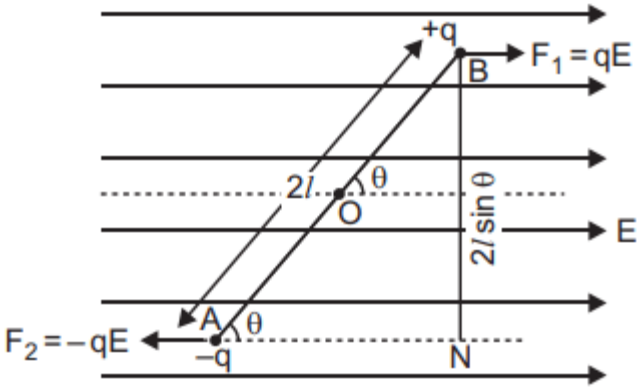
THE VILLAGE
INTERNATIONAL SCHOOL
"We Nurture Dreams"

GRADE - XII **01/08/2023**	**MT- 2 [2023-2024]** **PHYSICS**	**Max Marks - 20** **TIME – 50 min**

	Section A	
1	When the charge of a body becomes half, the electric field becomes A. Half B. Twice C. Thrice D. No change	**1**
2	What is the nature of gaussian surface involved in Gauss's law of electrostatics? A. Scalar B Electrical C Magnetic D Vector	**1**
3	Which of the following has higher magnetic susceptibility? (a) diamagnetic (b) paramagnetic (c) ferromagnetic (d) None of these	**1**
4	Assertion and Reasoning: These questions consist of two statements, each printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following four responses. Assertion: If direction of velocity of charge is parallel to applied magnetic field then the force experienced by moving charge will be maximum. Reason: Force on moving charge is independent of direction of applied magnetic field. A) Both Assertion and Reason are correct and Reason is the correct explanation for Assertion. B) Both Assertion and Reason are correct but Reason is not the correct explanation for Assertion.	**1**

	C) Assertion is correct but Reason is incorrect. D) Both Assertion and Reason are incorrect.	
	Section B	
5	A straight wire of length 0.5 meter and carrying a current of 1.2 A is placed in uniform magnetic field of induction 2 T. The magnetic field is perpendicular to the length of the wire. calculate the force on the wire	**2**
6	Write four differences between paramagnetic and diamagnetic substance.	**2**
	Section C	
7	Draw relevant diagram and derive the expression for electric field due to an electric dipole in equatorial line, sketch E-r graph for the same	3
	Section D	
8	State Biot-Savart law. Explain with neat diagram the magnetic field at a point X distance from the center of circular current carrying coil in anticlockwise direction OR Define electric flux. Write its SI unit. State and applying Gauss' law to calculate the electric field due to a uniformly charged long straight wire.	5
	Section E	
	Case Study Based Question : Read the Case Study given below and answer the question that follow:	**1X4=4**
9	When electric dipole is placed in uniform electric field, its two charges experience equal and opposite forces, which cancel each other and hence net force on electric dipole in uniform electric field is zero. However these forces are not collinear, so they give rise to some torque on the dipole. Since net force on electric dipole in uniform	

electric field is zero, so no work is done in moving the electric dipole in uniform electric field. However, some work is done in rotating the dipole against the torque acting on it.



(i) The dipole moment of a dipole in a uniform external field $\bar{E}$ is B. Then the torque τ acting on the dipole is

(a) $\tau = p \times E$

(b) $\tau = P.\ \bar{E}$

(c) $\tau = 2(p + \bar{E})$

(d) $\tau = (P + E)$

(ii) Torque on a dipole in uniform electric field is minimum when θ is equal to

(a) 0°

(b) 90°

(c) 180°

(d) Both (a) and (c)

(iii) When an electric dipole is held at an angle in a uniform electric field, the net force F and torque τ on the dipole are

(a) $F = 0, \tau = 0$

(b) $F \neq 0, \tau \neq 0$

(c) $F = 0, \tau \neq 0$

(d) $F \neq 0, \tau = 0$

(iv) An electric dipole consists of two opposite charges, each of magnitude 1.0 μC separated by a distance of 2.0 cm. The dipole is placed in an external field of 10^5 NC^{-1}. The maximum torque on the dipole is

(a) 0.2×10^{-3} Nm

(b) 1×10^{-3} Nm

(c) 2×10^{-3} Nm

(d) 4×10^{-3} Nm