Seat
No.

[5252]-544

SE (Electrical) (First Semester) EXAMINATION, 2017

MATERIAL SCIENCE

(2015 PATTERN)

Time : Two Hours　　　　　　　　　Maximum Marks : 50

Physical Constants :—

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

(ii)　Boltzmann's Constnat (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) = 8.854×10^{-12} F/m

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

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

1.　(a)　Explain :　　　　　　　　　　　　　　　　　　[6]

　　　(i)　Polarization

　　　(ii)　Pyroelectricity and

　　　(iii)　Ferroelectricity.

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

　　　(i)　Asbestos

　　　(ii)　Carbon.

2. (*a*) A parallel plate capacitor is used to store 16 μC at a potentil of 8 kV. The distance between the plates is 10×10^{-4} m. If the dielectric constant of the material is 20, kept between plates, what is the area of the plates ? [6]

   (*b*) Discuss insulating materials used for transmission line. [6]

3. (*a*) Explain Ferromagnetic and Ferrimagnetic materials and their applications. [7]

   (*b*) Describe the properties and applications of the following materials : [6]
   (*i*) Platinum
   (*ii*) Molybdenum.

4. (*a*) Explain in detail BH curve (hysteresis loop) for ferromagnetic materials. [6]

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

5. (*a*) Write down applications of carbon nano tubes and BN nano tubes. [6]

   (*b*) Write a short note on : ZEBRA batteries. [6]

6. (*a*) Write a short note on molecular machines. [6]

   (*b*) Explain with neat diagram, chemical reaction, applications of : [6]
   (*i*) Nickel-cadmium battery and
   (*ii*) Sodium-sulphur battery.

7. (*a*) Describe measurement of dielectric strength of solid insulating material with reference to IS. [7]

(*b*) What is dielectric loss ? Explain with a suitable phasor diagram and derivation. [6]

Or

8. (*a*) With a neat sktech explain how flux density is measured with the help of gauss meter. [7]

(*b*) How will you test transformer oil ? Explain with neat diagram the test set up. [6]