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Name

Reg. No.

**FIFTH SEMESTER B.TECH. (ENGINEERING) DEGREE (REGULAR/
SUPPLEMENTARY) EXAMINATION, NOVEMBER 2013**

EE/PTEE 09 506—ELECTRICAL MATERIAL SCIENCE

(2009 Scheme)

Time : Three Hours

Maximum : 70 Marks

Part A

Answer all the questions.

1. What do you mean by contact potential of conducting material ?
2. Sketch the typical hysteresis loops for soft iron and hard steel.
3. State the effect of applying static electric field to dielectric materials.
4. What are the factors which causes ageing of insulators ?
5. State the principle of photovoltaic cell.

(5 × 2 = 10 marks)

Part B

Answer any four questions.

1. Discuss the material and for electric resistances and lamp filament. State their properties and reason for their choice.
2. Explain the concept and behaviour of magnetic domain in ferromagnetic material under (a) No external field ; and (b) External field.
3. What do you understand by dipolar relaxation ? Show that dipolar relaxation leads to a complex dielectric constant of the material.
4. Explain the break-down of liquid dielectrics applying Bubble theory.
5. Giving few examples, discuss the properties and application of organic and inorganic insulating materials.
6. Briefly explain Nuclear magnetic resonance.

(4 × 5 = 20 marks)

Part C

Answer all the questions.

1. Describe briefly the conducting properties of metals on the basis of free electron theory and discuss the factors affecting conductivity of metallic conductors.

Or

Turn over



2. (a) Explain the operation of P-type and N-type semiconductor under forward and reverse bias. (7 marks)
- (b) What is the material and for construction of armature core of D.C. machine ? Discuss the reason for their choice. (3 marks)
3. Obtain Clausius–Massotti relation relating relative permittivity with electric polarization.

Or

4. (a) Explain the behaviour of ferromagnetic material with hysteresis curve. (6 marks)
- (b) What is dielectric loss ? Discuss the factors on which it depends. (4 marks)
5. Explain briefly any one mechanism leads break-down in :
- (a) Solid dielectrics.
- (b) Gaseous dielectrics.

Or

6. Give the classification of insulators on temperature basis. Discuss briefly the common insulating materials and their properties used in electrical apparatus.
7. Discuss briefly the following type of coating used in photothermal conversion system :
- (a) Cold mirror coatings.
- (b) Heat mirror coatings.

Or

8. (a) Explain the working of solar cell and draw its V-I characteristics. (5 marks)
- (b) Discuss the behaviour of an atom when it is excited by magnetic field. (5 marks)

[4 × 10 = 40 marks]