# JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

## TEST -3 EXAMINATION- 2024

### B.Tech-V Semester (ECE)

COURSE CODE(CREDITS): 18B11EC513(4)                    MAX. MARKS: 35

COURSE NAME: Electromagnetic Waves

COURSE INSTRUCTOR: Salman Raju Talluri                 MAX. TIME: 2 Hours

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

| Q.No | Question | CO | Marks |
|------|----------|----|-------|
| Q.1 | Write the Maxwell's equation in point form. Explain the significance of these equations in wave propagation. | CO-2 | 5 |
| Q.2 | An electric field in a medium is specified as $E(z,t) = 100\cos(10^8 t - 0.5z + 30°)a_y V/m$. Obtain the wavelength, phase constant, direction of propagation and the magnetic field intensity associated with this electric field. | CO-3 | 5 |
| Q.3 | What do you mean by polarization? Give the equations for Linearly polarized, Circularly polarized(Right hand and left hand) and Elliptically polarized waves. | CO-4 | 5 |
| Q.4 | Write the equations for incident, reflected and transmitted electric and magnetic field intensities for an oblique incidence from medium 1 to medium 2 in TE polarization. What is/are the difference/s in these equations with regards to TM polarization? | CO-4 | 5 |

| Q.No | Question | CO | Marks |
|------|----------|-----|-------|
| Q.5 | Specify the steps in finding the fields inside a rectangular waveguide for TE modes and TM modes. An air-filled rectangular waveguide has dimensions a = 2 cm and b = 1 cm. Determine the range of frequencies over which the guide will operate single mode ($TE_{10}$). | CO-5 | 5 |
| Q.6 | A 75Ω coaxial transmission line has a length of 2.0 cm and is terminated with a load impedance of 37.5 + j7 5 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 | 5 |
| Q.7 | Explain the following terms very briefly. <br><br> i. Plane of incidence and Normal to an interface <br><br> ii. Directional and Isotropic Antennas <br><br> iii. Intrinsic Impedance and Characteristic Impedance <br><br> iv. Phase Velocity and Group Velocity <br><br> v. Attenuation constant and Phase Constant | CO-3 | 5 |