JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2024

B.Tech-V Semester (ECE)

COURSE CODE(CREDITS): 18B11EC513(4) MAX. MARKS: 25

COURSE NAME: Electromagnetic Waves

COURSE INSTRUCTOR: Salman Raju Talluri MAX. TIME: 1 Hour 30 min.

Note: (a)All questions are compulsory. (b) The candidate is allowed to make suitable numeric assumptions wherever required for solving the problems.

Q.No	Question	CO	Marks
Q.1	Write the Maxwell's Equations in integral form and point (differential) form. Specify the names of the laws from which these are derived.	CO-1	4
Q.2	Let $J = \left(\frac{25}{\rho} a_\rho\right) - \left(\frac{20}{\rho^2+0.01}\right) a_z \; A/m^2$. (a) Find the total current crossing the plane z = 0.2 in the a_z direction for $\rho < 0.4$. (b) Calculate $\frac{\partial \rho_v}{\partial t}$.	CO-2	3
Q.3	Given the flux density $D = \frac{16}{r} \cos(2\theta)\, a_\theta \; C/m^2$, use the Gauss's divergence theorem to find the total charge within the region $1 < r < 2$ m , $0 < \theta <$ 90 degrees and $0 < \phi <$ 360 degrees by evaluating the surface and volume integrals.	CO-2	5
Q.4	The surface x = 0 separates two perfect dielectrics. For $x > 0$, $\epsilon_{r1} = 3$ while $\epsilon_{r2} = 5$ where $x < 0$. If $E_1 = 80a_x - 60a_y - 30a_z$V/m, find D_2, the electric flux density for $x < 0$.	CO-3	4
Q.5	A 75 Ω coaxial transmission line has a length of 2.0 cm and is terminated with a load impedance of 37.5 + j75 Ω. If the relative permittivity of the line is 2.56 and the frequency is 3.0 GHz, find the input impedance to the line, the reflection coefficient at the load, the reflection coefficient at the input, and the SWR on the line.	CO-5	4
Q.6	Explain the following terms very briefly. i. Impedance Matching ii. Laplace's Equation solution iii. Displacement Current Density iv. Retarded Potential v. Biot-Savart Law	CO-1	5