Reg. No:

Time: 3 hours   Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1. The surfaces $\rho=3$, $\rho=5$, $\Phi=100_o$, $\Phi=130_o$, z=3, and z=4.5 define a closed surface. (a) Find enclosed volume; (b) Find the total area of enclosing surface; (c) Find the total length of the twelve edges of the surfaces; (d) Find the length of longest straight line that lies entirely within the volume.   **12M**

OR

2. A circle, centred at the origin with radius of 2 units, lies in the xy plane. Determine the unit vector in rectangular components that lies in the xy plane, is tangent to the circle at ($\sqrt{3}$, 1, 0), and is in the general direction of increasing values of y.   **12M**

UNIT-II

3. A charge Q_0 located at the origin in free space, produces a field for which $E_2=1kV/m$ at point P (-2, 1,-1). (a) Find Q_0. Find E at M (1, 6, 5) in (b) Cartesian coordinates. (c) Cylindrical coordinates.   **12M**

OR

4. a. Derive the expression for electric field intensity at a point due to electric dipole   **6M**
   b. i) Define dipole moment.
      ii) Define an electric dipole.
      iii) State vector form of coulomb's law.   **6M**

UNIT-III

5. a. Explain the boundary conditions between conductor and free space   **6M**
   b. A parallel plate capacitor has a plate area of 1.5 m² and a plate separation of 5 mm. Three are two dielectrics in between the plates. The first dielectric has a thickness of 3 mm with a relative permittivity of 6 and the second has a thickness of 2 mm with a relative permittivity of 4. Find the capacitor.   **6M**

OR

6. At the boundary between glass $\varepsilon_r = 4$ and air, the lines of electric field make an angle of 40° with normal to the boundary. If electric flux density in the air is $0.25\mu C/m^3$. Determine the orientation and magnitude of electric flux density in the glass.   **12M**

UNIT-IV

7. a. Find the magnetic field intensity ($\bar{H}$) due to co-axial cable.   **6M**
   b. Find magnetic field intensity ($\bar{H}$) due to solenoid carrying current I and having length L= 4m.   **6M**

OR

8. a. State and explain ampere's circuital law.   **6M**
   b. A circular loop is located on $X^2+Y^2=9$ and Z=0 carries a direct current of 10A along $\bar{a}_\phi$ direction. Determine $\bar{H}$) at (0, 0, 5) m?   **6M**

UNIT-V

9. a. Derive the expression for self inductance of solenoid and toroid.   **6M**
   b. A toroid has air core and has a cross sectional area of 10mm² it has 1000 turns and its mean radius is 10mm. find its inductance   **6M**

OR

10 a Derive the expression for Neuman's formula.   6M

   b Find the mutual inductance between a long, straight wire and square loop lying in same plane.   6M

*** END ***