

RF Modeling & Antennas

QP Code : 14910

(3 Hours)

[Total Marks : 80

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

(2) Attempt any 3 (three) out of the remaining 5 (five) questions.

(3) Assume suitable data wherever necessary. Justify the assumption.

(4) Draw suitable diagrams wherever necessary.

1. (a) Compare striplines and Microstrip lines. 5
- (b) Explain the significance of Retarded magnetic vector potential and Retarded electric Scalar potential. 5
- (c) With suitable example explain pattern Multiplication for Antenna Arrays. 5
- (d) Explain how Richard's Transformation and unit elements are useful in RF filter designing. 5
2. (a) Explain with equivalent circuits the RF behavior of Resistor, Inductor and Capacitor. 10
- (b) Design a maximally flat LPF with a cut-off frequency of 2GHz; generator and Load Impedance of 50Ω ; and with 15 dB Insertion Loss at 3 GHz with discrete LC components. 10
3. (a) Using Image Parameter method design a Low-pass composite filter with a cut-off frequency 2 MHz and Impedance of 75Ω . Place the Infinite attenuation pole at 2.05 MHz. 10
- (b) Derive Array factor of N-element liner array, where all elements are equally fed and spaced. Also find the expression for the position of principle maxima, nulls and secondary maxima. 10
4. (a) Design a broadside Dolph-Tchebyshev array of 6 elements with spacing 'd' between the elements and with a major to minor lobe ratio of 26 dB. Calculate the excitation coefficients. 10
- (b) Explain the working principle of Yagi-Uda Antenna and draw its radiation pattern. Mention its applications. 10
5. (a) Explain the structure of Microstrip Antenna. Discuss its feed mechanisms and Applications. 10

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(b) Explain the following terms related to Basic Antenna concepts with relevant equations :- 10

- (a) Radiation Resistance
- (b) Effective aperture
- (c) Beam width
- (d) Directivity
- (e) Antenna efficiency.

6. Write short notes on the following :-

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- (a) Friss Transmission formula
 - (b) Ground effect in Antenna
 - (c) Near field and far field Radiation related to Antenna
 - (d) Log Periodic Antenna.
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