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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION-Sep 2017

M.Tech 3rd Semester

COURSE CODE:13M1WEC334 MAX. MARKS:15

COURSE NAME: Antenna Theory & Techniques

COURSE CREDITS: 3 MAX. TIME: One Hr

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

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1. The radiation patter of an antenna is given by:

$$F(\theta)=\frac{\sin(10\cos\theta)}{\sin(2\cos\theta)} \text{ Where } 0\le\theta\le\pi$$

Find the direction of nulls, direction of maximum radiation and HPBW of antenna. 2

2. A $\lambda/2$ dipole situated with its center at the origin radiates a time-averaged power of 600 W at a frequency of 300 MHz. A second $\lambda/2$ dipole is placed with its center at a point $P(r,\theta,\phi)$ where r = 200 m, $\theta=90^\circ,\phi=40^\circ$. It is oriented so that its axis is parallel to that of the transmitting antenna. What is the available power at the terminals of the second (receiving) dipole? 2
3. Prove that radiation pattern is Fourier transform of current distribution on antenna structure. 2
4. A thin linear dipole of length *l is* placed symmetrically about the *z*-axis. Find the far-zone spherical electric and magnetic components radiated by the dipole whose current distribution can be approximated by:

$$I_z(z')=\left\{I_0\left(1+\frac{2}{l}z'\right)\right\},-l/2\le z'\le 0$$

$$\left\{I_0\left(1-\frac{2}{l}z'\right)\right\},0\le z'\le l/2 \qquad 2$$

5. Plot the current distribution and radiation pattern for $\frac{\lambda}{2},\lambda,\frac{3}{2}\lambda,2\lambda$ length dipole antennas.2
6. Derive expressions for the near and far field components of Hertz dipole? Calculate the radiation resistance, total power radiated and directivity of this antenna? 5

EC-9, MT