



**VAAGAI VIDHYALAYA**  
**MATRIC.HR.SEC.SCHOOL H.PUDUPATTI**  
**I- HALF PORTION EXAMINATION -2023**

CLASS : XII  
 SUBJECT : PHYSICS (VOLUME - I)  
 DATE : 28.11.2023

MARKS : 70  
 TIME : 3.00hrs

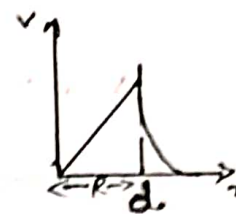
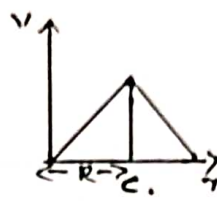
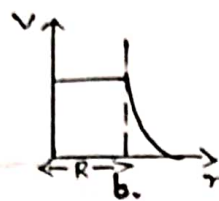
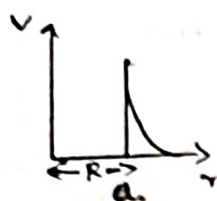
**PART - I**

**I. Answer the following questions:**

15x1=15

- The flux linked with a coil of any instant  $t$  is given by  $\phi_B = 15t^2 - 50t + 250$ . The induced emf at  $t = 3s$  is  
 a. -40 V                      b. -190 V                      c. 40 V                      d. -10V.
  - A wire connected to power supply of 230 V has power dissipation  $P_1$ . Suppose the wire is cut into two equal pieces and connected parallel to the same power supply. In this case power dissipation is  $P_2$ , The ratio  $\frac{P_2}{P_1}$  is  
 a. 1                      b. 2                      c. 3                      d. 4
  - Magnetic induction at the centre of the ring as shown in diagram.  
 a. 0.2T                      b. 0.5T  
 c. 0 T                      d. 1.0T
- 
- An electric dipole moment  $P$  is placed in a uniform electric field of intensity  $E$  at an angle  $\theta$  with respect to the field. The direction of the torque is  
 a. along the direction of  $P$                       b. opposite to the direction of  $P$   
 c. Along the direction of  $E$                       d. Perpendicular to the plane containing  $P$  and  $E$ .
  - Two point charges A and B having charges  $+Q$  and  $-Q$  respectively are placed at certain distance apart and force acting between them is  $F$ . If 25 % charges of A is transformed to B. Then force between the charges becomes  
 a.  $\frac{16}{9}F$                       b.  $\frac{4}{3}F$                       c.  $F$                       d.  $\frac{9}{16}F$
  - In an oscillating LC circuit the maximum charge on the capacitor is  $Q$ . The charge on the capacitor when the energy is stored equally between, the electric and magnetic fields is  
 a.  $\frac{Q}{2}$                       b.  $\frac{Q}{\sqrt{3}}$                       c.  $Q$                       d.  $\frac{Q}{\sqrt{2}}$
  - Which of the following electromagnetic radiations is used for viewing objects through fog  
 a. microwave                      b. Gamma rays                      c. X - rays                      d. Infrared
  - The temperature co-efficient of resistance of a wire is  $0.00125$  per  $^{\circ}C$ . At  $20^{\circ}C$ . Its resistance is  $1\Omega$ . The resistance of the wire will be  $2\Omega$  at  
 a.  $800^{\circ}C$                       b.  $700^{\circ}C$                       c.  $850^{\circ}C$                       d.  $820^{\circ}C$ .
  - There is a current of 1A in the circuit show below what is the resistance of  $P$   
 a.  $1.5\Omega$                       b.  $3.5\Omega$   
 c.  $4.5\Omega$                       d.  $2.5\Omega$
- 
- In a transformer, the no of turns in the primary and the secondary are 410 and 1230. If the current in primary is 6A. Then that in the secondary is  
 a. 2A                      b. 18A                      c. 12A                      d. 1A
  - The dimension of  $\frac{1}{\mu_0 \epsilon_0}$  is  
 a.  $[LT^{-1}]$                       b.  $[L^{-1}T]$                       c.  $[L^{-2}T^2]$                       d.  $[L^2T^{-2}]$
  - The magnetic force acting on a charged particle of charge  $-2\mu C$  in a magnetic field of 2T acting in  $y$  - direction. When the particle velocity is  $(2\hat{i} + 3\hat{j}) \times 10^6$  m/s is  
 a. 4N in Z direction                      b. 8N in y direction                      c. 8N in z direction                      d. 8N in (-z direction)

13. A thin conducting spherical shell of radius  $R$  has a charge  $Q$  which is uniformly distributed on its surface the correct plot for electrostatic potential due to this spherical shell is



14. The relative magnetic permeability of the medium is 2.5 and the relative electrical permittivity of the medium is 2.25. Compute the refractive index of the medium.  
 a. 2.37                      b. 5.625                      c. 4.75                      d. 1.5
15. The potential energy of magnetic dipole whose dipole moment is  $\vec{P}_m = (-0.5\hat{i} + 0.4\hat{j}) \text{ Am}^2$  kept in uniform magnetic field  $\vec{B} = 0.2 \hat{j} \text{ T}$ .  
 a.  $-0.1 \text{ J}$                       b.  $-0.8 \text{ J}$                       c.  $0.1 \text{ J}$                       d.  $0.8 \text{ J}$

### PART - II

II Answer any SIX questions (Q.NO. 24 is compulsory)

6x2=12

16. State Fleming's right hand rule.
17. Define one ampere.
18. If an electric field of magnitude  $570 \text{ Nc}^{-1}$ , is applied in the copper wire, find the acceleration experienced by the electron.
19. Why is the path of a charged particle not a circle when its velocity is not perpendicular to the magnetic field?
20. Write the applications of see back effect.
21. What are polar molecules? Give example.
22. Write down coulomb's law in vector form and mention what each term represents.
23. What is meant by Fraunhofer lines?
24. Calculate the instantaneous value at  $60^\circ$ , and RMS value of an alternating current whose peak value is 20 A.

### PART - III

III Answer any SIX questions (Q.NO: 33 is compulsory)

6x3=18

25. Write down any SIX properties of electromagnetic waves.
26. Deduce the expression for self-inductance of a long solenoid.
27. Derive the expression for resultant capacitance when capacitors are connected in series.
28. The resistance of a moving coil galvanometer is made twice its original value in order to increase current sensitivity by 50%. Find the percentage change in voltage sensitivity.
29. Mention the various energy losses in a transformer.
30. Write down the various forms of expression for power in electrical circuit.
31. Write the difference between soft and hard ferromagnetic materials.
32. State Kirchhoff's first and second laws.
33. A water molecule has an electric dipole moment of  $6.3 \times 10^{-30} \text{ Cm}$ . A sample contains  $10^{22}$  water molecules with all the dipole moments aligned parallel to the external electric field of magnitude  $3 \times 10^5 \text{ Nc}^{-1}$ . How much work is required to rotate all the water molecules from  $(\theta = 0^\circ \text{ to } 90^\circ)$ ?

### PART - IV

IV Answer all the questions

5x5=25

34. a) Derive an expression for electrostatic potential due to an electric dipole. (OR)  
 b) Describe the microscopic model of current and obtain microscopic form of ohm's law.
35. a) Obtain a relation for the magnetic field at a point along the axis of a circular coil carrying current. (OR)  
 b) Explain the determination of unknown resistance using meter bridge.
36. a) Explain in detail the construction and working of a van de graff generator. (OR)  
 b) Discuss the working of cyclotron in detail.
37. a) Show mathematically that the rotation of a coil in a magnetic field over one rotation induces an alternating emf of one cycle. (OR)  
 b) Prove that the total energy is conserved during LC oscillations?
38. a) What is spectrum? Explain the different types of absorption spectrum. (OR)  
 b) Write down Maxwell equations in integral form?