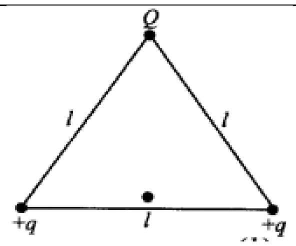
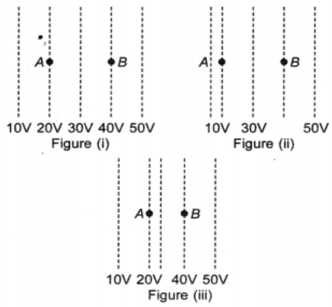
KENDRIYA VIDYALAYA SANGATHAN, ZIET CHANDIGARH

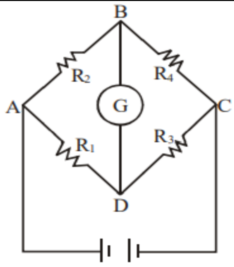
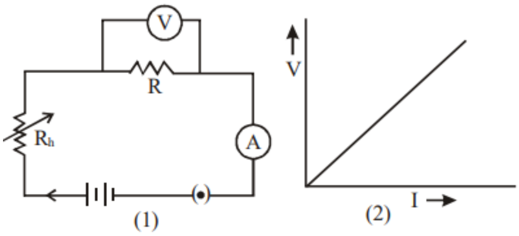
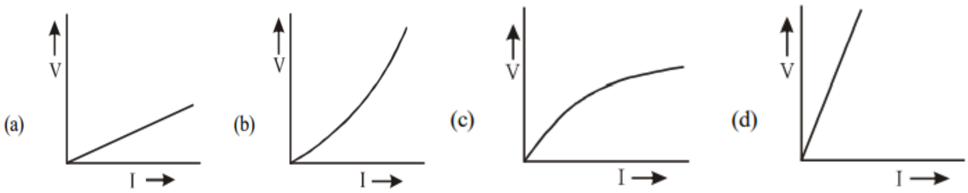
PERIODIC TEST 2023-24 - CLASS XII PHYSICS

PRACTICE PAPER 3 (ELECTROSTATICS & ELECTRICITY)

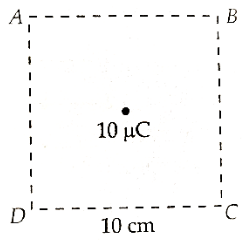
TIME: - 90 min **MM 40**

NOTE- All questions are compulsory
SECTION A contains 10 MCQs of 1 mark each, SECTION B contains 3 questions of 2 marks each SECTION C contains 5 questions of 3 marks each, SECTION D contains 1 case study-based question of 4 marks, SECTION E contains 1 long answer question of 5 marks.

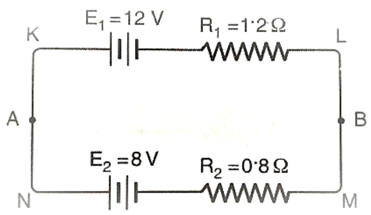
S. No.		MARKS
1	A body can be negatively charged by (a)Giving excess of electrons to it (b)Removing some electrons from it (c)Giving some protons to it (d)Removing some neutrons from it	**1**
2	Three charges Q, +q and +q is placed at the vertices of an equilateral triangle of side l as shown in the figure. If the net electrostatic energy of the system is zero, then Q is equal to (a) -q (b) +q (c) zero (d) –q/2  	**1**
3	Figures show some equipotential lines distributed in space. A charged object is moved from point A to point B. (a) The work done in Fig. (i) is the greatest. (b) The work done in Fig. (ii) is least. (c) The work done is the same in Fig. (i), Fig.(ii) and Fig. (iii). (d) The work done in Fig. (iii) is greater than Fig. (ii) but equal to that in Fig. (i).  	**1**
4	Quantization of charge was experimentally demonstrated by (a) Einstein's photoelectric effect (b) Frank-Hertz experiment (c) Davisson and Germer experiment (d) Millikan's oil drop experiment	**1**
5	Emf of a cell is (a) the maximum potential difference between the terminals of a cell when no current is drawn from the cell. (b) the force required to push the electrons in the circuit. (c) the potential difference between the positive and negative terminal of a cell in a closed circuit. (d) less than terminal potential difference of the cell.	**1**

6	In the figure in balanced condition of Wheatstone's bridge a) B is at higher potential (b) D is at higher potential (c) Any of the two B or D can be at higher potential than other arbitrarily. (d) B and D are at same potential. 	**1**
7	The figure (1) shows the experimental set up for verification of Ohm's law. Graph obtained for this set up is shown in figure (2). If the resistance R is changed with a new resistance of value 2R and the experiment is repeated again then which of the following will be the correct V-I graph?  	**1**
8	**Answer:(a) Both are correct and reason is correct explanation of assertion.** **Answer: (b) Both are correct but reason is not the correct explanation of assertion.** **Answer:(c) Reason is wrong.** **Answer:(d) Both are wrong.** Assertion: The coulomb force is the dominating force in the universe. Reason: The coulomb force is weaker than the gravitational force.	**1**
9	**Answer:(a) Both are correct and reason is correct explanation of assertion.** **Answer: (b) Both are correct but reason is not the correct explanation of assertion.** **Answer:(c) Reason is wrong.** **Answer:(d) Both are wrong.** Assertion: A current flows in a conductor only when there is an electric field within the conductor. Reason: The drift velocity of electron in presence of electric field decreases.	**1**
	SECTION B	
10	Show that $\boldsymbol{\rho = \frac{m}{ne^2\tau}}$, where symbols have their usual meaning.	**2**
11	Discuss the different methods of charging a conductor.	**2**
12	An electron and a proton are kept in the same electric field. Will they experience same force and have same acceleration?	**2**

<table>
<tr><td>13</td><td>what is the work done in moving a 2μC point charge from corner A to corner B of a square ABCD as shown in fig. when a 10 μC charge exists at the centre of the square?



</td><td>2</td></tr>
<tr><td>14</td><td>Define relaxation time of electrons in a conductor. Explain how it varies with increase in temperature of a conductor.</td><td>2</td></tr>
<tr><td></td><td>SECTION C</td><td></td></tr>
<tr><td>15</td><td>Obtain the expression for the energy stored per unit volume in a charged parallel plate capacitor. $\mathbf{u} = \frac{1}{2} \in_o \boldsymbol{E^2}$</td><td>3</td></tr>
<tr><td>16</td><td>Two-point charges of +16μC and -9 μC are placed 8 cm apart in air. Determine the position of the point at which the resultant electric field is zero.</td><td>3</td></tr>
<tr><td>17</td><td>A parallel plate capacitor is charged to a potential difference V by a d.c. source. The capacitor is then disconnected from the source. If the distance between the plates is doubled, state with reason how the following will change:
(i) electric field between the plates,
(ii) capacitance and
(iii) energy stored in the capacitor.</td><td>3</td></tr>
<tr><td>18</td><td>In the electrical circuit find the potential difference between the points A & B.



</td><td>3</td></tr>
<tr><td></td><td>SECTION D</td><td></td></tr>
<tr><td>19</td><td>According to Ohm's law, the current flowing through a conductor is directly proportional to the potential difference V across the ends of the conductor i.e. I ∝ V => $\frac{V}{I}$ ∝ R, where R is resistance of the conductor.
Electrical resistance of a conductor is the obstruction posed by the conductor to the flow of electric current through it. It depends upon length, area of cross-section, nature of material and temperature of the conductor.
We can write, R ∝ $\frac{V}{I}$ or R= $\rho \frac{l}{A}$ where p is electrical resistivity of the material of the conductor.
1. Dimensions of electric resistance is
(a) $[ML^2 T^{-2}A^{-2}]$ (b) $[ML^2 T^{-3}A^{-2}]$ (c) $[M^{-1}L^{-2}T^{-1} A]$ (d) $[M^{-1} L^2T^2A^{-1}]$
2. Specific resistance of a wire depends upon
(a) length (b) cross-sectional area
(c) mass (d) none of these</td><td>4</td></tr>
</table>

	3. The slope of the graph between potential difference and current through a conductor is (a) a straight line (b) curve (c) first curve then straight line (d) first straight line then curve 4. The resistivity of the material of a wire 1.0 m long, 0.4 mm in diameter and having a resistance of 2.0 ohm is (a) 1.57×10^{-7} Ωm (b) 5.25×10^{-7} Ωm (c) 7.12×10^{-7} Ωm (d) 2.55×10^{-7} Ωm OR If 1 μA current flows through a conductor when potential difference of 2 V is applied across its ends, then the resistance of the conductor is (a) 2×10^{6} Ω (b) 3×10^{5} Ω (c) 1.5×10^{5} Ω (d) 5×10^{7} Ω	
	SECTION E	
20	(a) Find the dimensions of electric potential. 1+2+2 (b) Define equipotential surfaces. (c) Derive expression for potential energy of an electric dipole placed in a uniform electric field.	**5**