



DOON UNIVERSITY, DEHRADUN
Mid Semester Examination, Six Semester, 2017-18
Department of Physics, School of Physical Sciences
Integrated M.Sc. Physics
Course: PHC-351: (Electromagnetic Theory)

Time Allowed: 2 Hours

Maximum Marks: 30

Note: Attempt All Questions from Sections A, C.

SECTION: A

(Marks: 2 X 3 = 6)

1. What is electric displacement? How is it related to electric field?
2. Write Maxwell equations in integral form for electrostatic field in vacuum.
3. Write down electric field in terms of scalar and vector potential for the case
 - (i) When the field is electrostatic.
 - (ii) When electric field induced due to change in magnetic field.

SECTION: B (Attempt any 3 Question)

(Marks: 4 X 3 = 12)

4. A long cylinder is carrying a charge which is proportional to the distance from its axis i.e $\rho = kr$. Using Gauss law find out electric field at a distance r from its axis.
5. How Maxwell fixed ampere's law? Explain the term displacement current in relation.
6. What are gauge transformations? Discuss Coulomb gauge and Lorentz gauge.
7. A vector function has the following components: $E_x = 6xy$, $E_y = 3x^2 - 3y^2$, $E_z = 0$. Is it a possible electrostatic field?

SECTION: C

(Marks: 6 X 2 = 12)

8. Derive Poynting's theorem. Calculate the magnitude of Poynting vector at the surface of the sun. Given that power radiated by sun = 3.8×10^{26} watts and radius of sun = 7×10^8 m.
7. Derive conditions for magnetic field (H) must satisfy at the boundary between two different media.