VIT
Vellore Institute of Technology

REG.NO.:

SCHOOL OF ELECTRONICS ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2024-2025

SLOT: F2+TF2

Programme Name & Branch	**: B.Tech & ECE/BML**
Course Code and Course Name	**: BECE205L - Engineering Electromagnetics**
Faculty Name(s)	**: Rajeshkumar V, Rajkishor Kumar, Biswajit Dwivedy, Shah Arpan Hasmukh Mayuri**
Class Number(s)	**: VL2024250104078, VL2024250104082, VL2024250104084, VL2024250104094**
Date of Examination	**: 18-10-2024**
Exam Duration	**: 90 minutes** **Maximum Marks: 50**

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes
  CO2. Compute and analyze magnetic fields in different materials and media.
  CO3. Analyze the EM wave propagation in conducting as well as in dielectric materials through time varying Maxwell's equations.
  CO4. Illustrate the wave mechanism in different transmission lines at high frequencies using transmission line parameters.

Q. No	Question	M	CO	BL
1.	A current filament on the Z-axis carries a current of 7mA in the a_z direction, and current sheets of $0.5a_z$ A/m and $-0.2a_z$ A/m are located at $\rho = 1$ cm and $\rho = 0.5$ cm, respectively. Calculate **H** at ρ = (i) 0.5 cm; (ii) 1.5 cm; (iii) What current sheet should be located at $\rho = 4$ cm so that **H = 0** for all $\rho > 4$ cm?	10	2	3
2.	A conductor carries a filamentary current of $10a_z$ A and is located along x=4, y=2. A current element of length 2 cm is located at the origin in free space and carries current 11 mA along a_x. Find the force on current element due to filamentary conductor.	10	2	3
3	A radio signal propagating in free space has $\mathbf{E} = E_0 \sin(200\pi t - \beta z)a_x$, $\mathbf{H} = (E_0/\eta)\sin(200\pi t - \beta z)a_y$. Determine β and η using Maxwell's equation.	10	3	3
4.	Consider the medium in which a plane wave of radian frequency 'ω' is propagating along '+z' direction and the E field component is along 'x' direction. If the field components have $E_0=1000e^{j\pi/9}$ and $H_0=10$, $\beta=1$, find the (i) intrinsic impedance (ii) attenuation constant (iii) type of medium (iv) E and H field equation.	10	3	3
5.	For the transmission line operating at 1GHz, the line parameters are $R = 1\ \Omega/m$, $L = 167$ nH/m, $C = 172$ pF/m and $G = 0$. Find Z_0, α, β and phase velocity.	10	4	3

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