

2123
B.E. (Electronics and Communication Engineering)
Fifth Semester
EC-503: Antennas and Wave Propagation

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

- a) Distinguish between antenna bandwidth and antenna beam-width.
- b) How the effective area of antenna related to the gain of antenna?
- c) What do you mean by the radiation resistance of an antenna
- d) Define the terms 'Lowest Usable frequency' and 'Skip Distance'.
- e) What is fading? List the major causes. (5x2)

UNIT - I

II. a) What are "broadside" and "end fire" arrays?

b) Derive an expression for the radiation pattern of a broadside, uniform linear array of 4-equally spaced (element spacing = $\lambda/2$) isotropic antennas. Calculate the width of its major lobe between first nulls. (3,7)

III. a) Prove that the directive gain and the effective area of an antenna is a universal constant.

b) What do you mean by the radiation resistance of an antenna? What is the nature of the current distribution in a base-fed half wave vertical antenna erected just above a perfect earth? (2x5)

IV. a) Discuss various feeding methods of an array.

b) Explain the principle of pattern multiplication and find the array factor of a two element array. (2x5)

UNIT - II

V. a) State and discuss the conditions of total reflection of radio waves from the ionosphere. Prove that the skip distance D for a given frequency is given by

$$D = 2h\{(f / f_c)^2 - 1\}^{1/2}$$

Contd.....P/2

(2)

where h is the effective height of the reflecting layer and f_c the critical frequency of the layer.

b) Discuss tropospheric propagation in detail. (2x5)

VI. What is the basic condition for frequency independent antennas? Is Log periodic antenna a frequency independent? Explain its principle of operation. (10)

VII. Write short note on:-

(a) Whip Antenna

(b) Rhombic antenna

(2x5)

x-x-x