R19

II B. TECH II SEMESTER REGULAR EXAMINATIONS, AUGUST 2021
ELECTROMAGNETIC FIELDS AND WAVES
(Electronics and Communication Engineering)

Time: 3 hours   Max. Marks: 60

Note: Answer **ONE** question from each Unit (**5 × 12 = 60 Marks**)
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UNIT - I

1. a) Explain Gauss Law and mention the limitation of Gauss law?   [6M]

    b) Calculate the force on a charge of 4 mc located at (6, 5, 7) in free space due to another charge 12 mc located at (1, 4, 7).   [6M]

(OR)

2. a) Explain the concept of Coulomb's law for 'N' number of point charges?   [6M]

    b) Two charges 3 nC and 6 nC are located at the positions (3,5,8) and (5,7,1) respectively. Determine the force acting on another charge 2 nC placed at (2,3,1).   [6M]

UNIT – II

3. a) Derive the expression for capacitance 'C' due to a coaxial capacitor?   [6M]

    b) Derive the expression for Electric field intensity 'E' due to electric dipole?   [6M]

(OR)

4. a) Derive the electric boundary conditions between dielectric-to-dielectric material?   [6M]

    b) Determine the electric potential due to a point charge of 6 nC at a distance of 3 cm in free space?   [6M]

UNIT – III

5. a) Explain Biot-Savart's Law?   [6M]

    b) A ring of current with radius '*a*' lying in the x-y plane with a current *I* along azimuthal direction. Find an expression for the magnetic field at arbitrary point at height '*h*' on z-axis.   [6M]

(OR)

6. a) Derive the expression for magnetic field intensity due to an infinitely long current carrying conductor?   [6M]

    b) Two infinitely long current carrying conductors each carrying a current of 10 A in opposite directions are separated by 50 cm. Find the magnetic field intensity at the mid distance between two conductors?   [6M]

UNIT –IV

7. a) Write Maxwell's equations in differential and integral form?   [6M]

    b) Write a short note on motional emf?   [6M]

<div align="center">(OR)</div>

8. a) Explain inconsistency of Ampere's law? [6M]

    b) Differentiate between conduction and displacement current densities with an example in time varying fields? [6M]

<div align="center">UNIT –V</div>

9. a) Derive the expression for Brewster's angle? [6M]

    b) An Electro Magnetic wave incidents normally on a dielectric having permeability same as free space and permittivity as 6. Find reflection coefficient and transmission coefficient? [6M]

<div align="center">(OR)</div>

10. a) Derive the relationship between Electric Field Intensity 'E' and Magnetic Field Intensity 'H' in free space. [6M]

    b) The magnetic field intensity component of a free space $H=2 \cos(10 \times 10^6 t - 0.1x)$. Determine its corresponding electric field intensity component E? [6M]

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