SIXTH SEMESTER B.TECH DEGREE EXAMINATION

13.605 ANTENNA& WAVE PROPAGATION (T)

Time: 3 Hours   Max. Marks: 100

PART – A

(Answer all questions. Each question carries 2 marks.)

1. Differentiate between beamwidth and bandwidth of an antenna.

2. What is the physical significance of radiation resistance?
3. Explain Grating lobes.
4. What is Pattern multiplication?
5. What are the applications of rhombic antennas?
6. What is the basic principle of beam steering?
7. Derive the relation between M.U.F and critical frequency.
8. Using pattern multiplication. Find the resultant pattern of 2 element array of

   infinitesimal horizontal dipoles of spacing λ/4 and β= -90^0.
9. Define duct propagation.
10.   Show that a linearly polarized wave is a combination of two circular

   polarized waves.

PART – B
(Answer any one question from each Module.)
Module – I

11.
   a. Illustrate with sketches at different time instants how a dipole radiates in

      free space.(10 Marks)

   b. Derive the expression for directivity and radiation resistance for a half wave

      dipole working out from infinitesimal dipole field expression. (10 Marks)

12.
   a. Find the gain. Beam width and capture area for a parabolic antenna with a 6 meters diameter dish and dipole feed at a frequency of 10 GHz.

   (10 marks)
   b. Explain the methods used for the measurement of directivity and impedance of an antenna.   (10 marks)

Module – II

13.
   a. Find the resultant pattern of uniform linear array with n=4, d= λ/4 and α= π.

   (10 Marks)
   b. What is mean by 'directivity' and 'power gain' of an antenna? Show how the directivity can be increased by using a number of antennas in a suitable array.   (10 marks)

14.
   a. Explain the principle of pattern multiplication and find the array factor of two element array.   (12 marks)
   b. Describe the principles of End-fire and Broadside arrays.   (8 marks)

Module – III

15.
   a. Write note on helical antenna working on Normal mode and Axial mode.(10 Marks)
   b. Write note on rectangular patch antenna with diagram indicating field distributions.   (10 Marks)

16.
   a. Explain the working of parabolic dish antenna. What is the significance of f/D ratio?

   (10 Marks)
   b. Write short note on Broadband antennas and antennas for mobile communication.

   (10 Marks)

Module – IV

17.
   a. Derive   the   expression   for   effective   earth's   radius.

   (10 Marks)

b. Explain how earth's magnetic field affects the propagation of radio waves in the Ionosphere. Discuss its effects on polarization and absorption of radio waves.

(10 Marks)

18.

a. Describe how the ionospheric layers are formed and how they affect the propagation of radio waves.

(10 Marks)

b. Derive the expression for refractive index of ionosphere neglecting earth's magnetic field on ionosphere.

(10 Marks)