

ANNA UNIVERSITY :: CHENNAI – 600 025

MODEL QUESTION PAPER

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

SEMESTER - 7

EC431 ANTENNAS & PROPAGATION

Time: Three Hours

Maximum : 100 Marks

Answer All The Questions

PART – A (10 x 2 = 20 Marks)

1. Define effective aperture of an antenna.
2. Antenna measurements are done in far field region. Give reasons.
3. What are the advantages of antenna arrays?
4. State the principle of pattern multiplication.
5. What are the applications of loop antennas?
6. Compute the radiation resistance of an antenna $\lambda/8$ long.
7. Efficiency of a microstrip antenna is generally low. Is this true or false. Give reasons for your answer.
8. How aperture blockage in reflector antennas is avoided?
9. Define critical frequency of an ionized layer of ionosphere.
10. What are the effects of earth's curvature on tropospheric propagation?

PART B – (5 x 16 = 80 Marks)

11. For an array of n isotropic point sources radiating in broad side direction derive and obtain the maxima and minima directions for major and minor lobes. Sketch the pattern. (16)
- 12.a)
 - i. Derive the Friis transmission formula. Discuss its significance. (8)
 - ii. What is the effective noise temperature if noise figure is given by 1.3 dB. (4)

- iii. For an antenna having an effective temperature of 20° K , Calculate available noise power per unit Bandwidth. (4)

(OR)

- 12.b)i. State and prove the reciprocity theorem with regard to antennas (8)
ii. Is there any analogy between transmission line and antenna? Discuss with regard to efficiency, Q factor, and resonant length. (8)
- 13.a) Derive the expression for the radiated fields from a half wave dipole antenna and hence obtain the value of its radiation resistance. (16)

(OR)

- 13.b)i. What are the practical design consideration for monofilar axial mode helical antenna? Discuss. (8)
ii. Define pitch angle of a helical antenna and explain the different types of Tapered monofilar antennas. (8)
- 14.a)i. What are phased arrays? What are their applications? (4)
ii. Specify the design consideration for a Rhombic antenna. (4)
iii. Explain the construction of yagi antenna. Discuss the design aspects. (8)

(OR)

- 14.b) Explain the geometry of a log periodic antenna. How wide band operation is possible with this antenna. Give the design equations. (16)
- 15.a) Discuss the effects of earth's magnetic field on ionospheric radio wave propagation. Comment on appleton hartree magnetic ionic formula. (16)

(OR)

- 15.b)i. Explain the principle of troposcatter propagation. (8)
ii. Describe the troposphere and explain how ducts can be used for microwave propagation. (8)
