuse wire.
2. State Curie-Weiss law.
3. Define polarization in dielectric materials.
4. Define dielectric strength of the insulating material.
5. Name any *two* devices which converts light energy into electrical energy.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

1. On what factors, the electrical conductivity of metal depends ? And explain briefly the effect of temperature on its factor.
2. With hysteresis curve, explain the behaviour of ferromagnetic material when its temperature is less than curie temperature.
3. Obtain the expression for dipolar polarization in poly atomic gases.
4. Give the brief analysis on frequency dependence of real and imaginary parts of dielectric constant of insulating material.
5. List the characteristics of good insulating material and its classification according to temperature.
6. Explain briefly the need of coating used for enhanced solar thermal energy collection and its various kinds.

(4 × 5 = 20 marks)

Turn over

Part C

Answer **all** *the questions.*

1. What is meant by the term intrinsic, donor and acceptor when applied to a semiconductor ? Differentiate between a P-type and N-type semiconductor. Explain with the help of energy diagram.

Or

2. Explain briefly the determination of energy state of electron in a solid using Fermi-Dirac distribution function for different temperatures.

Or

3. Explain briefly the behaviour of dielectrics under :
   (i) Static electric field.
   (ii) Alternating field.

Or

4. Obtain Clausius-Massotti equation relating relative permittivity with electronic Polarization move accurately.

5. What do you mean by breakdown in dielectrics ? Explain the different mechanism which describe breakdown in solid dielectrics.

Or

6. (a) Give the electrical properties and uses of the following insulating material :
   (i) Minarite.
   (ii) Transformer. (6 marks)

   (b) Discuss the effect of moisture on insulation. (4 marks)

7. (i) Explain the working principle of solar cell. What is the material used in it ? State the reason for this choice. (6 marks)

   (ii) Discuss the factor affecting output of solar cells. (4 marks)

Or

8. What is Magnetic resonance ? Explain Ferromagnetic resonance briefly. (10 marks)

[4 × 10 = 40 marks]