Sub Code:REC051

Paper Id: **130501** **Roll No:** | | | | | | | | | | | | | |

B. TECH.
(SEM-V) THEORY EXAMINATION 2019-20
ANTENNA AND WAVE PROPAGATION

Time -3 Hour ***Max. Marks: 70***

Note: Attempt all Section. If require any missing data: then choose suitably.

SECTION A

1. Attempt all questions in brief **2x7= 14**

(a) Define beam efficiency and stray factor in antenna terminology.

(b) How can increase the bandwidth of patch antenna?

(c) Find the radiation resistance of a length L = 1 meter at an operating frequency of 10MHz.

(d) What is mean by short electric dipole in an antenna?

(e) Draw the resultant pattern of 4 isotropic element by pattern multiplication method

(f) What is mean by multi hope propagation in wave mechanism?

(g) If the antenna has a main half power beam width of 20 degree, calculate its directivity.

SECTION B

2. Attempt any three of the following **7x3= 21**

(a) (i) The radiation resistance of the antenna is 75 ohms and loss resistance is 10 ohms. Calculate directivity of an antenna, if power gain is 16.

(ii) Derive the Friss formula for radio communication link.

(b) How the directivity of any antenna is defined and what is the relation between directivity and gain of antenna.

(c) Describe principle of Folded dipole antenna with its applications.

(d) What is microstrip patch antenna? Explain different types of feed method for parabolic reflector antenna.

(e) (i) What is mean by skip distance and virtual height in wave propagation system?

(ii) A parabolic reflector antenna is designed for operation at 8GHz. It is largest aperture dimension is 80 ft. For measurement of radiation pattern, what should be minimum distance between primary and secondary antenna.

SECTION C

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3. Attempt any one parts of the following 7x1=7

(a) State and explain the basic radiation equation and effective height of an antenna.

(b) What is mean by radiation pattern of an antenna? Describe the term fields from oscillating dipole in detail.

4. Attempt any one parts of the following 7x1=7

(a) Derive the relation for total electric field having linear array of n isotropic point sources of equal amplitude and spacing.

(b) Derive the relation for electric field in array of two isotropic point sources with same amplitude & opposite phase. Find out the maximum and minimum direction for radiation pattern.

5. Attempt any one parts of the following 7x1=7

(a) What is linear antenna? Derive the equation for radiation resistance of short dipole.

(b) (i) Explain Yagi uda antenna using proper diagram, designing parameter and its applications.

(ii) Obtain the roughness at wavelength 100m for an earth having $\sigma = 0.5$ with $\theta = 60$ degree.

6. Attempt any one parts of the following 7x1=7

(a) Explain the log periodic antenna using proper diagram and expressions.

(b) Compare between parabolic & corner reflector. Explain different types of horn antenna.

7. Attempt any one parts of the following 7x1=7

(a) What are the effects of the earth's magnetic field on ionospheric radio wave propagation? Prove that the refractive index of a layer of ionosphere is given by $n = (1- 81N/f^2)^{1/2}$

(b) Explain the terms maximum usable frequency and critical frequency in wave propagation.

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