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SAMPLE PAPER UNIT I
2025-26

STD: - XII

Sub:- Physics **Time:- 2 Hours**
Date: - **Marks: - 50**

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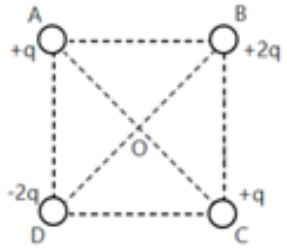
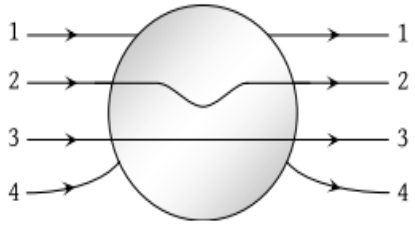
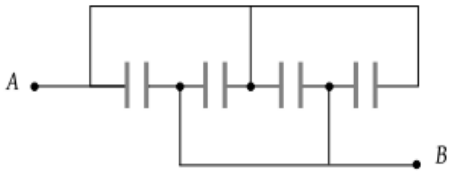
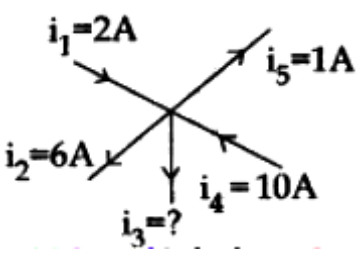
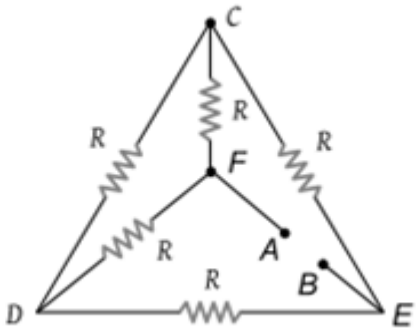
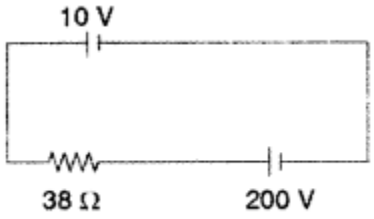
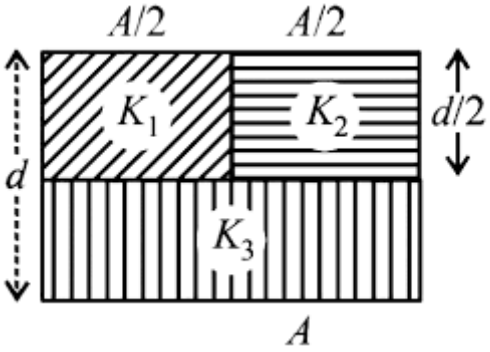
General Instructions:

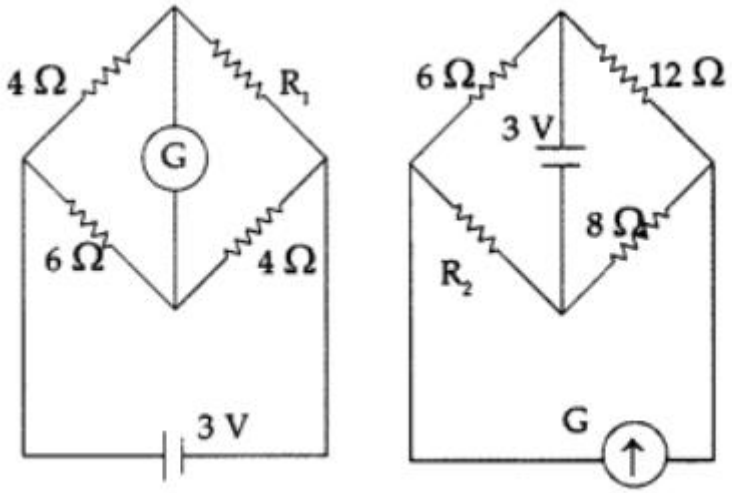
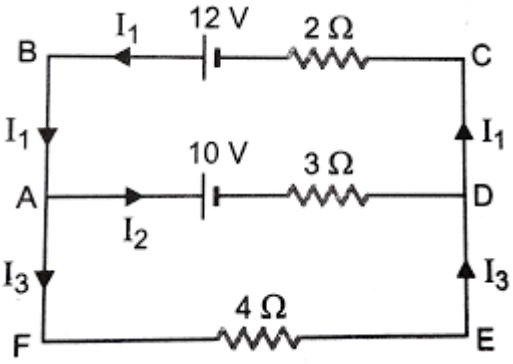
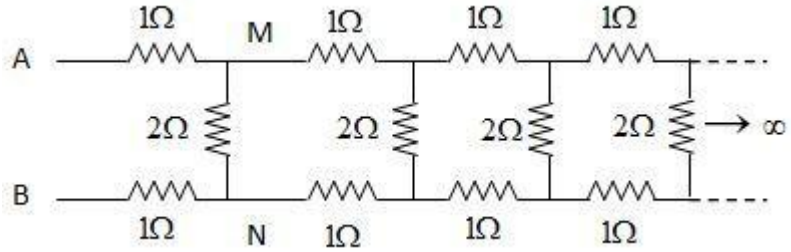
(1) All questions are compulsory. There are 25 questions in all.
(2) This question paper has five sections: Section A, Section B, Section C, Section D and Section E. All the sections are compulsory.
(3) Section A contains thirteen questions, nine MCQ and four Assertion Reasoning based of 1 mark each, Section B contains four questions of two marks each, Section C contains five questions of three marks each, Section D contains one case study-based questions of four marks each and Section E Contains two long answer questions of five marks each.

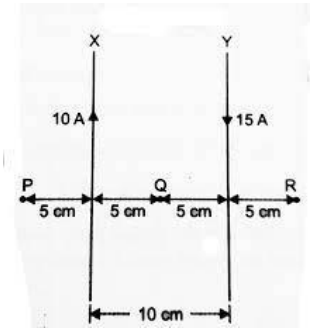
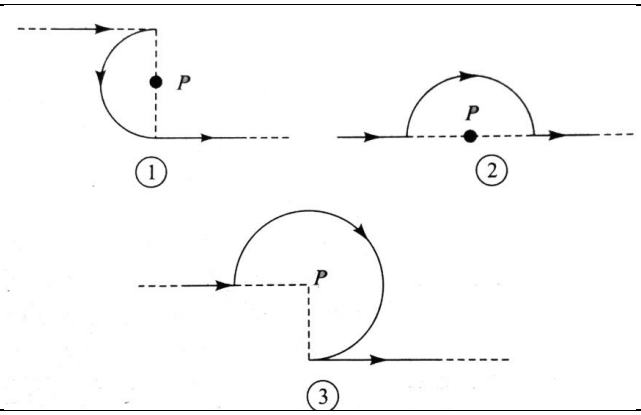
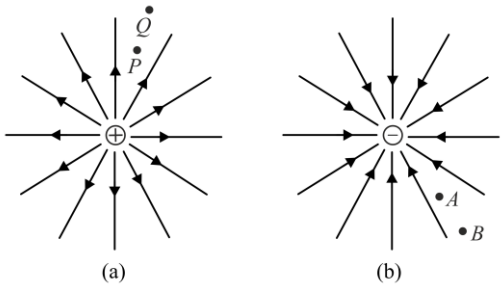
	SECTION A	
1	Four charges are arranged at the corners of a square ABCD, as shown in the adjoining figure. The force on the charge 5q kept at the centre O is  (a) Zero (b) Along the diagonal AC (c) Along the diagonal BD (d) Perpendicular to side AB.	1M

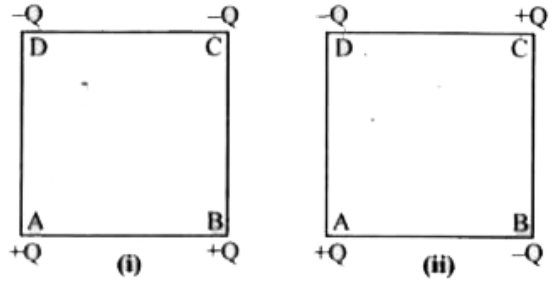
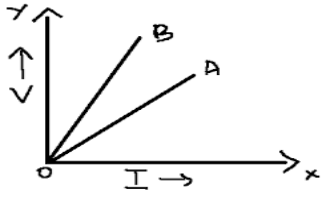
2	A metallic solid sphere is placed in a uniform electric field. The lines of forces follow the path (s) shown in the figure as (a) 1 (b) 2 (c) 3 (d) 4  	1M
3	The electric flux from a cube of edge ι is Φ. What will be its value if the edge of the cube is doubled and charge enclosed is halved? (a) 1/2 Φ (b) 2 Φ (c) 4 Φ (d) Φ	1M
4	Four condensers are joined as shown in the adjoining figure.The capacity of each is 8μF. The equivalent capacity between A and B will be ____ μF. (a) 32 (b) 2 (c) 8 (d) 16  	1M
5	Eight small drops, each of radius r and having same charge q are combined to form a big drop. The ratio between the potentials of the bigger drop to the smaller drop is (a) 8:1 (b) 4:1 (c) 2:1 (d) 1:8	1M
6	A cell of e.m.f. 'E' and internal resistance r is connected in series with an external resistance nr. Then the ratio of the terminal potential difference to e.m.f. is (a) 1/n (b) 1/n+1 (c) n/n+1 (d) n+1/n	1M
7	The value of current i_3 is ____ A.  (a) 7 (b) 6 (c) 5 (d) 12	1M

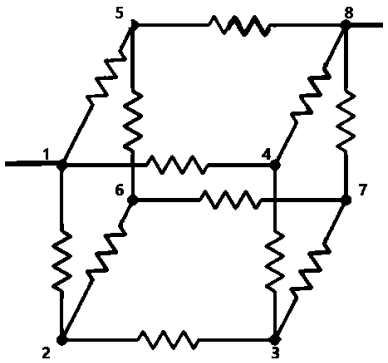
8	A wire of resistance R is cut into n equal parts. These parts are then connected in parallel. The equivalent resistance of the combination will be (a) nR (b) R/n (c) n/R (d) R/n^2	1M
9	Five equal resistances of each R are connected as shown in the figure. A battery of V volts is connected between A and B .The current flowing in AFCEB will be (a) 3V/R (b) V/R (c) V/2R (d) 2V/R 	1M
10	For question numbers 10, 11, 12 and 13, two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. a) Both A and R are true and R is the correct explanation of A b) Both A and R are true but R is NOT the correct explanation of A c) A is true but R is false d) A is false and R is also false e) A is false and R is true Assertion: The potential difference between any two points in an electric field depends only on initial and final position. Reason: Electric field is a conservative field so the work done per unit positive charge does not depend on path followed.	1M
11	Assertion : Polar molecules have permanent dipole moment. Reason : In polar molecules, the centres of positive and negative charges coincide even when there is no external field.	1M
12	Assertion(A): No work is done in moving a test charge from one point to another over an equipotential surface. Reason(R): Electric field is always normal to the equipotential surface at every point.	1M
13	Assertion(A): The potential inside a hollow spherical charged conductor is zero. Reason(R): Inside the hollow spherical conductor electric field is constant.	1M

	SECTION B **All questions are compulsory. In case of internal choices, attempt anyone.**	
14	A 10 V battery of negligible internal resistance is connected across a 200 V battery and a resistance of 38Ω as shown in the figure. Find the value of the current in circuit.  	2 M
15	Find the effective capacitance.  	2 M
16	Two-point charges +4 pC and +1 pC are separated by a distance of 2 m in air. Find the point on the line-joining charges at which the net electric field of the system is zero.	2 M
17	Derive an expression for the pitch of the helical path of charged particle. **OR** A uniform magnetic field of magnitude 1.5 T is directed horizontally from west to east. (a) What is the magnetic force on a proton at the instant when it is moving vertically downward in the field with a speed of 4×10^7m/s ? (b) Compare this force with the weight w of a proton.	2 M
	SECTION C **All questions are compulsory. In case of internal choices, attempt any one**	
18	A cylindrical conductor of radius 'R 'carries a current 'i'. The value of magnetic field at a point which is R/4 distance inside from the surface is 10T .Find the value of magnetic field at point which is 4R distance outside from the surface. **OR** Derive an expression for the magnetic field inside, outside and on the cylindrical conductor carrying current i of radius R .	3 M

19	What is drift velocity? Derive expression for drift velocity of electrons in a good conductor in terms of relaxation time of electrons? **OR** In the circuits shown in the figures, the galvanometer shows no deflection in each case. Find the ratio of R_1 to R_2. 	3 M
20	Find the current in each branch.  **OR** Find the equivalent resistance across A and B. 	3 M

21	Derive an expression for the force acting between like currents (parallel conductors carrying current i_1 and i_2) and separated by distance d and hence define 1 A. **OR**  Find the magnetic field at points P,Q and R respectively.	3 M
22	 Find the net magnetic field in each of the cases.	3 M
	SECTION D **Questions 23 is a Case Study based question and is compulsory. Each question carries 1 mark.**	
23	 Observe figures (a) and (b) and answer the following questions. (i) Give the sign of the potential difference $V_P - V_Q$, $V_B - V_A$. (ii) Give the sign of the work done by the field in moving a small positive charge from Q to P. (iii) Give the sign of the work done by the external agency in moving a small negative charge from B to A. (iv) Does the kinetic energy of a small negative charge increase or decrease in going from B to A ?	4M

	SECTION E **All questions are compulsory. In case of internal choices, attempt anyone.**	
24	(a)Two-point charges, $q_1 = 10 \times 10^{-8}$ C, $q_2 = -2 \times 10^{-8}$ C are separated by 60 cm in air. (i) Find at what distance from the 1st charge, q_1 would the electric potential be zero. (ii) Also calculate the electrostatic potential energy of the system. (b) Find the value of electric field and potential at point of intersection of two diagonals of a square of side 'a' in figure (i) and (ii).  **OR** (a) An infinite line charge produces a field of 9 x10 ^{4} NC^{-1} at a distance of 2 cm. Calculate the linear charge density. (b) Derive an expression for an electric field at a point in the equatorial plane of an electric dipole of dipole moment p .	5 M
25	(a) Two cells of emfs 1.5 V and 2.0 V having internal resistance 0.2 Ω and 0.3 Ω respectively are connected in parallel. Calculate the emf and internal resistance of the equivalent cell. (b) Compare resistances of A and B.  (c)State an expression between resistivity of the material of a conductor and relaxation time of electrons. **OR** (a) Find the equivalent resistance between points 1 and 8 with respect to	5 M

	the figure.  (b)If the temperature of a conductor decreases ,find the change in the relaxation time of electrons. (c) A current I flow in a wire of circular cross-section with the free electrons travelling with a drift velocity v. Find the drift velocity of electrons when a current 2I flows in another wire of twice radius and of the same material .	

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Sr. No.	CHAPTERS	1 Mark	4 Marks CASE STUDY	2 Marks	3 Marks	5 Marks	Total
1	Electric Charges and Fields	1 x 3 = 3	-	2 x 1 = 2	-	5 x 1= 5	10
2	Electrostatic Potential and Capacitance	1 x 6 = 6	4 x 1 = 4	-	-	-	10
3	Current Electricity	1 x 4 = 4	-	2 X 2 = 4	3 X 2 = 6	5 x 1= 5	19
4	Moving Charges and magnetic effects of electri current	-	-	2 x 1 = 2	3 X 3 =9	-	11
	Total	13	4	8	15	10	50

Sr.No.	Typology of Questions	VSA 1 mark	CASE STUDY	SA 2 marks	LA I 3 marks	LA II 5 marks	MARKS	Percentage