

(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 Friss 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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