

Total No. of Printed Pages:2

**SUBJECT CODE NO:- B-2026**  
**FACULTY OF SCIENCE & TECHNOLOGY**  
**B.Sc. F.Y. (Sem-II)**  
**Examination November/December- 2022**  
**Physics Paper-V**  
**Electricity & Magnetism**

[Time: 1:30 Hours]

[Max. Marks: 50]

Please check whether you have got the right question paper.

- N.B
- i) Attempt all question.
  - ii) Use of logarithmic table and electronic pocket calculator is allowed.
- Q.1
- (a) Explain scalar triple product and give its geometrical interpretation. 10
  - (b) Derive an expression for potential at a point due to a point charge 10
- OR
- (a) State Biot-Savart's law and obtain expression for magnetic induction due to straight conductor carrying current. 10
  - (b) Derive the expression for time constant when condenser discharge through resistor. 10
- Q.2
- (a) Explain line and surface integrals 05
  - (b) prove that  $\nabla \times (\nabla \phi) = 0$ . 05
  - (c) Write the principle and construction of moving coil ballistic galvanometer. 05
  - (d) Calculate magnetic Induction along axis of a solenoid of length 1.5m carry mg current of 2amp. and having 500turns. 05
- OR
- (a) Write short note on polarization of dielectric. 05
  - (b) Calculate the electric field when force of  $9 \times 10^9$  N is acting on a charge of  $20 \mu\text{C}$  05
  - (c) Write a note on LR circuit. 05
  - (d) Find resonant frequency of LCR circuit if  $R=10\text{K}\Omega$ ,  $L= 10\text{mH}$  and  $C=20\mu\text{F}$ . 05

## Q.3 Multiple choice questions.

(1) Amperes circuital law is applicable to

- (a) Open Loop (b) close Loop  
(c) Only straight conductor. (d) Both open and closed loop

(2) The relation between  $\vec{D}$ ,  $\vec{E}$  and  $\vec{P}$  is

- (a)  $\vec{D} = \frac{\vec{E}}{\epsilon}$  (b)  $\vec{D} = \vec{E} + \frac{\vec{P}}{\epsilon_0}$  (c)  $\vec{D} = \epsilon_0 (K - 1)\vec{E}$  (d)  $\vec{D} = \epsilon_0 \vec{E} + \vec{P}$

(3) Magnetic field at a distance of 2m at right angles to a long wire of radius R and carrying current I is

- (a)  $\frac{\mu_0 I}{2\pi}$  (b)  $\frac{\mu_0 I}{4\pi}$  (c)  $\frac{\mu_0 I}{8\pi}$  (d)  $\frac{\mu_0 I}{16\pi}$

(4) The equation of decay of charge in RC circuit is given by

- (a)  $Q = Q_0 e^{-\frac{R}{C}t}$  (b)  $Q = Q_0 e^{-\frac{t}{RC}}$   
(c)  $Q = RC e^{-\frac{t}{RC}}$  (d)  $Q = \frac{R}{C} e^{-t/RC}$

(5) Which of the following is true.

- (a)  $\vec{P} \cdot (\vec{Q} \times \vec{R}) = \vec{R} \cdot (\vec{P} \times \vec{Q})$  (b)  $\vec{P} \cdot (\vec{Q} \times \vec{R}) = \vec{Q} \cdot (\vec{R} \times \vec{P})$   
(c)  $\vec{P} \cdot (\vec{Q} \times \vec{R}) = \vec{Q} \cdot (\vec{P} \times \vec{R})$  (d) Both a, and b,

(6) If  $(\vec{A} + \vec{B}) = \vec{A} - \vec{B}$  then angle between  $\vec{A}$  and  $\vec{B}$  is

- (a)  $3\pi/4$  (b)  $\pi/4$  (c)  $\pi/2$  (d)  $\frac{3\pi}{2}$

(7) Dipole moment of electric dipole is

- (a)  $q = P \times 2l$  (b)  $P = q \times 2l$  (c)  $d = q \times 2P$  (d)  $P = 2q \times 2l$

(8) The S.I unit of  $\frac{1}{4\pi\epsilon_0}$  is

- (a)  $C^2/Nm^2$  (b)  $C/Nm$  (c)  $Nm/C$  (d)  $Nm^2/C^2$

(9) The flux of the electric field is

- (a) Scalar (b) Tensor (c) Vector (d) Both a and b

(10) The resonant frequency in series LCR circuit when  $L=1H$  and  $C = 2\mu F$  is

- (a)  $\frac{1}{\pi\sqrt{8}}$  (b)  $\frac{100}{\pi\sqrt{8}}$  (c)  $\frac{1000}{\pi\sqrt{8}}$  (d)  $\frac{10}{\pi\sqrt{8}}$