



Continuous Assessment Test – I

Fall Semester: 2023

Programme Name & Branch: B.Tech & ECE

Course Code & Name: BECE205L – Engineering Electromagnetics

Slot: D1

Exam Duration: 90 Min.

Maximum Marks: 50

Answer ALL the questions.

S.No.	Question	Marks	CO	BT
1.	Given point $P_1 = (2, \pi/2, -1)$ and vector $\mathbf{E} = 2\mathbf{a}_\rho + 3\mathbf{a}_\phi + 4\mathbf{a}_z$ defined in cylindrical coordinates, express P_1 and $\mathbf{E}$ in Cartesian coordinates and evaluate $\mathbf{E}$ at P_1 .	10	1	L1
2.	Line $x = 3, z = -1$ carries charge 20 nC/m while plane $x = -2$ carries charge 4 nC/m^2 . Find the force on a point charge 9 mC located at the origin.	10	1	L2
3.	A uniform volume charge density of $80 \mu\text{C/m}^3$ is present throughout the region $8 \text{ mm} < r < 10 \text{ mm}$. Let $\rho_v = 0$ for $0 < r < 8 \text{ mm}$. (a) Find the total charge inside the spherical surface $r = 10 \text{ mm}$. (b) Find $\mathbf{D}_r$ at $r = 10 \text{ mm}$. (c) If there is no charge for $r > 10 \text{ mm}$, find $\mathbf{D}_r$ at $r = 20 \text{ mm}$.	10	1	L3
4.	Two infinite and parallel conducting planes are separated by 4 cm , with one of the conductor in the $x = 0 \text{ cm}$ plane with $V = 0 \text{ Volt}$ and the other in the $x = 4 \text{ cm}$ plane with $V = 10 \text{ Volt}$. Assuming charge density $\rho_v = 0$ and permittivity $\epsilon = 4\epsilon_0$ between the conductors, find (a) Potential at $x = 3 \text{ cm}$. (b) Surface charge densities on each conductor.	10	1	L3
5.	Two infinite current carrying filaments are kept along $x = -2, z = 0$ and $x = 4, z = 0$ carrying currents $I_1 = 4 \times 10^{-6} \hat{\mathbf{a}}_y \text{ A}$ and $I_2 = 1 \times 10^{-6} \hat{\mathbf{a}}_y \text{ A}$ respectively. Find the total magnetic field intensity at the origin due to these current carrying filaments.	10	2	L3