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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION-Apr 2019

B.Tech 8th Semester

COURSE CODE:13B1WEC832 MAX. MARKS: 25

COURSE NAME: Modern Antennas

COURSE CREDITS: 3 MAX. TIME: 1Hr.30 Min

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

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1. Explain the principle of pattern multiplication and plot the radiation patterns for:

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

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

2. Calculate the wave polarization of the following uniform plane waves:

(i) $\vec{E} = 5\text{Cos}(\omega t - \beta z)a_x + 5\text{Cos}(\omega t - \beta z + 90^\circ)a_y$

(ii) $\vec{E} = 5\text{Cos}(\omega t - \beta z)a_x + 10\text{Cos}(\omega t - \beta z)a_y$

(iii) $\vec{E} = 10\text{Cos}(\omega t - \beta z - 60^\circ)a_x + 5\text{Cos}(\omega t - \beta z + 30^\circ)a_y$

(iv) $\vec{E} = 5\text{Cos}(\omega t - \beta z - 60^\circ)a_x + 5\text{Cos}(\omega t - \beta z - 30^\circ)a_y$

Also, define axial ratio, what are its values for different wave polarizations.

[CO-2; 4 Marks]

3. Design a Linear array with spacing between elements of d= $\frac{\lambda}{4}$ such that it has zeros at $\theta = 0^\circ, \theta = 90^\circ, \theta = 180^\circ$. Determine the number of elements, their excitation and plot the desired radiation pattern. [CO-3; 4 Marks]
4. Calculate BWFN, HPBW, direction of pattern minima, direction of nulls and phase difference b/w sources for 4-element broadside antenna array with equal amplitude and spacing. [CO-3; 4 Marks]

5. Find the power radiated and radiation resistance for $\frac{\lambda}{2}$ length dipole antenna.

[CO-2,3; 2 Marks]

6. With the help of image theory explain the working of monopole antennas. Compare the input impedance and directivity of monopole antennas and $\frac{\lambda}{2}$ length dipole antennas.

[CO-2; 2 Marks]

7. 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; 5 Marks]

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