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Question Paper Code: 4033222

M.E./M.Tech DEGREE EXAMINATIONS, NOV / DEC 2024
Third Semester
Communication Systems
P23CUV34 – ADVANCED ANTENNA DESIGN
(Regulation 2023)

Time: Three Hours   Maximum: 100 Marks

Answer ALL questions

PART – A   (10 x 2 = 20 Marks)

1. State the condition to be satisfied with respect to current and charge for emitting radiation.

2. Categorize the antenna parameters.

3. A radiating element of 1 cm carries an effective current of 0.5 A at 3GHZ, calculate the power radiated by the element.

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

5. Interpret the design considerations for an aperture antenna.

6. State Babinet's principle.

7. Discuss the importance of Constant jammers.

8. List the effects resulted due to different elevation angle.

9. Mention few Recursive algorithm used in Adaptive array Processing.

10. Classify smart antennas.

PART – B
(5 x 16 = 80 Marks)

11. (a) Examine the Friis transmission equation relating the power received to the power transmitted between the antennas separated by a distance of 'R' units. (16)

(OR)

(b) Derive the relationship between gain of an antenna and the antenna aperture. Also analyze the significance of directivity gain of an antenna. (16)

12. (a) For a 2-element linear antenna array separated by a distance $d = 3\lambda/4$, derive the field quantities and draw its radiation pattern for the phase difference of $45°$. (16)

(OR)

(b) Quote and derive the expression for field pattern of broad side array of N point sources. (16)

13. (a) Construct a slot antenna 2.4 GHz Slot Antenna using WR-430 Parameters for cellular tower operations. (16)

(OR)

(b) A detailed insight by applying the Huygens principle for high gain low-cost Antenna. (16)

14. (a) Show that the active impedance of any element in an array depends on both the self and mutual impedances and that the terminal current phases, hence directivity, of an array are affected by mutual coupling. (16)

(OR)

(b) The method of moments (MoM) is used to evaluate the mutual coupling between the elements of a given array, Illustrate with an example. (16)

15. (a) Classify Adaptive arrays from conventional thinking in antenna design, offering substantial improvements in performance over fixed pattern antennas in environments that include severe interference and jamming. (16)

(OR)

(b) Examine recursive algorithm of adaptive array weight vectors and its systolic array implementing structure. (16)

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