[Total No. of Questions - 9] [Total No. of Printed Pages - 3] (2125)

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B. Tech 6th Semester Examination

Antenna and Wave Propagation (OS)

EC-6002

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, selecting one question from each Section and all parts from Section-E.

SECTION - A

1. (a) Deduce the expression for field components H_ϕ & E_θ at a distance r and at an angle θ from a half wave dipole. (10)

   (b) What is significance of the concept 'Retarded Vector Potential'? Explain retarded vector potential mathematically with the help of diagram. (10)

2. (a) What is effective aperture & effective length of an antenna? Derive a relationship between effective aperture & effective length of an antenna. (10)

   (b) When an input power of 10kW is applied to an antenna, 10 Ampere current flows through it. The radiation resistance of the given antenna is 80 ohm, What will be the directority of the antenna if the power gain of antenna is 12? (10)

[P.T.O.]

SECTION - B

3. (a) Derive expression for field strength, maxima direction & minima direction in case of array of two point sources with equal amplitude & phase. Also draw the field pattern. (10)

   (b) Explain principle of pattern multiplication & its significance in antenna arrays, plot radiation pattern of antenna array consisting of 4-isotropic elements fed in phase spaced $\lambda/2$ apart. (10)

4. (a) Explain Binomial arrays, what are their advantages & disadvantages? (10)

   (b) How the direction of radiation can be controlled electronically in an antenna array? Support your answer with an example. (10)

SECTION - C

5. (a) What are Rhombic antennas? Explain their advantages & disadvantages. (10)

   (b) Explain the procedure for measuring antenna radiation pattern. (10)

6. (a) Explain construction & working of Yagi Uda antenna explaining why parasitic elements are important. Also list advantages of yogi uda antenna. (10)

   (b) Explain in detail the process & method of radiation resistance measurement of an antenna. (10)

SECTION - D

7. (a) Derive expression for refractive index of ionosphere. Explain mechanism of radio wave bending by ionosphere. (10)

(b) What is virtual height? Derive expression for range of Ionospheric propagation in terms of virtual height. (10)

8. (a) Explain surface wave communication. Also explain the effect of wave tilt and problem associated with wave tilt. (10)

(b) Derive the expression for field strength of space wave. (10)

SECTION - E

9. Write note on:

(a) Directority.

(b) Antenna Temperature.

(c) Radiation resistance.

(d) Duct propagation.

(e) Skip distance. (5×4=20)