Total No. of Printed Pages: 3

SUBJECT CODE NO:- 2018
FACULTY OF SCIENCE & TECHNOLOGY
B.Sc. T.Y Sem-V
Examination March/April-2022 (To be held in June/July-2022)
Physics Paper- XVI
(Electrodynamics)

[Time: 1:53 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
$\varepsilon_0 = 8.85 \times 10^{-12}$ S. I. units

Q.1 a) Define electric flux. State and prove Gauss theorem in electrostatics. 10
b) State Maxwell's Four equations and derive any one of them. 10

OR

a) Explain transverse nature of electro-magnetic wave. 10
b) Explain reflection and refraction at the boundary of two non-conducting media and obtain expression of Snell's law of refraction. 10

Q.2 a) Find expression for electric field due to charged cylinder. 05
b) A conducting cylinder having charge per unit length of 0.251×10^{-6} coulomb per meter and radius 20 mm. Find the electric field intensity at a point 1 m from the axis of the cylinder. 05
c) State any five characteristics of electromagnetic wave. 05
d) Calculate the value of Poynting vector at the surface of the Sun if the power radiated by the Sun is 4.6×10^{26} watts while its radius is 7×10^{8} m. 05

OR

a) Write a note on Maxwell's displacement current. 05
b) Find number of turns in the secondary of the transformer if voltage across primary is 100 V with number of turns 1000 and voltage of secondary is 20V. 05
c) State Kinematic and dynamic properties of reflection and refraction. 05
d) The angle of transmission is 30° and refractive indices of two media are 1.62 and 1.23. Find the angle of incidence of electromagnetic wave. 05

Q.3 Multiple Choice Questions. 10

1. The equation $\nabla . E = \frac{\rho}{\varepsilon_0}$ is
a) Divergence Theorem

b) Gauss law in differential form
c) Stoke's Theorem
d) Green's Theorem

2. According to Gauss law, the electric flux ϕ through any closed surface is equal to _____ times the net charge enclosed by the surface.
a) $\frac{1}{\mu_0}$
b) $\frac{1}{\varepsilon_0}$
c) $\frac{1}{\lambda}$
d) $\frac{1}{c}$

3. According to Faraday's law, emf induced is proportional to
a) Rate of change of magnetic flux
b) Rate of change of electric flux
c) Rate of change of current
d) None of the above

4. The phenomenon of induced emf in the same circuit is called _____.
a) Mutual inductance
b) Self inductance
c) Mutual and Self inductance
d) None of the above

5. The rate of change of displacement vector D with time is called _____.
a) Eddy Current
b) Displacement Current
c) Conduction Current
d) None of these

6. Electromagnetic wave travel through _____.
a) Vacuum
b) Conducting medium
c) Non – conducting medium
d) All of the above

7. Energy of electromagnetic wave is divided equally into _____ field vectors.
a) Electrical
b) Magnetic
c) Electrical and Magnetic
d) None of these

8. $n_1 \sin\theta_1 = n_2 \sin\theta_2$ represents _____ of refraction.
a) Momentum Law
b) Brewster Law

c) Faraday's Law
d) Snell's Law

9. The normal component of electric displacement is _____ across the surface.
a) Discontinuous
b) Continuous
c) Both a & b
d) None of these

10. Electric intensity is a _____ quantity.
a) Tensor
b) Vector
c) Scalar
d) None of the above.