Code No: NR310402 **NR**

III B.Tech I Semester Supplementary Examinations, April/May 2005
ANTENNA AND WAVE PROPAGATION
(Common to Electronics & Communication Engineering and Electronics & Telematics)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Write down the components of electric and magnetic fields for an electric dipole.
   (b) Show that only the radial component of the Poynting Vector has an average power flowing out of the dipole.
   (c) Estimate the total power radiated and evaluate the radiation resistance for
      i. a uniform and
      ii. Triangular current distributions.
2. (a) Define and explain the terms Antenna gain, Effective aperture, Radiation intensity and effective length in case of a $\lambda/2$ dipole.
   (b) Calculate the power density in W/mt^2 at a distance of 8000 meters from a 900 W isotropic antenna source. Calculate power if the antenna is replaced with another antenna having gain of 26 dB.
3. (a) Show that the directivity can be improved by using a number of antennas in an array.
   (b) Prove that the level of secondary lobe is -13.5 dB below that of major lobe in an uniform linear array.
4. (a) Give the current distribution and radiation pattern of a folded dipole antenna. Explain how the radiation pattern will be modified with the addition of a reflector and two directors with such an antenna.
   (b) What are the different types of antennas used at very high frequencies? Discuss the advantages of a folded dipole. What is a balun and why it is used at these frequencies?
5. (a) With neat sketches distinguish between the band width, selectivity and other radiation characteristics of slot and complimentary dipoles.
   (b) What are the special features of loop antennas? Explain how a small loop is treated as equivalent to a short magnetic dipole.
6. (a) Establish and explain the gain and beam width relations for a parabolic reflector and account for its beam shaping considerations.
   (b) Write short notes on: Cassegrainian antennas.
7. (a) Define and distinguish between the principal plane patterns, as applicable to

i. Horizontally polarized antennas and
ii. Vertically polarized antennas.

(b) Sketch and explain the basic set up for antenna pattern measurements.

8. Describe the structure of the ionosphere and the part played by each layer in it in the long distance transmission of radio signals in the HF band.

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