

TEC-505

1136

Odd Semester Examination 2018-19

B.TECH. (ECE) (SEMESTER-V)

**ANTENNA AND WAVE PROPAGATION**

Time: 03:00 Hours

Max Marks :100

Note: Attempt all questions. All questions carry equal marks.

1. Attempt any four parts: [5x4=20]
  - (a) List the feature associated with broadband array.
  - (b) Draw the radiation pattern of Marconi antenna.
  - (c) A half wave dipole antenna is required to radiate 250MHz. If velocity factor of antenna is 0.85, how much its length should be?
  - (d) List the essential features of Yagi antenna.
  - (e) The radiation resistance of antenna is 72 ohm and loss resistance is 8 ohm. Find the Directivity for the power gain of 16.
  
2. Attempt any four parts: [5x4=20]
  - (a) Explain the effective aperture of an antenna. A dipole having  $L=3\text{cm}$  is operated at 1GHz. The efficiency factor  $k=0.6$ . Calculate the radiation resistance, antenna gain and effective aperture.
  - (b) Explain Linear Polarization and Elliptical Polarization. Obtain the expression of radiation resistance of short dipole antenna.
  - (c) The maximum radiation intensity of a 90% efficiency antenna is 200mW/unit solid angle. Find the directivity and gain (dimensionless and in dB) when the input power is 125.66mW.

(d) How radiation is accomplished? Explain Physical concept of radiation in a single wire.

(e) What are the key features of non resonant antenna?

3. Attempt any **two** parts: [10x2=20]

(a) A television transmitting antenna mounted at a height of 120m radiates 15kW of power equally in all direction is azimuth at a frequency of 50MHz. Calculate

(i) Maximum line of sight range

(ii) The field strength at a receiving antenna at a height of 16 m at a distance of 120km.

(iii) The distance at which the field strength reduces to 1 mV/m.

(b) What is effective earth's radius? Derive the expression for the effective earth's radius for space wave propagation.

(c) Write the range of various layers of atmosphere. Explain the effect of earth's magnetic field on radio wave propagation.

4. Attempt any **two** parts: [10x2=20]

(a) Draw the radiation pattern of a  $\frac{\lambda}{2}$  antenna. Obtain the front to back ratio of an antenna which puts out 3kW in its most optimum direction and 500W in opposite direction.

(b) Determine the electric field at point 'P' due to doublet of length 'dl'. Obtain the expression of radiation resistance for same.

(c) Describe the method of measuring the polarization of electromagnetic waves.

5. Attempt any two parts: [10x2=20]

(a) Write the Short notes on the following:

(i) Horn Antenna

- (ii) Log Periodic Antenna
- (iii) Noise Figure and Noise Temperature

(b) Explain :

- (i) Skip Distance
- (ii) Optimum Working Frequency

Determine the effective earth's radius in space wave propagation.

(c) Discuss in brief the working principle of parabolic reflector antenna and mention its area of application.

Find the diameter of dish antenna that will form a beam having a  $0.5^\circ$  half power beam width at a frequency of 8.2 GHz. Assuming an efficiency constant  $k=0.6$ . Calculate antenna gain and effective aperture

----- x -----