Programme Name & Branch: B. Tech - ECE

Course Code and Course Name: BECE205L – Engineering Electromagnetics

Name: DR. SHAMBAVI K, DR. POONKUZHALI DR. RAJESHKUMAR V, DR. SURESH KUMAR T R , DR. CHRISTINA JOSEPHINE MALATHI A, DR. TANMAYA KUMAR DAS

Class Number(s): VL20252601000503, 0504, 0506, 2616, 0508, 2632.

Exam Duration: 90 minutes **Maximum Marks: 50:**

General instruction(s): • Answer All Questions

- BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4)
- Course Outcomes
  a. CO2: Compute and analyze magnetic fields in different materials and media.
  b. CO3: Analyze the EM wave propagation in conducting as well as in dielectric materials through time varying Maxwell's equations.
  c. CO4:Illustrate the wave mechanism in different transmission lines at high frequencies using transmission line parameters.

Answer all the questions (5 x10 = 50 Marks)				
Q. No	**Question**	**Max Marks**	**CO**	**BL**
1	The z = 0 plane carries current K = $10a_x$ A/m, while current filament situated at y = 0, z = 6 carries current I along a_x. Find I such that H(0, 0, 3) = 0.	10	CO2	BL3
2	Let $\mu_1 = \mu_o$ for region 1 ($\rho \geq 10\ m$) and $\mu_2 = 3\mu_o$ for region 2 ($\rho \leq 10\ m$). If $H_2 = 4\ a_\rho - 6\ a_\phi + 7a_z\ kA/m$, find [i] H_1 [ii] B_2 [iii] The angles H_1 and H_2 make with the normal to the surface $\rho = 10\ m$.	10	CO2	BL3
3	A circular loop of radius 0.1 m is placed in a uniform magnetic field directed into the page. The magnetic field varies with time as B(t) = $0.05t^2$ (Tesla), where t is in seconds. [i] Calculate the induced emf in the loop at t = 4 . [ii] State the direction of the induced current using Lenz's law. [iii] Using Maxwell–Faraday's equation verify that the induced electric field magnitude around the loop is consistent with the emf you found.	10	CO3	BL3
4	A uniform plane wave propagating in a medium has the electric field $E(z,t) = 5e^{-\alpha z}\sin(2\times10^8 t - \beta z)\,a_x\ V/m$ where the medium parameters are ε_r=2, μ_r=15, σ =2.5 S/m. Find [i] Propagation constant, [ii] Intrinsic wave impedance, [iii] Magnetic field, H.	10	CO3	BL3
5	The characteristic impedance of a line is 1800 Ω at a frequency of 1.5KHz. At this frequency, the propagation constant is found to be $0.074 \angle 50^0$. Determine the line parameters R, L, G, and C.	10	CO4	BL3