VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)
CHENNAI

Reg. Number:	2

Continuous Assessment Test (CAT) - II - OCTOBER 2025

Programme	:	B.Tech (VLSI)	Semester	:	FS - 2025 - 26
Course Code & Course Title	:	BEVD202L & Electromagnetic Field Theory	Class Number	:	CH2025260100504
Faculty	:	Dr M Saranya Nair	Slot	:	A1+TA1
Duration	:	90 Minutes	Max. Mark	:	50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks	CO	BT
1.		A copper conductor of length 17.5m and diameter 2.15mm carries a current of 32A. Determine the Electric field intensity, Drift velocity, Electric potential, Volume charge density and Resistance of the conductor. Given that the conductivity and electron mobility in copper is 5.8×10^7 S/m and 0.0032 m^2/Vs respectively.	**10**	**1**	**3**
2.		If the magnetic field intensity around the edge of the rectangular loop is given by $\vec{H} = y\vec{a}_x - x\vec{a}_y (A/m)$ on plane z=0, determine the amount of current flowing through the loop described by $0 < x < 2$, $-1 < y < 3$.	**10**	**1**	**3**
3.		For a current distribution in free space, the magnetic vector potential is given as $\vec{A} = (2x^2y + yz)\vec{a}_x + xy^2\vec{a}_y + 2x^2y^2\vec{a}_z (Wb/m)$ (a) Find the magnetic flux through a loop described by x = 1, $0 < y, z < 2$. (b) Prove the non-existence of magnetic monopole in the given field.	**10**	**2**	**3**
4.	(a)	The conduction current density in a lossy dielectric is given by $J_c = 0.04 \sin 10^9 t (A/m^2)$ Find the displacement current density if the conductivity and relative permittivity of the material are given by $10^3 S/m$ and 4 respectively.	**5**		**3**
	(b)	A conducting circular loop of radius 7 cm lies in the z = 0 plane in a magnetic field $\vec{B} = 15 \cos 377t\, \vec{a}_z\, mWb/m^2$. Calculate the induced voltage in the loop.	**5**	**3**	**3**
5.		In a certain region with $\sigma = 0$, $\mu = \mu_0$, and $\varepsilon = 6.25\varepsilon_0$, the magnetic field of an EM wave is $\mathbf{H} = 0.6 \cos \beta x \cos 10^8 t\, \mathbf{a}_z$ A/m. Find β and the corresponding **E** using Maxwell's equations.	**10**	**4**	**4**

**********All the best **********