# M.Sc. DEGREE END SEMESTER EXAMINATION - NOVEMBER 2024
## SEMESTER 1 : PHYSICS
### COURSE : 24P1PHYT03 : ELECTRODYNAMICS
*(For Regular - 2024 Admission)*

Duration : Three Hours                                                                   Max. Weights: 30

## PART A
### Answer any 8 questions                                                              Weight: 1

1. Compare the power radiated by electric and magnetic dipoles. (U)
2. Give the expression for electric field of a dipole. (R)
3. Quote continuity equation. What is its significance? (R)
4. What are advanced potentials? Why do advanced potentials have no physical significance? (U)
5. Explain the concept of radiation pressure in an EM wave. (R)
6. What is a plane wave? (R)
7. Give mathematical expressions for both fields in an EM wave. (U)
8. Differentiate between magnetic flux density and auxiliary field. (U)
9. Explain the properties of electromagnetic field tensor. (U)
10. Give the generalized expressions for both fields in an EM wave. (U)

(1 x 8 = 8)

## PART B
### Answer any 6 questions                                                              Weights: 2

11. Write electromagnetic field tensor in terms of four vector potential. Show that $F_{12} = B_3$. (A)
12. Find the wavelength and propagation speed in copper for radio waves at 1 MHz. (A)
13. Write the real fields of a monochromatic planewave traveling in negative x direction and polraized in z direction. Sketch the wave. (A)
14. Derive Faraday's law in differential form. (A)
15. Find the potential of a point charge moving with constant velocity. (A)
16. If a particle's kinetic energy is n times its rest energy, What is its speed? (A)
17. Find the first and second order TE cut off wavelengths of an infinite parallel plate waveguide with plate separation of 1.5 cm. (A)
18. A charged particle cannot be held in stable equillibrium by electrostactic forces alone. Justify. (A)

(2 x 6 = 12)

## PART C
### Answer any 2 questions                                                              Weights: 5

19. What is a monochromatic wave? Derive wave equations for fields, in a dielectric and expression for radiation pressure. (U)
20. From Lienard Wiechert potentials, obtain the expression for fields of a moving charge. (U)

21. Derive integral form of Maxwell`s equations, in matter. Explain their physical implications. (U)

22. Explain the working principles of Rectangular wave guide, and describe the Fundamental TE mode in rectangular wave guide ()

**(5 x 2 = 10)**

OBE: Questions to Course Outcome Mapping

| CO | Course Outcome Description | CL | Questions | Total Wt. |
|----|----------------------------|----|-----------|-----------|

Cognitive Level (CL): Cr - CREATE; E - EVALUATE; An - ANALYZE; A - APPLY; U - UNDERSTAND; R - REMEMBER;