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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION-Oct2017

M.Tech 3rd Semester

COURSE CODE: 13M1WEC334 MAX. MARKS:25

COURSE NAME: Antenna Theory & Techniques

COURSE CREDITS: 3 MAX. TIME: One Hour Thirty Minutes

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

1. Design a linear array with a spacing b/w the elements of $d = \frac{\lambda}{4}$ such that it has zeros at $\theta = 0°, \theta = 90°$ and $\theta = 180°$. Determine the number of elements, their excitation and plot the desired radiation pattern. 4
2. A 1.2λ long dipole has 1 amp peak current. Find the maximum peak current seen on the dipole, if the dipole is oriented along the Z-axis. Find the radiation electric and magetic fields at a distance of 100 m along $\theta = 60°$. 4
3. An antenna is fed with 100 W power. The efficiency of the antenna is 80%. If the radiation pattern of an antenna is

$$P(\theta) = \sin^2\theta \sin^2\phi \quad 0 \le \theta \le \pi$$

$$0 \le \phi \le \pi$$

and zero elsewhere, Find the radiation intensity in the direction of maximum radiation. Also, find the power density at a distance of 10 Km in the direction of maimum radiation. 4

4. A Z-orinted hertz dipole of length 10 cm is excited with a sinusoidal current of amplitude 20 Amp and frequency 10 MHz. Find the instanteous electric field at a distance of 1 m along the X-axis at 1 micro sec. Also, find the orintation of electric field. 3
5. Find the power radiated and radiation resistance for $\frac{\lambda}{2}$ length dipole antenna. 2
6. Write the applications of antenna reciprocity theorem. 2

7. Plot the radiation pattern of 8-isotropic elements, fed in phase and spaced $\frac{\lambda}{2}$ apart using principle of multiplication of patterns. 2

8. Calculate BWFN, direction of pattern maima, direction of nulls and phase differnce b/w sources for 4-element end fire antenna array with equal amplitude and spacing. 4