JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-2 EXAMINATION -2023

PhD 1st Semester (ECE)

COURSE CODE (CREDITS): 13M1WEC334 (3)                    MAX. MARKS: 25

COURSE NAME: Antenna Theory & Techniques

COURSE INSTRUCTOR: Dr. Naveen Jaglan                     MAX. TIME: 1 Hr. 30 Min.

*Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

1. Derive the expressions for the near and far field components of Hertz dipole? Calculate the radiation resistance and total power radiated by this antenna.   [CO-1,2; 3 Marks]

2. What is the need of antenna arrays? How distance among antenna elements, relative amplitude and phase can control the radiation pattern of hertz dipole antenna array.

   [CO-3, 4; 5 Marks]

3. Obtain the radiation patterns plots for:

   (i)   Array of two elements with equal amplitude and same phase.

   (i)   Array of two elements with equal amplitude and opposite phase.

   [CO-1, 4; 5 Marks]

4. Find the direction of nulls and thereafter plot the radiation patterns of $\frac{\lambda}{2}$, $\lambda$, $\frac{3\lambda}{2}$, $2\lambda$ length dipole antennas.                                                    [CO-3, 4; 5 Marks]

5. Define antenna directive gain and power gain. What is the significance of power gain?

   [CO-1, 2; 2 Marks]

6. Explain the Principle of Pattern Multiplication and plot the radiation pattern for:

   (a) 4- Isotropic elements fed in phase and spaced and $\frac{\lambda}{2}$ apart.

   (b) 8- Isotropic elements fed in phase and spaced $\frac{\lambda}{2}$ apart.        [CO-3,4; 3 Marks]

7. A low frequency transmitting antenna has a radiation resistance of 0.5Ω and a total loss resistance of 2.5Ω. Calculate the radiated power, power input and antenna efficiency if the current fed in antenna is 100A.                                      [CO-3,4; 2 Marks]