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Question Paper Code: 95404

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

Fifth Semester

Electronics and Communication Engineering

19UEC504 - Antenna and Wave Propagation

(Regulation 2019)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. The beam width of the antenna pattern measured at half power points is called _____ CO1-U
(a) Half power beam width (b) Full null beam width
(c) Beam width (d) None of the above
2. Linear array is a system of _____ spaced elements CO1- U
(a) Un equally (b) Equally (c) Both a and b (d) None
3. The relation between slot and dipole impedances is CO1- U
(a) $Z_S Z_d = Z_i^2 / 4$ (b) $Z_S Z_d = Z_i^2 / 2$ (c) $Z_S Z_d = Z_d^2 / 4$ (d) $Z_S Z_d = Z_d^2 / 2$
4. Which one is frequency independent antenna CO1- U
(a) Helical antenna (b) Yagiuda antenna
(c) Rhombic antenna (d) Log periodic antenna
5. During day which layer does not exist CO1- U
(a) D layer (b) F1 layer (c) F2 layer (d) F layer

PART – B (5 x 3= 15 Marks)

6. Calculate the maximum effective aperture of an antenna which is operating at a wavelength of 2 meters and has directivity of 100. CO2 Ana
7. Calculate the bandwidth of a 50 cm long half wave dipole having a Q of 15. CO2 Ana
8. Differentiate flat reflector and corner reflector antenna CO1 U

9. Draw the structure of Yagi-Uda Antenna CO1 U
10. What are the factors that affect the propagation of radio waves? CO1 U

PART – C (5 x 16= 80 Marks)

11. (a) Prove that the current produced by antennas are same, if EMFs generated by the antenna is same when it is used either transmitting or receiving mode. CO1-U (16)

Or

- (b) (i) Two spacecraft are separated by 100 Mm. Each has an antenna with $D = 1000$ operating at 2.5 GHz. If craft A's receiver requires 20 dB over 1 pW, what transmitter power is required on craft B to achieve this signal level? CO2-Ana (6)

- (ii) What is the effective length of half wave dipole operating at 50MHz and 200MHz.given $A_e = .13\lambda^2$, $R_r = 73$ ohm, $Z = 377$ ohm. CO2-Ana (10)

12. (a) Design an antenna for a radio receiver operating at the frequency range of 3KHz to 300GHz CO5- C (16)

Or

- (b) Design an end fire array antenna consisting of 2 point sources of equal amplitude and out of phase. Plot the field pattern. CO5- C (16)

13. (a) Explain the principle operation of horn antenna and describe the various forms of horn antenna. Obtain the design equation of horn antenna. CO1- U (16)

Or

- (b) Explain the principle operation of parabolic reflector antenna with a neat diagram and various types of feed used. CO1- U (16)

14. (a) Calculate the dimensions of a Yagi-Uda array that has a directivity of 12dB at 145MHz. Also calculate the same for 245MHz. Infer the results. CO4- Ana (16)

Or

- (b) Calculate the Length and width of the Rectangular patch antenna for RT/duroid 5880 substrate with dielectric constant of 2.2 and $h=1.58\text{mm}$ for the resonating frequency 10 Ghz .What will be its length and width if FR4 substrate (dielectric constant of 3.4 and $h=1.58\text{mm}$) is used for the same resonating frequency. Infer the results. CO4- Ana (16)
15. (a) Discuss the structure of atmosphere with various layers. Specify the factors affecting the radio wave propagation. CO1- U (16)
- Or
- (b) Explain the principle of ionospheric propagation with a neat diagram. CO1- U (16)

