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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- Dec 2018

B.Tech 5th Semester

COURSE CODE: 17B11EC512 MAX. MARKS: 35

COURSE NAME: Microwave Devices & Antenna Design

COURSE CREDITS: 4 MAX. TIME: 2 Hrs.

*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-4,6; 5 Marks]
2. Plot the radiation pattern of 8-isotropic elements, fed in phase and spaced $\frac{\lambda}{2}$ apart using principle of multiplication of patterns. [CO-5; 2 Marks]
3. Explain antenna reciprocity theorem. What are the limitations of this theorem? [CO-5,6; 5 Marks]
4. Derive the expressions of electric and magnetic fields components for TE modes in rectangular waveguides. Does TEM mode exist in rectangular waveguide? [CO-2; 5 Marks]
5. A two-cavity klystron amplifier has the following parameters:
   $V_O$=1000V, $R_O$=40kΩ, $I_O$=25mA, f=3GHz, Gap spacing in either cavity (d) =1 mm, Spacing B/w the two cavities (L) =4cm, Effective shunt impedance excluding beam loading ($R_{sh0}$=30kΩ).
   (i) Find the input gap voltage to give maximum voltage $V_2$.
   (ii) Find the efficiency of amplifier neglecting beam loading. [CO-3,4; 5 Marks]
6. What are the advantages of antenna array? Plot the radiation patterns of two element isotropic antenna array with equal amplitude and opposite phase. [CO-5; 5 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-5; 5 Marks]
8. Define antenna directive gain and power gain. What is the significance of power gain? [CO-5,6; 2 Marks]
9. Define antenna directivity, effective aperture and radiation resistance. [CO-5,6; 3 Marks]

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