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Question Paper Code : 10528

M.E./M.Tech. DEGREE EXAMINATION, APRIL/MAY 2019.

First Semester

Communication Systems

CU 5191 – ADVANCED RADIATION SYSTEMS

(Common to M.E. Electronics and Communication Engineering)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define polarization of an antenna.
2. What is the function of balanced and unbalanced transformer?
3. What are the applications of slot antennas?
4. Define Fermat's principle.
5. What is meant by pattern multiplication?
6. What are tapered arrays?
7. Draw the schematic diagram of microstrip antenna.
8. Why microstrip antenna arrays are preferred for space applications?
9. What is the importance of EMC testing?
10. What is an antenna free space range and what are its types?

PART B — (5 × 13 = 65 marks)

11. (a) Derive the electric and magnetic field components radiated by a short dipole. (13)

Or

- (b) Derive the total power radiated by a half wave dipole. Provide required diagrams and analyse the various factors governing the radiated power. (13)

12. (a) Explain in detail the radiation through an rectangular aperture. How does it differ from the circular aperture in terms of field distribution? (13)

Or

- (b) Discuss the radiation mechanism of Slot antenna and give the design steps executed for slot antenna. (13)
13. (a) For a two element linear antenna array separated by a distance $d = 3\lambda/4$ and with a quadrature phase difference, derive the half power points major lobe and minor lobe directions. Draw the radiation pattern. (13)

Or

- (b) (i) Explain how synthesis technique is employed an antenna array. (8)
(ii) Write down the principle of phased array. (5)
14. (a) With neat diagram explain the radiation mechanism and excitation methods of a microstrip antenna. (13)

Or

- (b) Analyse the various feeding networks for the microstrip array with neat diagrams. (13)
15. (a) What are the minimum requirements for EMC measurement and explain the measurement process? (13)

Or

- (b) With schematic diagram, explain both direct and indirect method of measuring gain of the antenna. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Design a four element array using pattern multiplication and justify its radiation characteristics consider a broadside array. (15)

Or

- (b) Design a compact microstrip antenna resonating at the frequency of 3 GHz. Provide the design equations and diagrams. (15)