(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2120 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. V) ODD SEMESTER THEORY EXAMINATION 2013-14

ANTENNA AND WAVE PROPAGATION

Time : 2 Hours *Total Marks : 50*

Note :– Attempt **all** the questions. All questions carry equal marks.

1. Attempt any **two** parts of the following : **(5×2=10)**

   (a) Prove that the radiation resistance of half wave dipole antenna is 73 ohms.

   (b) A transmitting antenna having an effective height of 100 meters has a current at the base 100 A at the frequency of 300 kHz. Calculate :

      (i) The field strength at a distance of 100 km

      (ii) The value of radiation resistance.

   (c) How the directivity of an antenna is defined and what is the relation between directivity and gain of an antenna ?

2. Attempt any **two** parts of the following : **(5×2=10)**

(a) Design a four element broadside array of $\lambda/2$ spacing between elements. Consider unit element as $\lambda/2$ length antenna. Draw its radiation pattern and calculate its HPBW.

(b) What is end-fire array ? Deduce an expression for the radiation pattern of an end-fire array with n vertical dipoles.

(c) What is meant by Dolph-Chebyshev distribution for a linear array ? Show that such a distribution gives a minimum side lobe level for a given beam-width of major lobe.

3. Attempt any **two** parts of the following : **(5×2=10)**

(a) A loop aerial for use at 500 kHz is of height 0.5 meter, width 0.5 meter and 25 turns, when directed to receive a maximum signal the emf induced in the loop is 150 μv. What is the field strength of the signal picked up ?

(b) What is a rhombic antenna ? Describe its construction and properties with special reference to directivity and bandwidth.

(c) Design Log-periodic Antenna of your own defined parameter. Describe microstrip antenna. What are its advantage and disadvanatge ? Describe any one feed method.

4. Attempt any **two** parts of the following : **(5×2=10)**

(a) Explain the important features of the Horn Antenna and the principle of its working. Describe Helical Antenna is Normal mode of operation.

(b) Describe the parabolic antenna used at microwave frequencies. Describe the methods of feeding a paraboloid reflector in which the primary antenna is located at the focal point.

(c) Describe the method of Radiation pattern measurement in the lab.

5. Attempt any **two** parts of the following : **(5×2=10)**

(a) Find the skip distance for waves of frequency 4.6×10^{6} Hz at a time when the maximum ionization in the E-region has a value of 1×10^{11} e/m^{3} at a height of 110 km.

(b) Define maximum usable frequency and derive an expression for the same in the case of a thin ionospheric layer over a plane earth.

(c) Discuss the phenomenon of ground wave propagation at long and medium waves.