SUBJECT CODE NO:- B-2018
FACULTY OF SCIENCE & TECHNOLOGY
B.Sc. T.Y (Sem-V)
Examination November/December- 2022
Physics Paper- XVI
(Electrodynamics)

[Time: 1:30 Hours]   [Max. Marks:50]

Please check whether you have got the right question paper.

N.B   i) Attempt all questions.
                 ii) Figure to the right indicate full marks.

Given $\mu_0 = 4\pi \times 10^{-7}$ $S.I. Units$

         $\epsilon_0 = 8.85 \times 10^{-12}$ $S.I\ Units$

Q.1   a) State Gauss's law in electrostatics and hence derive an expression for curl of E.   10

        b) Derive Maxwell's equation $\nabla.D =$ $and\ \nabla \times E = \frac{-\partial B}{\partial t}$ 10

OR

        a) State Maxwell's equation for EM waves in conducting medium derive wave equation for   10
        magnetic field.

        b) Determine the boundary conditions at the interface between two media for vector B and D.   10

Q.2   a) Derive Poisson's equation using differential form of Gauss law.   5

        b) A conducting cylinder having charge per unit length of 0.15×10^{-6} coloumb per meter and   5
        radius 15mm. find the electric field intensity at a point 1m from the axis of the cylinder.

        c) Define poynting vector. Obtain an expression for poynting vector.   5

        d) Calculate the value of poynting vector for 200 watt lamp at a distance of 2.0m from it.   5

OR

        a) Explain mutual induction in coil.   5

        b) The inductor has inductance of 0.6H and carries the current. The current is decreasing at a   5
        uniform rate -0.04A/S. find the self induced emf in the circuit.

        c) State Kinematic and dynamic properties of reflection and refraction.   5

d) The angle of incidence and refraction are 60^0 and 30^0 respectively if refractive index of rarer   5
   medium is 1.35. find the refractive index of denser medium.

Q.3   Multiple choice questions   10

1. The electric force experiented by a unit positive charge placed at that point is called as the
   intensity of ------
   a) Electric field   c) Electromagnetic field
   b) Magnetic field   d) None of these

2. In electric field due to charged cylinder if e > R , then electric field is -----.
   a) $\dfrac{n\lambda}{2\pi r\epsilon_0}$ c) $\dfrac{\lambda}{2\pi r^2\epsilon_0}$
   b) $\dfrac{\lambda}{2\pi r\epsilon_0}$ d) None of these

3. According to Gauss theorem , the flux through any surface enclosing the charge is -------.
   a) $q.\epsilon_0$ c) $q_0\epsilon_0$
   b) $\dfrac{q}{\epsilon_0}$ d) None of these

4. The rate of change of displacement vector D with time is called ------.
   a) Displacement current   c) Current
   b) Conduction current   d) Displacement

5. Lenz's law is a consequence of the law of conservation of -----.
   a) Charge   c) momentum
   b) Energy   d) Lines of force

6. Which of the following gives direction of propagation of wave
   a) $\vec{B} \times \vec{D}$ c) $\vec{E} \times \vec{B}$
   b) $\vec{E} \times \vec{D}$ d) $\vec{H} \times \vec{E}$

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7. The rate of energy flow per unit area or power flow per unit area is

   a) $\vec{E} \times \vec{B}$ c) $\vec{E} \times \vec{D}$

   b) $\vec{E} \times \vec{H}$ d) $\vec{D} \times \vec{H}$

8. Electromagnetic wave travel through ------

   a) Conducting medium   c) Non conducting medium

   b) Vaccum   d) None of these

9. $n_1 sin\theta_1 = n_2 sin\theta_2$ represent ------ law of refraction.

   a) Snell's law   c) Momentum

   b) Brewster's law   d) None of these

10. The normal component of ------- is discontinuous across the interface.

   a) Magnetic induction $\vec{B}$ c) Electric displacement $\vec{D}$

   b) Magnetic intensity $\vec{H}$ d) Electric field $\vec{E}$