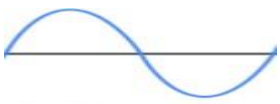
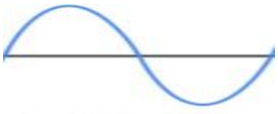
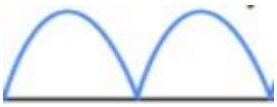
THE VILLAGE
INTERNATIONAL SCHOOL
"We Nurture Dreams"

GRADE - XII **10/06/2024**	**MT- 1[2024-2025]** **PHYSICS**	**Max Marks - 20** **TIME – 50 min**

	Section A	
1	An electric dipole of dipole moment 2×10^{-8} C-min a uniform electric field experiences a maximum torque of 6×10^{-11} N-m.The magnitude of electric field is (a)22×10^{3} Vm^{-1} (b)12×10^{3} Vm^{-1} (c)3×10^{7} Vm^{-1} (d)4×10^{7} Vm^{-1}	**1**
2	Forward biasing is that in which applied voltage (a) increases potential barrier (b) cancels the potential barrier (c) is equal to 1.5 volt (d) None of these	**1**
3	What is the ratio of number of holes and number of conduction electrons in an n type extrinsic semiconductor (a) 1 (b)more than1 (c)less than 1 (d) 0	**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**: A point charge is brought in an electric field, the field at a nearby point will increase or decrease, depending on the nature of charge. **Reason:** The electric field is independent of the nature of charge.	**1**

	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. C) Assertion is correct but Reason is incorrect. D) Both Assertion and Reason are incorrect.	
	Section B	
5	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	**2**
6	An isolated point charge particle produces an electric field E at a point 3m away from it. The distance of the point at which the field is E/4 will be	**2**
	Section C	
7	1. An ac signal is fed to circuits X and Y and output is given  X   Y  (a) Identify the circuits X and Y (b) Briefly explain the working of circuit Y	3
	Section D	

8	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	A microwave oven or simply microwave is an electric oven that heats and cooks food by exposing it to electromagnetic radiation in the microwave frequency range.[1] This induces polar molecules in the food to rotate and produce thermal energy in a process known as dielectric heating. Microwave ovens heat foods quickly and efficiently because excitation is fairly uniform in the outer 25–38 mm (1–1.5 inches) of a homogeneous, high-water-content food item. The development of the cavity magnetron in the United Kingdom made possible the production of electromagnetic waves of a small enough wavelength (microwaves) to efficiently heat up water molecules. American engineer Percy Spencer is generally credited with inventing the modern microwave oven after World War II from radar technology developed during the war. Named the "Rada Range", it was first sold in 1947. 1. Which of the following electromagnetic radiations have the longest wavelength? (a) X-rays (b) γ-rays (c) microwaves (d) radio waves. 2. Why does a microwave oven heat up a food item containing water molecules most efficiently? (a) Microwaves are heat waves, so always produce heating (b) Infrared waves produce heating in a microwave oven	

(c) Energy from the microwaves is transferred efficiently to the kinetic energy of water molecules at their resonant frequency.

(d) The frequency of microwaves has no relation with natural frequency of water molecules.

3. Microwaves are

(a) Transverse electromagnetic wave

(b) Longitudinal electromagnetic wave

(c) Stationary wave

(d) None of the above

4. Which of the following rays are not electromagnetic waves?

(a) γ-rays

(b) β-rays

(c) Microwaves

(d) Heat rays

OR

4. Microwaves are used in

(e) Radar system for aircraft navigation

(f) Long-distance communication systems via geostationary satellites

(g) Microwave ovens

(h) All of the above