B.Sc. 1st Semester (Hons) Examination,

November–2014

PHYSICS

Paper–Phy-103

Electricity

Time allowed : 3 hours]   _[Maximum marks : 40_

Note : _Attempt **five** questions in all, selecting at least **two** questions from each unit. Use of Scientific (Non-programmable) Calculator is allowed._

Unit–I

1.   (a)   Discuss Kirchoff's laws in a.c. circuits.   5

     (b)   Where the series and parallel resonance circuits are used ?   3

2.   (a)   Apply Gauss's law to calculate the electric field at a point due to infinite plane sheet of charge.   5

     (b)   Calculate the electric flux through one face of a cube of side 1m. if the charge of 4.425C is placed at its centre.   3

3.   What do you mean by potential ? Prove that potential due to an arbitrary charge distribution of finite extent at a large distance from the distribution can always be expressed as a sum of multiple potentials.   8

4. Write note on :   4 each
   (a) A.C. Bridges
   (b) Conductors in electric field.

Unit—II

5. Calculate the electrostatic energy of an ionic crystal.

   8

6. (a) What are polar and non-polar dielectrics ? How they behave in the presence of external electric field ?   5

   (b) Is the behaviour of dielectric different in electrostatic field than in varying electric field ?

   3

7. Derive the relation

   (a) $\vec{D} = \epsilon_0 \vec{E} + \vec{P}$ 4
   (b) Derive an expression for Gauss's law in the presence of a dielectric medium.   4

8. Write note on :   4 each
   (a) Dielectric Break down
   (b) Boundary Conditions in dielectrics.