DMM-1621
M. Sc. (Physics; Sp. Materials Science)
(Sem. IV) Examination
April / May - 2016
PH(M)-543 : Properties of Materials

Time : Hours] [Total Marks : 70

Instructions :

(1) Fillup strictly the details of signs on your answer book.

Name of the Examination :
M. Sc. (PHYSICS; SP. MATERIALS SCIENCE) (SEM. 4)

Name of the Subject :
PH(M)-543 : PROPERTIES OF MATERIALS

Subject Code No. : 1621 Section No. (1, 2,.....) : Nil

Seat No. :

(2) Figures to the extreme right side indicate full marks of question.
(3) Symbols have their usual meaning.
(4) Assume data if required.

1 Attempt any two questions :

(a) Define magneto resistant. Explain the effect of Temperature on magnetic materials.

(b) Discuss on the Relative permeability, magnetization and susceptibility. Write the name of few hard magnetic materials.

(c) Define Magnetic Susceptibility. Determine the power loss due to hysteresis in a transformer core having a volume of 0.012 m³ at a frequency of 50Hz. The area of the loop is 550 J/m³.

2 Attempt any two questions :

(a) Write the types of laser and its applications. Describe with the help of schematic diagram essential elements of the fiber optic communication system.
(b) Give three examples of optical phenomena not involving the visible Spectrum. Calculate the energy of photon of infrared light with a wave length of $10^{-6}$ m. Where $h = 6.63 \times 10^{-34}$ Js and $c = 3.00 \times 10^8$ m/s.

(c) What are the difference between fluorescence and phosphorescence? Discuss on the effect of band gap on colure properties of materials.

3 Attempt any two questions:

(a) What is the distinction between electronic and ionic conduction? Discuss on superconductors and insulating materials.

(b) Define dielectric properties of materials. What are the difference between Ferroelectric and piezoelectric materials?

(c) Criticize the following statement: Ohm's law is valid only for metallic conductor's. Discuss on different types of thermocouple.

4 Attempt any two questions:

(a) Derive the equations of Kelvin-voigt model for viscoelastic materials and also define four element models.

(b) Define plastic deformation, Explain plastic deformation of a single Crystal.

(c) Discuss on selection of materials for engineering design. How to select Materials for Designing Railway track?

5 Attempt any two questions:

(a) Define fracture and fatigue. Explain Griffith theory of Brittle fracture.

(b) What is creep? Discuss on creep mechanism in metals.

(c) Explain measurement of micro-hardness for crystalline materials by Using viscer micro harness tester.