Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

Seat No.	

[4757]-1033

S.E. (Electrical) (I Sem.) EXAMINATION, 2015
MATERIAL SCIENCE
(2012 PATTERN)

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

N.B. :— (*i*) Answer Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6**, Q. No. **7** *or* Q. No. **8**.

(*ii*) Figures to the right indicate full marks.

Physical Constants :

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

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

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

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

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

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

(7) Velocity of light (c) = 2.998×10^{8} m/sec

(8) Dieletric Constant of free space (ε_0) = 8.854×10^{-12} F/m

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

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

1. (*a*) Define dielectric loss tangent and explain it with phasor diagram. [6]

(*b*) Write down insulating materials used for insulators and switch gears. [6]

P.T.O.

Or

2. (*a*) Write down the materials used for various photoconductive cells. [6]

(*b*) Describe various crystal defects. [6]

3. (*a*) Describe magnetic strip technology. [7]

(*b*) Differentiate between characteristics of high and low resistive materials. [6]

Or

4. (*a*) In a material an application of magnetic field of 2.75×10^3 kA/m causes and magnetic flux density of 0.2485 Wb/m^2. Calculate its permeability, susceptibility and magnetization. [7]

(*b*) Write down properties and applications of :

(*i*) Silver and Silver alloys

(*ii*) Copper and Copper alloys. [6]

5. Write short notes on the following : [12]

(*i*) Carbon Nano-tubes (CNT)

(*ii*) Carbon clusters.

Or

6. Write short notes on the following : [12]

(*i*) Molecular Machines

(*ii*) Single Electron Transistor (SET).

7. (*a*) With neat sketch, explain how flux density is measured with the help of Gauss meter. [7]

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

Or

8. (*a*) Explain the step by step method of finding dielectric strength of transformer oil with a neat diagram as per IS 6798. [7]

(*b*) Explain various tests carried out on high voltage cables. [6]