Virudhunagar District
**Common First Mid Term Test - 2024**

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Standard 12
PHYSICS

Time: 1.30 Hours   Marks: 50

I. Choose the correct answer: $10 \times 1 = 10$

1) An electric dipole is placed at an alignment angle of 30° with an electric field of 2×10^5 NC^{-1}. If experiences a torque equal to 8 Nm. If the dipole length is 1cm, the change on the dipole is
   a) 4 mc
   b) 8mc
   c) 5 mc
   d) 7 mc

2) The capacitance of a parallel plate capacitor increases from 5 μF to 50 μF. when a dielectric is filled between the plates. The permitivity of the dielectric is
   a) 9×10^9 Nm^2 C^{-2}
   b) 10×10^{-12} N^{-1}C^{2}m^{-2}
   c) 12×10^{-12} C^{2}N^{-1}m^2
   d) 8.85×10^{-11} C^{2}N^{-1}m^{-2}

3) Two identical conducting balls having positive charge q_1 and q_2 are separated by a center to center distance 'r'. If they are made to touch each other and then separated to the same distance, the force between them will be
   a) less than before   b) same as before   c) more than before   d) zero

4) Which of the following cannot be the unit of electric field intensity?

   a) NC^{-1}
   b) Vm^{-1}
   c) JC^{-1}/m
   d) JC^{-1}

5) Which charge configuration produces uniform electric field?
   a) point charge
   b) uniform changed infinite line
   c) uniform charged infinite plane
   d) uniform charged spherical shell

6) A toaster operating at 240 V has a resistance of 120 ohm, Its power is
   a) 400 W
   b) 2 W
   c) 480 W
   d) 240 W

7) The internal resistance of a 2.1 V cell which gives a current of 0.2 A through a resistance of 10 Ω is
   a) 0.2 Ω
   b) 0.5 Ω
   c) 0.8 Ω
   d) 1.0 Ω

8) A wire of resistance 2 Ohm permeter is bent ot form a circle of radius 1 m. The equivalent resistance between its two diametrically opposite points A and B as shown in the figure is

   a) π Ohm
   b) $\pi/2$ Ohm

   c) 2π Ohm
   d) $\pi/4$ Ohm

9) A wire connected to a power supply of 220 V has power dissipation P_1. Suppose the wire is cut into two equal pieces and connected parallel to the same power supply. The power dissipation is P_2. The ratio P_2/P_1 is
   a) 1
   b) 2
   c) 3
   d) 4

10) The potential difference across the terminals of a cell varies with the current drawn from the cell according to the graph.
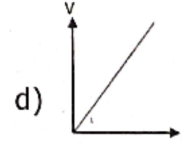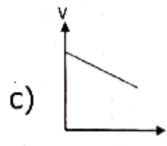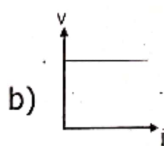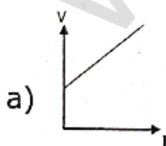
II. Answer any 6 of the following questions: Q.No. 19 is compulsory $6 \times 2 = 12$

11) Define electric field intensity.
12) Two electric field lines never intersect. Why?
13) When two objects are rubbed with each other approximately a charge of 50 nC is produced. Calculate the number of electrons that must be transferred to produce this charge.

14) Define electric dipole and electric dipole moment.
15) Define current density.
16) Write down the various forms of expression for power in the electric circuit.
17) HCl molecules are kept in an electric field of 3×10^4 NC^{-1}. They experience a dipole moment 3.4×10^{-30} cm, calculate the maximum the torque experienced by the HCl molecules.
18) State the principle of potentio meter.
19) The potential difference across 24 Ohm resistor is 12 V, Calculate the current flowing through the resistor.

III. Answer any 6 of the following questions: Q.No. 28 is compulsory   6×3=18

20) What are the differences between Coulomb force and gravitational force
21) Derive an expression for electric potential at a point due to a point charge.
22) In a Meterbridge experiment a known resistance of 10Ω is used, the balancing length $l_1 = 55$ cm is obtained. Find the value of unknown resistance.
23) Calculate the effective capacitance of capacitors connected in series.
24) Write the applications of Seeback effect
25) State Kirchoff's I and II law
26) How will you compare the emfs of two given cells using potentiometer?
27) Calculate the total emf and total current of the circuit.

$$qv \quad qv \quad qv \quad qv$$

I↓   0.1Ω 0.1Ω 0.1Ω 0.1Ω

10 Ω
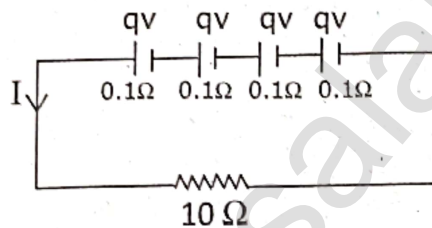
28) Calculate the total capacitance and charge on 6 μF capacitor in the given circuit.

6 μF

8 μF   2 μF   8 μF

qv
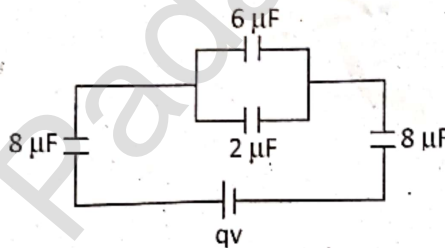
IV. Answer the following questions in detail: 2×5=10

29) a) Discuss the effect of introducing dielectric inside the parallel plate capacitor when the capacitor is disconnected from the battery.

(OR)

b) Explain the microconcept of electric current and obtain microscopic expression for Ohm's law.

30) a) Obtain the balancing condition of wheat stone's bridge by applying kirch off's laws.

(OR)

b) State Gauss law. Obtain the expression for electric field due to an infinitely long charged wire.

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