B.E./B.Tech. DEGREE EXAMINATIONS

Nov/Dec 2025 – Expected Question Paper

EC3452 – ELECTROMAGNETIC FIELDS

Regulation 2021

PART A – (10 × 2 = 20 Marks)

1. Define the curl of a vector field.

2. State and explain the divergence theorem.

3. State Coulomb's law.

4. Define electric potential.

5. State the principle of Ampere's law.

6. Define magnetic field intensity.

7. What is displacement current?

8. Define time-harmonic fields.

9. What is phase velocity of EM waves?

10. Define skin depth.

PART B – (5 × 13 = 65 Marks)

11. (a) Apply Gauss law to derive the electric field due to a uniformly charged sphere.
OR
(b) Convert the given vector from cylindrical to Cartesian coordinates.

12. (a) Determine electric flux crossing a given surface from D-field.
OR
(b) Solve Poisson/Laplace equation for the given potential region.

13. (a) Derive the magnetic field inside and outside a solid conductor carrying current density.
OR
(b) Find magnetic field due to a current-carrying wire at a given point.

14. (a) Derive Maxwell's equations for static and time-varying fields.
OR
(b) Derive the EM wave equation in free space.

15. (a) Explain and derive Poynting theorem.
OR
(b) Derive phase constant, intrinsic impedance, and phase velocity.

PART C – (1 × 15 = 15 Marks)

16. (a) Using Biot–Savart law, derive the magnetic field at the centre of a circular loop carrying current.
OR
(b) Derive reflection and transmission coefficient for normal incidence at dielectric boundary.