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**Question Paper Code: R5404**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2025

Fifth Semester

Electronics and Communication Engineering

R21UEC504 - ANTENNA AND WAVE PROPAGATION

(Regulations R2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

- 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
- In a Broad side array the radiation is along \_\_\_\_\_. CO1 - U  
(a) X-direction (b) Y-direction (c) Both a and b (d) None of the above
- Antenna that does not belong to the horn antenna family among the following are \_\_\_\_\_. CO1 - U  
(a) Pyramidal horn (b) Conical horn (c) Bi-conical horn (d) None of the above
- Which one is most high gain antenna? CO1 - U  
(a) Helical antenna (b) Yagi uda antenna  
(c) Rhombic antenna (d) Log periodic antenna
- D layer extends approximately from \_\_\_\_\_. CO1 - U  
(a) 50 to 90km (b) 20 to 50km (c) 90 to 110 km (d) upto 50km

PART – B (5 x 3= 15 Marks)

- Compare HPBW and FNBW. CO1 - U
- Calculate the radiation resistance of a current element whose overall length is  $\lambda/50$ . CO2 - App
- Calculate the power gain of a parabolic antenna with aperture equal of  $8 \lambda$ . CO2 - App
- Define Parasitic elements and mention its advantages. CO1 - U
- How can we minimize fading in radio wave propagation? CO1 - U

PART – C (5 x 16= 80 Marks)

11. (a) Prove that the EMFs generated by an antenna are the same when it is used in either transmitting or receiving mode. CO1-U (16)
- Or
- (b) State and prove the reciprocity principle with an antenna. CO1-U (16)
12. (a) Analyze the fields radiated from a quarter wave dipole antenna using Maxwell's equation. CO4-Ana (16)
- Or
- (b) Examine and design end fire consisting of several half wave length isotropic radiators to have a directive gain of  $30^0$ . Find the array length and width of the major lobe (i.e Beam width first nulls) Compute these values for a broadside array? Infer the results. CO4-Ana (16)
13. (a) Illustrate the various shapes of a Horn antenna and explain its working principle of Horn antenna and design its parameters with the help of flare angle. CO1-U (16)
- Or
- (b) Express the geometry of a common curved reflector antenna and the significance of F/D ratio. Explain its feed configuration. CO1-U (16)
14. (a) Explain the construction and working principle of Yagi-Uda antenna and its design. CO1-U (16)
- Or
- (b) Illustrate the techniques used for antenna gain measurement. CO1-U (16)
15. (a) Show how the ionosphere layers D, E, F1 and F2 are formed and how they affect the propagation of radio waves. CO1-U (16)
- Or
- (b) Explain the structure of atmosphere with various layers. Specify the factors affecting the radio wave propagation. CO1-U (16)