Dr. Naveen Jaglan

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- Dec 2017

M.Tech 3rd Semester

COURSE CODE: 13M1WEC334 MAX. MARKS: 35

COURSE NAME: Antenna Theory & Techniques

COURSE CREDITS: 3 MAX. TIME: Two Hours

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

---

1. Determine Dolph-Tchebyscheff current distribution for the maximum beam width of a linear in phase broadside array of eight isotropic sources. The spacing b/w the elements is 3λ/4 and the side lobe level is 40 dB down. What is the half power beam width? 5
2. Derive expressions for near and Far field components of Hertz dipole? Calculate the radiation resistance, total power radiated and directivity of this antenna. 5
3. Design a linear array with a spacing b/w the elements of $d = \frac{\lambda}{4}$ such that it has zeros at $\theta = 0^\circ, \theta = 90^\circ$ and $\theta = 180^\circ$. Determine the number of elements, their excitation and plot the desired radiation pattern. 3
4. Calculate BWFN, HPBW, direction of pattern minima, direction of nulls and phase differnce b/w sources for 4-element broadside antenna array with equal amplitude and spacing. 3
5. What is folded dipole antenna? Write its advantages, frequency of operation and applications. 4
6. Explain normal mode and axial mode of radiations for helical antennas. 5
7. What are the advantages of different feeding techniques available in microwave dish antennas? 3
8. 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

9. What is antenna reciprocity theorem? Write the applications of this theorem. 3