11192

B.Sc. (Pass Course) 1st Semester
(Regular/Re-appear/Imp.) Exam., 2022

PHYSICS-II
ELECTRICITY AND MAGNETISM
Paper Code : PHY-102

Time : 3 Hours   **Max. Marks : 45**

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard will be entertained after examination.

Note : Attempt **Five** questions in all.

1. (a) If unit vectors $\hat{A}$ and $\hat{B}$ are inclined at an angle θ then prove that $|\hat{A} - \hat{B}| = 2\sin(\theta/2)$.   4

   (b) Define gradient of a scalar function. Show that, the gradient of a scalar function at any point is a vector representing the greatest rate of change of scalar function at that point.   5

2. (a) Find a unit vector normal to the surface $x^2y + 2xz = 4$ at the point $(2, -1, 3)$.   4

   (b) What do you mean by circulation of a vector express it in cartesian coordinates and give its physical significance also define irrotational vector field.   5

3. (a) Drive poisson's and laplace's equations in electrostatics and mention their importance in Physics.   5

   (b) The potential function point is given by $(V(x, y, z) = 4x + 3y - z$. Find the electric field vector.   4

4. (a) What do you mean by solenoidal nature of magnetic field and prove it? What do you understand by magnetic permeability and intensity of magnetisation?   4

   (b) Calculate curl and divergence property of magnetic field.   5

5. (a) Differentiate between Dia, Para and Ferro magnetic substances and give the domain theory of ferromagnetism. 5

(b) An electron in an atom of Hydrogen circulates in an orbit of radius 0.5×10^{-10}m calculate the change in magnetic moment for this electron. Magnetic field of induction 2 Tesla, acts at right angles to plane of orbit. https://www.iguonline.com 4

6. (a) Write differential form of Maxwell's equations in E.M. theory. Describe the physical significance of each equations. 5

(b) A magnetic vector potential in certain region of space is $\overline{A} = \frac{1}{2}\alpha t\,(x\hat{j} - y\hat{i})$ where is α is a constant. Find magnetic field corresponding to it. 4

7. (a) Define Scalar and Vector potentials. 4

(b) State Poynting Vector and prove Poynting theorem. 5

8. (a) Describe boundary conditions at the interface between different media for B, E, Vectors. 5

(b) A plane radio wave has $E_0 = 0.5 \times 10^{-10}$ V/m calculate (i) B_0 (ii) the intensity of the wave as measured by S_{av}. 4

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