

Antenna & Wave propagation

Con. 4842-07.

[REVISED COURSE]

CD-5625

(3 Hours)

[Total Marks : 100]

- N.B. : (1) Question No. 1 is compulsory.
 (2) Attempt any **four** questions out of remaining **six** questions.
 (3) Assume **suitable** data wherever **required**.
 (4) **Figures** to the **right** indicate **full** marks.

1. (a) Explain the following terms :- 10
 - (i) Critical frequency
 - (ii) Beam efficiency
 - (iii) Radiation intensity
 - (iv) Friss transmission formula
 - (v) Directivity.
- (b) Derive an expression for the near field and far field for a short electric dipole. Draw the field pattern. 10
2. (a) When a linear dipole is called an infinitesimal dipole or a small dipole or a finite length dipole ? Compare infinitesimal dipole, small dipole and halfwave length dipole in terms of current distribution, radiation resistance, effective length and directivity. 10
- (b) What is an array factor (AF) ? 5
- (c) List the parameters that decide the overall pattern of an antenna array. 5
3. (a) Why antenna array is required ? Explain broadside and end-fire array in detail. 10
- (b) Design a broadside Dolph-Tschebyscheff array of 10 elements with spacing d between the elements and with a major to minor lobe ratio of 26 dB. Find the excitation coefficient. 10
4. (a) Discuss the effect of 'flare angle' on aperture phase angle variation in microwave pyramidal Horn antenna. Also explain E-plane & H-Plane Horn antenna. 10
- (b) What is Yagi antenna ? Explain its construction & properties with special reference to directivity and bandwidth. 10
5. (a) Describe space wave propagation and derive the relation for maximum distance between transmitting and receiving antenna. Earth is assumed to be flat. 10
- (b) A radio communication link is to be established via ionosphere. Take maximum virtual height to be 100 km. at the mid-point of the path. Assume critical frequency to be 2 MHz and distance between stations to be 600 km. Find optimum working frequency (OWF) and angle of elevation of beam. 10
6. (a) Explain the working of loop antenna. Sketch its field pattern. Give applications. 10
- (b) Explain the different types of feeds for paraboloidal reflector antenna. 10
7. (a) Write details on the formation of ionised layer in the ionosphere and describe their importance in radio communication. 10
- (b) Explain travelling wave antennas and their applications. 10