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Seat
No.

[5057]-233

S.E. (Electrical) (First Semester) EXAMINATION, 2016

MATERIAL SCIENCE

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

Physical Constants :—

(i) Angstrom Unit (AU) = 1×10^{-10} metres

(ii) Boltzmann's Constant (k) = 1.380×10^{-23} joule.degree^{-1}.

(iii) Charge on Electron (e) = 1.601×10^{-19} coulomb

(iv) Mass of Electron (m) = 9.107×10^{-31} kg

(v) Electron volt (eV) = 1.602×10^{-19} joules

(vi) Mass of Proton (m_p) = 1.627×10^{-27} kg

(vii) Velocity of light (c) = 2.998×10^8 m/sec

(viii) Dielectric Constant of free space (ε_0)

$$= 8.854 \times 10^{-12} \text{ F/m}$$

(ix) Permeability of freespace (μ_0) = $4\pi \times 10^{-7}$ H/m

(x) Debye Unit = 3.33×10^{-30} coulomb.metre.

1. (*a*) Differentiate three types of polarization namely—electronic, ionic and orientation polarization. [6]

   (*b*) Explain various factors which affect breakdown in liquid insulating materials. [6]

P.T.O.

Or

2. (*a*) Define with unit : [6]

(*i*) Electric dipole moment

(*ii*) Polarization

(*iii*) Polarizability.

(*b*) State the properties and applications of : [6]

(*i*) Porcelain

(*ii*) SF_6.

3. (*a*) Write a short note on Superconductivity and its applications. [6]

(*b*) Describe properties and applications of Tungsten and Aluminium. [6]

Or

4. (*a*) Define the following terms along with units if any : [6]

(*i*) Residual flux density

(*ii*) Coercive force

(*iii*) Saturation.

(*b*) Write properties and applications of silver and silver alloys. [6]

5. (*a*) Describe with neat diagrams :

(*i*) Carbon Fullerene and Nanobud [4]

(*ii*) Carbon Nano Tubes. [4]

(*b*) Discuss briefly, the energy bands in conductors and insulators. [5]

Or

6. (*a*) What do you mean by Single Walled and Multi Walled Nano Tubes ? [6]

(*b*) Write a short note on molecular machines. [7]

7. (*a*) Explain method of finding dielectric strength of air using sphere gap voltmeter with a neat diagram as per IS 2584. [7]

(*b*) Describe the method for measurement of dielectric strength of resins and polymers. [6]

Or

8. (*a*) With neat sketch, explain how flux density is measured with the help of Gauss meter. [6]

(*b*) Explain measurement of dielectric loss angle (tan δ) by Schering Bridge as per IS 3585-1994. [7]