53 (EC-710) AWPR

2016

ANTENNA AND WAVE PROPAGATION

Paper : EC 710

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer **five** *questions out of* **seven** *questions.*

1. *(a)* Define transmission line of an Antenna System. Also with the help of figure show the transition region between guided wave and free space wave.

    2+5=7

   (b) Define characteristic impedance of a transmission line. Explain how characteristic impedance is important with the length of the transmission line terminated by a load.   2+8=10

   (c) Define Dipole of an Antenna.   3

2. *(a)* Explain how antenna size depends on the wavelength and frequency of the electromagnetic wave transmitting through the antenna system.   7

   (b) Point out the difference between antenna conductors and antenna insulators.   5

   (c) Explain how the field strength is an important term in configuring the radiation pattern of the radiated energy from an antenna.   8

3. *(a)* Explain how antenna feeders are used in reducing the energy losses in the antenna system. Also explain the various types of antenna feeders used in the antenna system w.r.t its operation of frequency.   5+5=10

   (b) Define front to back ratio of an antenna. Also give the difference between Effective Area and Effective Length of an Antenna.   3+7=10

4. *(a)* Explain and find out the power in a uniform plane wave which is necessary to develop a power theorem or Poynting theorem for an electromagnetic wave.
          15

(b) Explain the purpose of using Isotropic antenna with practical antenna in transmitting broadcasting station. 5

5. (a) Explain the comparison between Directive gain and Directivity of an antenna. 5

(b) Explain the radiation process from a small current element dipole possessing electromagnetic field. 5

(c) Define Array of an Antenna. Point out the difference between Broadside Array and End fire Arrays of an antenna.

5+5=10

6. (a) Explain pattern multiplication of array of an antenna. Also define the multiplication of field pattern and addition of phase pattern. 5+3=8

(b) Explain YAGI-UDA antenna by showing its radiation pattern, optical equivalent.

8

(c) Point out the difference between Biconical antenna and Helical antenna.

4

7. *(a)* Find out the fundamental equation for free space propagation. 10

   (b) Explain the structure of Atmosphere and point out the different functions of layers present in the atmosphere. 10