Department of Electronics and Communication Engineering
Question Bank - Academic Year (2021-22)

Course Code & Course Name : **19ECC08 & Antenna Systems Engineering**

Year/Sem : **III/VI**

Unit-I: Antenna Fundamentals
Part-A (2 Marks)

1. Define an antenna?

2. Describe the meant by radiation pattern &   Define Radiation intensity?

3. Write the Statement of Equivalence of Radiation Pattern of an Antenna.

4. Distinguish between power gain and directive gain.

5. Describe the meant by antenna beam width?

6. Draw the 3D pattern of a directional antenna with maximum in z- direction at $\theta = 0°$.

7. Summarize the types of Baluns and its applications.

8. Describe the meant by effective height?

9. An antenna has loss resistance 10Ω, power gain of 20 and Directivity 22 than calculate its radiation resistance (Rr)?

10. Derive the power radiated by the short dipole?

Part-B (16 Marks)

1. Explain different types of effective aperture and effective height (16)

2. Derive the relation between directivity and effective aperture. (16)

3. Explain the following terms with respect to antenna
   (a) Radiation intensity(4)   (b)Effective aperture (4)
   (c) Directivity (4)   (d)Radiation Pattern(4)

4.(i). A transmitting antenna having effective height of 61.4 m takes a current of 10 amps.At a wavelength of 625m. find Radiation resistance , power radiated by an antenna and antenna efficiency for Ra = 50 Ohm (10)

 (ii). Derive the relation between directivity and effective aperture (6)

5.(i). Compute the field components for a half wave dipole. (8)

 (ii). Describe folded dipole antenna (8)

Unit-II: Antenna Arrays

Part-A (2 Marks)

1. Write about pattern multiplication and its advantages.

2. Identify the feed networks used in a phased array antenna.

3. Enumerate the basic principle of antenna synthesis.

4. Draw the radiation pattern for broad side and end fire array.

5. Draw the radiation pattern of isotropic point sources of same amplitude and opposite phase that are $\lambda/2$ apart along X-axis symmetric with respect to the origin.

6. Explore the need for phase shifter in phased array antennas.

7. Compare end fire and broad side array.

8. A linear end fire, uniform array of 10 elements has a separation of $\lambda/4$ between elements. Formulate the directivity of an array.

9. Devise the relative excitation levels of a binomial array of 2 and 3 elements.

10. Describe the meant by Yagi_ Uda Array.

Part-B (16 Marks)

1. Develop an expression for electric field intensity of array of two point sources of equal amplitude and equal phase. Reduce the maximum, minimum and half power direction from the above equation. (16)

2. Explain the following antenna arrays (16)
   i) Binomial array

   ii) Pattern multiplication

3. Design the radiation pattern of 8-isotropic elements fed in phase and spaced $\lambda/2$ apart using Principle of Multiplication of patterns (16)

4. With a neat diagram Explain Structure and operation of Yagi-Uda Antenna (16)

5.(i). A linear broad side array consists of 4 equal isotropic in phase point sources with $\lambda/3$ spacing. Find the Directivity and beam width. (8)

   (ii). Explain principle of pattern multiplication with two examples (8)

Unit-III : Aperture and Slot Antennas

Part-A (2 Marks)

1. Relate the field equivalence principle with aperture antennas.

2. Identify the limitations of a microstrip patch antenna.

3. Discuss about the features of the pyramidal horn antenna.

4. List the merits and applications of offset feed reflector antenna.

5. Classify the different feed structures used for parabolic reflector.

6. Compare Parabolic and Corner Reflector Antennas.

7. Draw and explain the different types of horn antennas.

8. Recall the definition of FNBW and HPBW of aperture antenna.

9. Outline the numerical techniques useful for the analysis of antenna.

10. Describe the radiation pattern and fields on the axis of an E&H-plane Sectorial horn

Part-B (16 Marks)

1. What is Horn Antenna? Sketch the various types of Horn Antenna and explain its operation   (16)

2. Explain the structure and operation of Slot antenna. Also derive the expression of its input impedance.   (16)

3. Explain the special features of parabolic reflector antenna and discuss on different types of   feed used with neat diagram.   (16)

4.(i) With a neat diagram Explain Structure and operation of Micro strip antennas.   (8)

  (ii) Write short notes on Patch antenna and Spill over   (8)

5.(i). Explain numerical tool analysis of an antenna.   (8)

  (ii). Explain the term aperture blocking   (8)

Unit-IV : Special Antennas and Antenna Measurements

Part-A (2 Marks)

1. Illustrate the difference between planar and conical spiral antenna.

2. Discuss the drawbacks in measurement of antenna parameters.

3. Generalize the antenna test range types.

4. Conclude the applications of log periodic antenna.

5. Summarize the applications of helical antenna.

6. Describe the parameters to be considered for the design of a helical antenna

7. Explain the procedures for the measurement of VSWR.

8. Describe the a normal mode of helix antenna

9. What is pitch angle of a helical antenna?

10. Recall about absolute gain and gain transfer.

Part-B (16 Marks)

1. Explain in details about spiral antenna.   (16)

2. Elaborate on Log Periodic Antenna with a neat sketch.   (16)

3. Describe the construction and operation of a normal and axial mode helical antenna?   (16)

4. Explain in details about the antenna test ranges in antenna measurement and Explain Directivity and VSWR measurement in detail.   (16)

5. Explain the construction and characteristic features of frequency independent antenna (16)

Discuss briefly on construction and working principle of Reconfigurable antenna

Unit-V : Propagation of Radio Waves

Part-A (2 Marks)

1. Define maximum usable frequency in sky wave propagation.

2. Difference the Relation between Skip Distance and MUF

3. What are the features of ground wave propagation

4. Draw the Structure of Ionosphere

5. Examine how fading is compensated in multipath propagation.

6. Express virtual height and actual height in terms of mathematical equations.

7. Define the terms Skip distance and Virtual height.

8. Point out Critical frequency and maximum usable frequency in wave propagation.(

9. List out the properties of radio waves.

10. What are the advantage of sky wave propagation?

Part-B (16 Marks)

1. Explain the following and derive the relevant expressions: (16)
   a. Critical frequency.(4)
   b. Maximum usable frequency.(4)
   c. Virtual height.(4)
   d. Skip distance.(4)

2. (i) Explain characteristics of different ionized layers in ionosphereric propagation. (8)
   (ii)Describe how the layers D, E, and F are formed and how they effect of propagation (8)
   of radio wave

3. Explain the following and derive the relevant expressions: (16)
   a. Fading.(8)
   b. Duct propagation.(8)

4. Obtain an expression for space wave field component taking into account a direct wave (16)
   field component and a reflected wave from the earth surface.

5. Explain the important features of ground wave propagation. (16)

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3.
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