



**KINGS**  
COLLEGE OF ENGINEERING



**DEPARTMENT OF ELECTRONICS AND COMMUNICATION**  
**ENGINEERING**

**QUESTION BANK**

**SUB.NAME : ANTENNAS & WAVE PROPAGATION**  
**YEAR : III SEMESTER : VI**

**SUB CODE : EC 1352**

**UNIT I: ANTENNA FUNDAMENTALS**

**PART – A ( 2 Marks)**

1. Define an antenna.
2. What is meant by radiation pattern?
3. Define Radiation intensity
4. Define Beam efficiency
5. Define Directivity
6. What are the different types of aperture?
7. Define different types of aperture
8. Define Aperture efficiency
9. What is meant by effective height?
10. What are the field zone?
11. What is meant by Polarization?
12. What is meant by front to back ratio?
13. Define antenna efficiency
14. What is radiation resistance ?
15. What is meant by antenna beamwidth?
16. What is meant by reciprocity theorem?
17. What is meant by isotropic radiator?
18. Define gain
19. Define self impedance

20. Define mutual impedance
21. What is meant by cross field.?
22. Define axial ratio
23. What is meant by Beam Area.?
24. What is duality of antenna?
25. What is point source?
26. What is meant by array?
27. What is meant by uniform linear array?
  
28. What are the types of array?
30. What is Broad side array?
31. Define End fire array
32. What is collinear array?
33. What is the condition on phase for the end fire array with increased directivity.?
34. Define array factor.
35. Define beam width of major lobe?
36. List out the expression of beam width for broad side array and end fire array.

### **PART – B**

1. With neat sketch, explain the operation of helical antenna? (16)
2. Obtain the expression for the field and the radiation pattern produced by a 2 element array of infinitesimal with distance of separation  $1/2$  and currents of unequal magnitude and phase shift 180 degree? (16)
3. Derive the expression for far field components of a small loop antenna. (16)
4. Derive the expression for electric field of a broadside array of  $n$  sources and also find the maximum direction minimum direction and half power point direction? (16)
5. Design a 4 element broadside array of  $1/2$  spacing between elements, the pattern is to be optimum with a side lobe level 19.1 db. Find main lobe maximum? (16)
6. Explain pattern multiplication (8)

7. Derive the expression for electric field of an end fire of  $n$  sources and also find the maximum direction minimum direction and half power point direction? (16)
8. Write short notes a radiation resistance? (8)
9. Calculate the maximum effective aperture of a  $1/2$  antenna? (8)
10. Derive the maxima directions, minima directions, and half power point direction for an array of two point sources with equal amplitude and opposite phase? (16)
11. Explain the various types of amplitude distributions in details? (16)

## **UNIT II: RADIATION FIELDS OF WIRE ANTENNAS**

### **PART – A ( 2 Marks)**

1. What is a Short Dipole?
2. How radiations are created from a short Dipole?
3. Why a short dipole is also called an elemental dipole?
4. What is a Infinitesimal Dipole?
5. Why a short dipole is called a oscillating dipole?
6. What do you understand by retarded current?
7. Define induction field
8. Define Radiation field
9. At what distance from the dipole is the induction field equal to the radiation field?
10. Define Radiation Resistance
11. Give the expression for the effective aperture of a short dipole
12. What is a dipole antenna?
13. What is a half wave dipole?
14. Give the expression for the effective aperture of a Half wave Dipole

15. What is the radiation resistance of a half wave dipole
16. What is a loop antenna?
17. Give an expression of radiation resistance of a small loop
18. How to increase the radiation resistance of a loop antenna?
19. What are the types of loop antennas?
20. What are Electrically Small loop antennas?
21. What are Electrically large loop antennas?
22. List out the uses of loop antenna
23. What is capacitance hat?
24. Define top loading
25. Define retardation time

**PART – B**

1. Derive the expression for the radiated field from a short dipole? (16)
2. Starting from first principles obtain the expression for the power radiated by a half wave dipole? (16)
3. Derive the expression for power radiated and find the radiation resistance of a half wave dipole? (16)
4. Derive the radiation resistance, Directivity and effective aperture of a half wave dipole? (8)
5. Derive the fields radiated from a quarter wave monopole antenna? (8)
6. Find the radiation resistance of elementary dipole with linear current Distribution? (8)
7. Derive the radiation resistance, Directivity and effective aperture of a Hertzian dipole? (8)
8. Derive the power radiated and radiation resistance of current element. (8)
9. Explain in detail assumed current distribution for wire antennas (8)
10. Write in brief about the use of capacitance hat and loading coil for short antennas. (8)

### **UNIT III: TRAVELING WAVE (WIDE BAND) ANTENNAS**

#### **PART – A ( 2 Marks)**

1. Name and draw a frequency independent antenna
2. What is Yagi - Uda antenna?
3. What do you mean by parasitic element?
4. What do you mean by driven elements?
5. What is the purpose of using more directors in Yagi - Uda antenna?
6. Why folded dipole antenna is used in Yagi antenna?
7. What is beam antenna?
8. Which antenna is referred to super gain or super directive antenna?
9. What is a frequency independent antenna?
10. Why log periodic antenna is named so far?
11. What is the condition for an antenna to be frequency independent?
12. What is LPDA?
13. What are the different regions in log periodic antenna and how are they differentiated?
14. Give the expression for design ratio, spacing factor and frequency ration of log periodic antenna.
15. What are the applications of log periodic antenna?
16. What are the application of Rhombic antenna?
17. Define rhombic antenna.
18. What are the two types of rhombic antenna de
19. What are the limitations of rhombic antenna?
20. What do you mean by self-impedance?
21. What is mutual impedance?

22. What is the effect of decreasing angle  $\alpha$ ?
23. Define a traveling wave antenna?
24. What is the advantage of traveling wave antenna?
25. What is Beverage or wave antenna?
26. What is the type of radiation pattern produced when a wave travels in a wire? Draw the pattern.

### **PART – B**

1. Explain the radiation from a travelling wave on a wire ? (8)
2. What is Yagi-uda Antenna ? Explain the construction and operation of Yagi-uda Antenna .Also explain its general characteristics ? (16)
3. Explain the construction, operation and design for a rhombic antenna ? (16)
4. Explain the geometry of a log periodic antenna ? Give the design equations and uses of log periodic antenna ? (16)
5. Discuss in details about : (a) Self impedance (b) Mutual impedance ? (8)

### **UNIT IV: APERTURE AND LENS ANTENNAS**

#### **PART – A**

1. State Huygen's Principle
2. What is Slot Antenna?
3. Which antenna is complementary to the slot dipole?
4. How will you find the directivity of a large rectangular broadside array?
5. What is the relationship between the terminal impedance of slot and dipole antenna?
6. What is the difference between slot antenna and its complementary dipole antenna?
7. Define lens antenna
8. What are the different types of lens antenna?

9. What is a dielectric lens antenna?
10. What are the drawbacks of lens antenna?
11. What are the field components that are radiated from open end of a coaxial line?
12. What are the advantages of stepped dielectric lens antenna?
13. What is biconical antenna?
14. What is Lunenburg lens?
15. What are the advantages of lens antenna
16. Mention the uses of lens antenna
17. How spherical waves are generated?
18. Define the characteristic impedance of biconical antenna?
19. Bring out the expressions for voltage across the feed points of the biconical antenna and current flowing through the surface of the cone?
20. What do you meant by sect oral horn?
21. What do you meant by pyramidal horn?
22. What is back lobe radiation?
23. What are the various feeds used in reflectors?
24. What are the different types of horn antennas?
25. Define refractive index of lens antenna?
26. What are secondary antennas? Give examples?

**PART - B**

1. Explain the different types of lens antenna (8)
2. Explain the radiation from a rectangular aperture (16)
3. Explain the radiation from an elemental area of a plane wave (16)
4. Describe the parabolic reflector used at micro frequencies (16)
5. Write short notes on Lunenburg lens (16)

6. Discuss about spherical waves and biconical antenna (16)
7. Derive the various field components radiated from circular aperture and also find beam width and effective area (16)
8. Derive the field components radiated from a thin slot antenna in an Infinite cylinder (8)
9. Show the relationship between dipole and slot impedances? (8)
10. Explain the radiation from the open end of a coaxial cable? (8)

### **UNIT V: PROPAGATION**

#### **PART – A ( 2 Marks)**

1. Define Sky wave.
2. Define Troposphere wave.
3. Define Ground wave.
4. What are the types of Ground wave?
5. What is meant by Space Wave?
6. What is meant by Surface Wave?
7. What is meant by fading?
8. What is the type of fading?
9. What is inverse and multi path fading?
10. What is meant by diversity reception?
11. Define Space diversity Reception.
12. Define frequency diversity Reception.
13. Define polarization diversity reception.
14. What is meant by Faraday's rotation?
15. What are the factors that affect the propagation of radio waves?

16. Define gyro frequency.
17. Define critical frequency.
18. Define Magneto-Ions Splitting.
19. Define LUHF.
20. Define Refractive index.
21. Define maximum Usable Frequency.
22. Define skip distance.
23. Define Optimum frequency?
24. What is wave impedance?
25. Define wave velocity and Group velocity?

**PART -B**

1. Explain in details about ionosphere (8)
2. Explain space wave propagation and sky wave propagation (16)
3. Explain the ground wave propagation (8)
4. Discuss the effects of earth's magnetic field on ionosphere radio wave Propagation (8)
5. Describe the troposphere and explain how ducts can be used for Microwave propagation (8)
6. Explain in details, the diversity reception methods (8)
7. Explain the advantages of Troposphere wave propagation and sky wave propagation (16)
8. Deduce an expression for the critical frequency of an ionized region in terms of its maximum ionization density (8)
9. Derive an expression for the refractive index of the ionosphere in terms of the electron number density and frequency (8)