GUJARAT UNIVERSITY
B.E. SEM V EC
Question Bank of Antenna & Wave Propagation

1 Attempt all following short questions.
(i)What is Antenna?
(ii) Define Radiation Resistance.
(iii) Show Antenna Field Zones.
(iv) Define Directivity.
(v) What is Beam Solid Angle?

2 Answer the followings
(i)Show that effective length of receiving antenna is same as that of transmitting antenna.
(ii) Show that directivity of a current element is 1.5 or 1.76 db.

3 Explain Schelkunoff Theorem and show its usefulness.

4 Discuss the following with respect to Chebyshev's distribution : (i) Chebyshev's polynomials $T_m(x)$ and its curve for both m even and m odd.(ii) polynomial $T_4(x)$

5 Explain Principle of Pattern Multiplication for array of point sources. Also give two examples of short dipoles.

6 Explain Broadside and End-fire Array, considering linear array of four isotropic sources.

7 Answer the followings
(i)Starting with field equations of short dipole, show that amplitude of radiation field and induction field are equal at $\lambda/6$ distance.
(ii)Derive expression for Effective Aperture A_e of an antenna having impedance Z_A and terminating impedance Z_T.

8 Obtain expression for the resultant field due to two isotropic point sources placed at a distance 'd' and fed with the same amplitude of currents but with a phase of 'α'.Sketch the radiation pattern for the spacing of $d= \lambda/2$ and phase $\alpha=180^\circ$

9 Explain in brief how impedance matching is done with the help of Folded Dipole Antenna.

10 Derive the expression for radiation resistance of a half-wave dipole antenna

11 Derive the expression for the far field pattern of an array of 2 isotropic Point sources with equal amplitude and phase of feed currents.

12 Derive the expression for the far field pattern of an array of 2 isotropic Point sources with un equal amplitude and any phase of feed currents.

13 Explain Radio Communication Link with Transmitting Antenna and a Receiving Antenna.

14 Derive expression for Radiation Resistance of Loop antenna.

15 Compare far fields of Short Dipole and Small Loop antenna.

16 Show that Short Magnetic dipole is equivalent to a loop.

17 Explain in brief log periodic antenna.

18 Draw the figure of helix with its associated dimensions showing the relationship between the circumference, spacing, turnlength and pitch angle of helix.State the limits of C_λ ,α and n for a helix to produce an axial mode.

19 Explain Practical design considerations for the Monofilar Axial Mode Helical antenna.

20 Explain Yagi-Uda antenna in detail Give the design steps for the 5 element yagi uda antenna.
21 Explain Non-metallic Dielectric Lens Antenna.
22 Explain different types of Reflector Antennas.
23 Explain the radiation patterns of a slot in an infinite sheet and of complementary dipole antenna. How is the field affected if the sheet is of finite extent?
24 Describe Antennas for Terrestrial Mobile communication systems.
25 Describe the working principle, design and applications of a micro strip patch antenna. Explain the physical significance of fringing field.
26 Draw and explain the experimental set up for measuring the radiation patterns. Also enlist the factors affecting the laboratory measurements, assumptions made and probable remedies.
27 What do you mean by frequency independent antennas? Draw the log periodic wire antenna and explain its functioning and design concepts in detail.
28 What are main features of microwave antennas? Explain parabolic reflector antennas. Enlist and compare various feed mechanisms for the same.
29 Classify various types of horn antennas. Describe their functioning. How does the corrugation help the overall performance of the horn antennas?
30 What is a slot antenna and where is it used? State Babinet's principle and illustrate its application to slot antennas and complementary antennas
31 Explain Frequency Scanning Arrays and mention its advantages.
32 Explain Antenna Gain measurement methods.
33 Explain the working of artificial dielectric lens antennas and derive the relation for effective index of refraction of such a lens formed by conducting spheres.
34 Explain phased array antenna. How is it used as frequency scanning antenna? Justify.
35 Explain briefly (i)Sky Wave (ii Space Wave (iii) Troposphere Scatter Propagations
36 Explain Characteristics of Ionosphere layer and define following terms MUF, Critical Frequency & Skip Distance.
37 Explain different modes of Propagation with its practical significance.
38 Two planes 20 KM apart are in radio communication. The transmitting plane delivers 1000Watts.Its antenna gain being 20 in the direction of other plane. The power absorbed by the receiving antenna of the second plane is 10μwatts.Calculate (i) electric field strength of the incident wave at the receiving antenna (ii) the effective aperture.
39 A rhombic antenna in a horizontal plane is to radiate at 200 in the vertical plane .The operating frequency is 15 MHz. Find the required (i)tilt angle (ii)leg length (iii)height above ground. What will happen if rhombic antenna is not terminated by a suitable resistance?
40 Deduce expression for (i) the critical frequency of an ionized region in terms of its maximum ionization density (ii) the refractive index of the Ionosphere in terms of the electron number density and frequency? If the critical frequency of an ionized layer is 1.5 MHz, find the electron density of layer.