

**III B.Tech I Semester Regular Examinations, November 2007**  
**ANTENNAS 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

\*\*\*\*\*

1. (a) Define antenna beam width and directivity and obtain the relation between them.  
(b) Calculate the electric field (Erms) due to an isotropic radiator radiating 3KW power at a distance of 2 Km from it. [8+8]
2. (a) State the following antenna theorems and bring out their importance in antenna measurements :
  - i. Reciprocity theorem.
  - ii. Maximum power transfer theorem.(b) A half wave transmitting antenna radiates 10KW of power at 100MHz. If the heights of transmitting and receiving antennas are 100m and 9m, calculate the power received at a distance of 10kms from the transmitting antenna. [8+8]
3. (a) Calculate
  - i. HPBW
  - ii. Solid Angle if a linear array having 10 isotropic point source with  $\lambda/2$  spacing and phase difference  $\delta=90^\circ$ .(b) Write short notes on Hansen-Wood yard end fire array. [8+8]
4. (a) Distinguish between Traveling wave and Standing wave antennas.  
(b) Compare Resonant and Non Resonant antennas.  
(c) Explain the working of Rhombic antenna. [4+4+8]
5. (a) Compute the gain, principle beam width and HPBW of a 10m diameter parabolic dish with a half wave length dipole feed in focus at 10GHz.  
(b) Explain the Cassegrain mechanism in transmission mode. List out the advantages and disadvantages of Cassegrain feed. [8+8]
6. (a) What is an electromagnetic horn antenna? What are its applications? The length of an E-plane sectoral horn is 15cms. Design the horn dimensions such that it is optimum at 10GHz.  
(b) Calculate the minimum distance required to measure the field pattern of an antenna of diameter 2m at a frequency of 3GHz. Derive the necessary equation. [8+8]

7. (a) Show that Ionosphere act as a variable refractive index medium.  
(b) A radio link has to be established between two earth station at a distance of 25000kms. If the height of ionosphere is 200kms and its critical frequency is 5MHz. Calculate the MUF for the given path. Also calculate the electron density in the ionosphere layer. [8+8]
8. (a) Describe the troposphere and explain how tropospheric ducts can be used for microwave propagation.  
(b) Derive the expression for space wave electric field produced by an antenna at a distance point, assuming a flat earth. [8+8]

\*\*\*\*\*