Total No. of Printed Pages:02

**SUBJECT CODE NO:- B-2012**
**FACULTY OF SCIENCE AND TECHNOLOGY**
**B.Sc. T.Y. (Sem-V) Examination Oct/Nov 2019**
**Physics Paper- XVI**
**Electrodynamics**

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

Please check whether you have got the right question paper.

N.B
1) All questions are compulsory.
2) All questions carry equal marks.
Given Data:-
1) $\epsilon_0 = 9 \times 10^{-12}$ SI units.
2) $C = 3 \times 10^8$ meter/sec

Q.1
a) State the Gauss's Law and derive an expression for electric field due to uniformly charged 10 sphere.

b) Derive an equation of continuity.    10

**OR**

a) Derive an expression for flow of electromagnetic energy.    10

b) Determine the boundary conditions satisfied by $\vec{D}$ and $\vec{H}$    10

Q.2
a) Obtain Gauss law in differential form.    05

b) Calculate electric flux that will come through a surface S=20 j kept in electric field $E = 4\hat{i} + 2\hat{j} + 5k$    05

c) Give the characteristics of electromagnetic waves.    05

d) If 500 watt of a laser beam is concentrated by the lens into a cross sectional area $10^{-10} m^2$. Find the value of poynting vector and amplitude of electric field.    05

**OR**

a) Derive the Maxwell's equation.    05
$\nabla \times E = -\frac{\partial B}{\partial t}$

b) The inductor has an inductance of 0.5H and carries the current. The current is decreasing at the uniform rate -0.05 A/s. Find the self-induced emf in the circuit.    05

c) State the kinematic and dynamic properties of refraction and reflection.    05

d) The red light through prism is shown through air onto the glass cuvette at an angle of 45° to the normal. At what angle, to normal does the light have it is in the glass? (Refractive index of air is 1 and glass is 1.5)    05

Q.3    Multiple Choice Questions:-    10

1) Maxwell's displacement current density is given by---------------
a) $\frac{\partial \vec{D}}{\partial t}$    b) $\nabla \cdot \vec{D}$    c) $J + \frac{\partial \vec{D}}{\partial t}$    d) None

1

2) The phenomenon of production of induced emf in same circuit is called as -------------
 a) Mutual Induction
 b) Self-Induction
 c) Both a and b
 d) None of these

3) Electromagnetic waves travels through -------------
 a) Vaccum    b) conducting medium    c) Non conducting medium    d) None

4) The rate of energy flow per unit area or power flow per unit area is presented as ------------
 a) $\vec{E} \times \vec{D}$    b) $\vec{P} \times \vec{H}$    c) $\vec{E} \times \vec{H}$    d) $\vec{E} \times \vec{B}$

5) $n_1 sin\theta_1 = n_2 \sin \theta_2$ represents ----------- law of refraction.
 a) Brewster's law
 b) Snell's law
 c) Momentum law
 d) None of these

6) The normal component of magnetic induction $\vec{B}$ is ----------- across the boundary.
 a) Continuous    b) discontinuous    c) both a & b    d) none of these

7) $\nabla . E = \frac{\rho}{\epsilon_0}$ represents -------------
 a) Gauss's law in differential form
 b) Gauss's law in integral form
 c) Poisson's equation
 d) Stokes theorem

8) Electric field for a point on uniformly charged solid sphere of radius R is
 a) $\frac{p}{4\pi R^2 \epsilon_0}$
 b) $\frac{q}{4\pi R^2 \epsilon_0}$
 c) $\frac{q^2}{4\pi R^2 \epsilon_0}$
 d) $\frac{q^2}{4\pi R^3 \epsilon_0}$

9) Electromagnetic waves propagates in the form of varying ----------field.
 a) only electric    b) only magnetic    c) electric & magentic   d) none

10) Henry is unit of ----------
 a) Self inductance
 b) Mutual inductance
 c) both a & b
 d) none of these

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