### **Model Question Paper**

Electrostatistics - Part I

Physics

# 12th Standard

### I.Answer all the Questions. II.Use blue pen only.

Time : 01:00:00 Hrs

## Section-A

1) A glass rod rubbed with silk acquires a charge of  $+8 imes 10^{-12}C$  . The number of electrons it has gained or lost

- $\hbox{(a)} \ 5\times 10^{-7} \ (gained) \ \ \hbox{(b)} \ 5\times 10^7 \ (lost) \ \ \hbox{(c)} \ 2\times 10^{-8} \ (lost) \ \ \hbox{(d)} \ -8\times 10^{-12} \ (lost)$
- 2) The electorstatic force between two point charges kept at a distance d apart, in a medium  $\varepsilon_r = 6$ , is 0.3N. The force between them at the same separation in vacuum is (a) 20 N (b) 0.5 N (c) 1.8 N (d) 2 N
- 3) Electric field intensity is 400Vm<sup>-1</sup> at a distance of 2 m from a point charge. It will be 100Vm<sup>-1</sup> at a distance?
  (a) 50 cm
  (b) 4 cm
  (c) 4 m
  (d) 1.5 m
- 4) Two point charges  $+4_q$  and  $+_q$  are placed 30 cm apart. At what point on the line joining them the electric field is zero? (a) 15 cm from the charge q (b) 7.5 cm from the charge q (c) 20 cm from the charge 4q (d) 5 cm from the charge q

5) A dipole is placed in a uniform electric field with its axis parallel to the field. It experiences(a) only a net force(b) only a torque(c) both a net force and torque(d) neither a net force nor a torque

#### Section-B

- 6) State Coulomb's law in electrostatics and represent it in vector form.
- 7) What is permittivity and relative permittivity? How are they related?
- 8) Explain the principle of superposition.
- 9) What is an electric dipole? Define electric dipole moment?
- 10) What does an electric dipole experience when kept in a uniform electric field and non-uniform electic field?

### Section-C

11)

Three capacitors are connected in parallel to a 100 V battery as shown in figure. What is the total energy stored in the combination of capacitor?

- 12) A parallel plate capacitor is maintained at some potential difference. A 3 mm thick slab is introduced between the plates. To maintain the plates at the same potential difference, the distance between the plates is increased by 2.4 mm. Find the dielectric constant of the slab.
- 13) A dielectric of dielectric constant 3 fills three fourth of the space between the plates of a parallel plate capacitor. What percentage of the energy is stored in the dielectric?

14)

Find the charges on the capacitor shown in figure and the potential difference across them.

15) Three capacitors each of capacitance 9 *pF* are connected in series (i) What is the total capacitance of the combination? (ii) What is the potential difference across each capacitor, if the combination is connected to 120V supply?

#### Section-D

16) What is an electric dipole? Derive an expression for the electric field due to an electric dipole at a point on its axial line.

17) Derive an expression for the electric potential at a point due to an electric dipole. Discuss the special cases.







Reg.No. :

5 x 3 = 15

 $5 \times 5 = 25$ 

Total Marks: 65

 $5 \times 1 = 5$