No of printed Pages: 03

INDIAN SCHOOL SOHAR
UNIT TEST I - 2024-25
PHYSICS (042)
SET-2

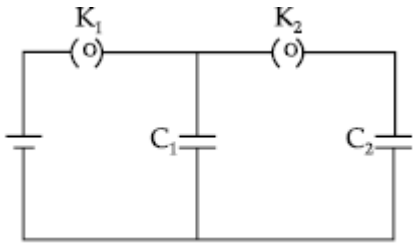
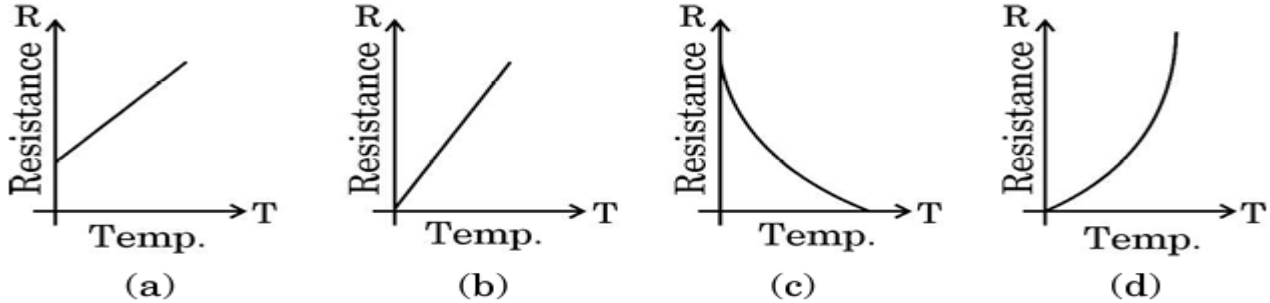
CLASS: XII **Max Marks: 20**
DATE: 22-05-2024 **Time: 45 Minutes**

General Instructions:

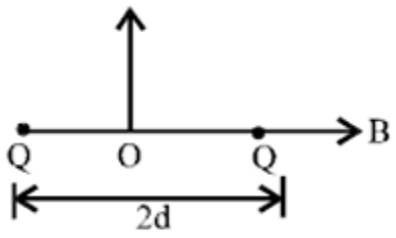
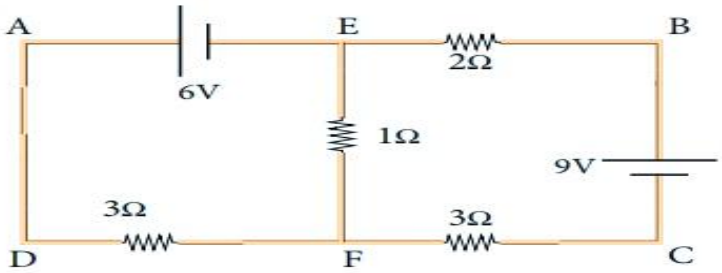
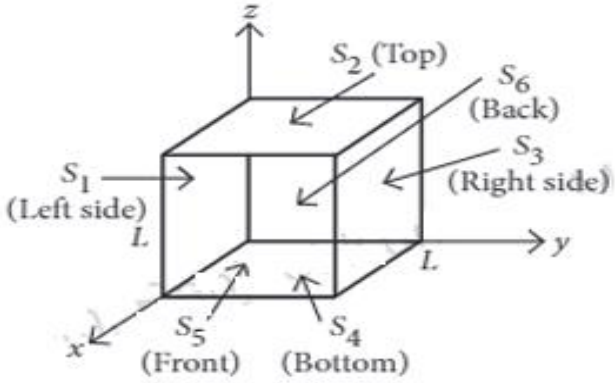
(i) There are 10 questions in all. All questions are compulsory.
(ii) This question paper has five sections: Section A, Section B, Section C, Section D and Section E.
(iii) Section **A** contains **six** questions of **one** mark each, Section **B** contain **one** question of **two** marks, Section **C** contain **one** question of **three** marks, Section **D** contains **one case study-based** question of **four** marks and Section **E** contain one question of **five** marks.
(iv) There is no overall choice. However, an internal choice has been provided in one question of five mark. You have to attempt only one of the choices in such questions.

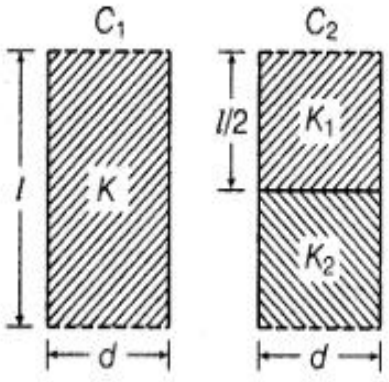
Section - A

All questions are compulsory. In case of internal choices, attempt any one of them.

1	A point charge situated at a distance r from the short dipole on its axis, experience a force a F. if the distance of the charge is 2r, the force on the charge (a) F/16 (b) F/8 (c) F/4 (d) F/2	1
2	In the circuit shown in Figure, initially key K_1 is closed and key K_2 is open. Then K_1 is opened and K_2 is closed.  (a) Voltage across C1 = Voltage across C2 (b) Voltage across C1 > Voltage across C2 , if C1 > C2 (c) Charge on C1 = charge on C2 (d) None of the above.	1
3	The potential difference across a cell in an open circuit is 8 V. It falls to 4 V when a current of 4 A is drawn from it. The internal resistance of the cell is: (a) 4 (b) 3 (c) 2 (d) 1	1
4	For a metallic conductor, the correct representation of variation of resistance R with temperature T is :  	1

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 and R is not the correct explanation of A.
c) A is correct but R is incorrect
d) A is incorrect and R is also incorrect.

5	**Assertion:** Consider two identical charges placed distance 2d apart, along x axis. The equilibrium of a positive test charge placed at the point O midway between them is stable for displacements along the x-axis.  **Reason:** Force on test charge is zero.	1
6	**Assertion:** Two metal plates having charges Q, –Q face each other at some separation and are dipped into an oil tank. If the oil is pumped out, the electric field between the plates increases. **Reason:** Electric field between the plates, $E_{med} = E_{air}/K$**.**	1
	Section - B	
7	Write two differences between the emf and terminal potential difference of a cell. What is the most important precaution that one should take while drawing current from a cell?	2
	Section - C	
8	Calculate the current that flows in the 1 Ω resistor in the following circuit.  	3
	Section - D (CASE STUDY)	
9	**Read the following text and answer the following questions on the basis of the same:** **Electric Flux through a Cube** Net electric flux through a cube is the sum of fluxes through its six faces. Consider a cube as shown in figure have sides of length L = 10.0 cm. The electric fiddle is uniform has a magnitude E = 4. 00 x 10^3 N/C and is parallel to the xy plane at an angle of 37^0 measured form the + x-axis towards the + y-axis.  i) Electric flux passing though surface s6 is (a) -24 N m^2 C^{-1} (b) 24 N m^2 C^{-1} (c) 32 N m^2 C^{-1} (d) -32 N m^2 C^{-1}	4

	ii) Electric flux passing though surface s3 is (a) -24 N m^2 C^{-1} (b) 24 N m^2 C^{-1} (c) 32 N m^2 C^{-1} (d) -32 N m^2 C^{-1} iii) the surfaces that have zero flux are (a) s1 and s2 (b) s5 and s6 (c) s2 and s4 (d) s3 and s2 iv) the total net electric flux throuhg all faces of the cube is a) 8 N m^2 C^{-1} (b) -8 N m^2 C^{-1} (c) 23 N m^2 C^{-1} (d) zero OR The dimesional forumul of surface intergral $\oint \vec{E} \cdot d\vec{S}$ of an electric field is (a) $[ML^3I^{-1}T^{-3}]$ (b) $[M^2L^2I^{-1}T-2]$ (c) $[ML^3I^1T^{-3}]$ (c) $[ML^{-3}I^{-1}T^{-3}]$.	
	Section - E **In case of internal choices, attempt any one of them.**	
10	i) Parallel plate capacitor of capacitance C is charged to a potential V. It is then connected to another uncharged capacitor having the same capacitance. Find out the ratio of the energy stored in the combined system to that stored initially in the single capacitor. ii) Two identical parallel plate (air) capacitors C1 and C2 have capacitance C each. The space between their plates is now filled with dielectrics as shown in the figure. If the two capacitors still have equal capacitance, then obtain the relation between dielectric constants K, k1 and k2  **OR** (i) A parallel plate capacitor is charged by a battery to a potential. The battery is disconnected and a dielectric slab is inserted to completely fill the space between the disconnected and a dielectric slab is inserted to completely fill the space between the plates. How will (a) its capacitance (b) electric field between the plates and (c) energy stored in the capacitor be affected? Justify your answer giving necessary mathematical expressions for each case. (ii) (a) Draw the electric field lines due to a conducting sphere. (b) Draw the electric field lines due to a dipole.	5