

**VIT**

Vellore Institute of Technology

Chartered by the Government of India under Section 3 of the AICTE Act, 1987

School of Electronics Engineering

Fall Semester 2022-23 (CAT-1)

BECE205L -- Engineering Electromagnetics – D1 + TD1

Duration : 90 Minutes

Max. Marks : 50 Marks

Answer All Questions

Q. No	Question (SET-1)	Max. Mark	CO	BL
1	Determine the curl and divergence at $(5, \pi/3, 1)$ for the following vector: $\vec{D} = \frac{150}{\rho^2} \hat{a}_\rho + 10\hat{a}_\phi$	10	CO1	L5
2	Find electric field $\vec{E}$ at the origin if the following charge distributions are present in free space: point charge 12 nC at $P(2,0,6)$; uniform line charge density 5 nC/m at intersection of planes $x = -2, y = 3$; uniform surface charge density of 0.2 nC/m ² at $x = 2$.	10	CO1	L5
3	In a slab of dielectric material for which $\epsilon = 3.8\epsilon_0$ and $V = 320 z^2$ V. Determine: a. Electric field intensity, b. Electric flux density, c. Volume charge density, d. Electric susceptibility, e. Polarization field.	10	CO1	L5
4	A cylindrical capacitor has inner radius of $a = 1$ cm and outer radius of $b = 2.5$ cm. If the space between the plates is filled with a dielectric material with $\epsilon_r = \left(\frac{1+\rho}{\rho}\right)$ where ρ is in centimeter, find the capacitance per meter of the capacitor.	10	CO1	L5
5	a. Region 1 ($z < 0$) contains a dielectric material with $\epsilon_{r1} = 2.5$ while the region 2 has dielectric material with $\epsilon_{r2} = 4$ for $z > 0$. Let electric field intensity $\vec{E}_1 = -30\hat{a}_x + 50\hat{a}_y + 70\hat{a}_z$ V/m, then find $\vec{E}_2$ in region 2. b. Find $d\vec{H}$ at $(2, -3, 4)$ due to a current element $I d\vec{l} = 4 \times 10^{-5} \hat{a}_x$ A.m at origin.	5 5	CO2	L5