

T.E. Sem V

CBGS

EXTC

25/05/15

RFMA

Q.P. Code : 3380

(3 Hours)

[Total Marks : 80]

N.B. : (1) Question No. 1 is compulsory.

(2) Solve any **Three** questions from the remaining.

(3) Assume suitable data wherever even necessary justify the assumption.

(4) Draw suitable diagrams wherever needed.

1. (a) Discuss principle of pattern multiplication with example. 5
- (b) Show that the directivity of an isotropic antenna is unity. At what distance from 50 cycle circuit is radiation field approximately equal to induction field. 5
- (c) Draw electric equivalent for high frequency resistor, inductor and capacitor. 5
- (d) Explain the working principle of folded dipole antenna. What are advantages and applications. 5
2. (a) Derive radiation resistance of infinitesimal dipole. Explain its significance. 10
- (b) Why Yagi Uda antenna is called parasitic array. Why radiation pattern of this array is unidirectional. 10
3. (a) Define image impedance. Design a composite high pass filter by image parameter method with following specifications. 5
  - Cut off frequency : 50 MHz.
  - Infinite attenuation : 48 MHz.
  - Pole
  - Characteristic impedance  $R_0 = 75 \Omega$
- (b) When is a dipole called Hertzian dipole. Explain how the radiation pattern of folded dipole can be modified with addition of directors & reflectors. 5
- (c) Explain radiation mechanism, by showing that a parallel wire can act as source of radiation. Calculate radiation resistance of  $\frac{\lambda}{10}$  dipole in free space. 5
4. (a) Derive Friis transmission formula. State its significance in wireless communication. What is maximum power received at a distance of 0.5 Km over free space for 1GHz frequency. The system consists of transmitting antenna with 2.5dB gain and receiving antenna with 20dB gain & antenna is fed with 150 W power. 10
- (b) Derive array factor of N-element linear array, where all elements are equally fed and spaced. Also find the expression for the position of principle maxima, nulls & secondary maxima. 10

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5. (a) Design a low pass filter with cut off frequency of 200MHz and attenuation of 50dB at 250 MHz. The flatness of filter response is not a design consideration. Choose the filter implementation that requires least number of components. 10
- (b) What are binomial arrays. Give their significance. 10
6. (a) Explain important features of loop antenna. Discuss use of loop antenna in radio direction finding. 8
- (b) Draw & explain log periodic antenna. Why is it called so. Discuss advantages. 6
- (c) Explain horn antenna with reference to its working, antenna field & applications. 6
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