

TE / EXTC / Sem VI / Rev  
 Antenna & W.P.  
 ( REVISED COURSE )

h-12-10

GT-7644

Con. 5721-10.

( 3 Hours )

[ Total Marks : 100

**N.B. :** (1) Question No. 1 is compulsory.

(2) Answer any **four** questions from the remaining **six** questions,

(3) Assume any **suitable** data wherever required.

(4) **Figures** to the **right** indicate **full marks**.

1. Answer the following :— 20
- (a) Draw and explain the Transmission-line Thevenin equivalent of an antenna in the transmitting and receiving mode.
- (b) Discuss the voltage and current distribution of a half-wave dipole antenna. Can we say the antenna is resonant ?
- (c) Explain the principle of pattern multiplication with a suitable example.
- (d) Deduce the wave equations for a plane wave in free space with the help of Maxwell's equations.
2. (a) Derive the expression for radiation resistance of an infinitesimal dipole. Explain its significance. 10
- (b) Explain the significance of the term "Effective Area of an Antenna". Derive the relationship between effective area and directivity of any antenna. 10
3. (a) Derive the array factor of a N-element uniform linear array and hence deduce the condition for which the array will radiate in the broadside and end-fire direction. 10
- (b) Analyze the performance of an antenna when placed rear or on the infinite flat perfect conductor using Image theory. 10
4. (a) Explain the working of a microstrip antenna with the help of transmission-line model. Also give its applications. 10
- (b) Explain different types of horn antennas. Find its directivity and beam width. 10
5. (a) Describe how the radiation pattern of a given antenna can be measured experimentally. 10
- (b) Explain the different components of the ground waves. What are frequency characteristics of the ground waves ? 10
6. (a) 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 its excitation coefficients and array factor. 10
- (b) Explain the principal modes of operation of helical antennas and draw its radiation pattern. 10
7. Write notes on :—
- (a) Dielectric wave guide. 7
- (b) Antennas used in satellite and mobile communications. 7
- (c) Floded dipole antenna and its applications. 6