QP CODE : 22616

(3 Hours) **Marks : 80**

N.B. : (1) Question **No. 1** is **compulsory.**
(2) Solve **any three** questions from the remaining **five.**
(3) Figures to the right indicate full marks
(4) Assume suitable data if necessary and mention the same in answer sheet.

Q1 (a) Explain the Hazards of Electromagnetic Radiation. 20

(b) Explain the radiation mechanism of antenna with single wire system.

(c) Explain the use of Richard transformation and Kurodas Identity in RF filter design

(d) Derive an expression for array of two isotropic sources with same amplitude and in phase.

Q2 (a) Explain the RF behavior of resistor, capacitor and inductor. 10

(b) Discuss the design procedure for filter using image parameter method. 10

Q3 (a) Design a maximally flat LPF with a cut off frequency of 2 GHz. The generator and load impedance is 50 Ω with 15 dB insertion loss at 3GHz with discrete LC components. 10

(b) Derive an expression for 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 and secondary maxima. 10

Q4 (a) A radio link has 15 watt transmitter connected to an antenna of 2.5 m^2effective aperture at 5 GHz. The receiving antenna has an effective aperture of 0.5 m^2 and is located at a15 km line of sight distance from transmitting antenna. Assume lossless antennas. Find power delivered to the receiver. 10

(b) Derive an expression for E field and H field of infinitesimal dipole antenna 10

Q5 (a) What is folded dipole Antenna? Draw its typical structure and explain working mechanism. Give its advantages. 10

(b) What is Dolph- Chebyshev array? Explain the steps involved in design of Dolph-Chebyshev array. 10

Q6. **Write short notes** 20
(a) Ground effects on Antenna
(b) Log periodic Antenna
(c) Loop antenna
(d) Horn antenna

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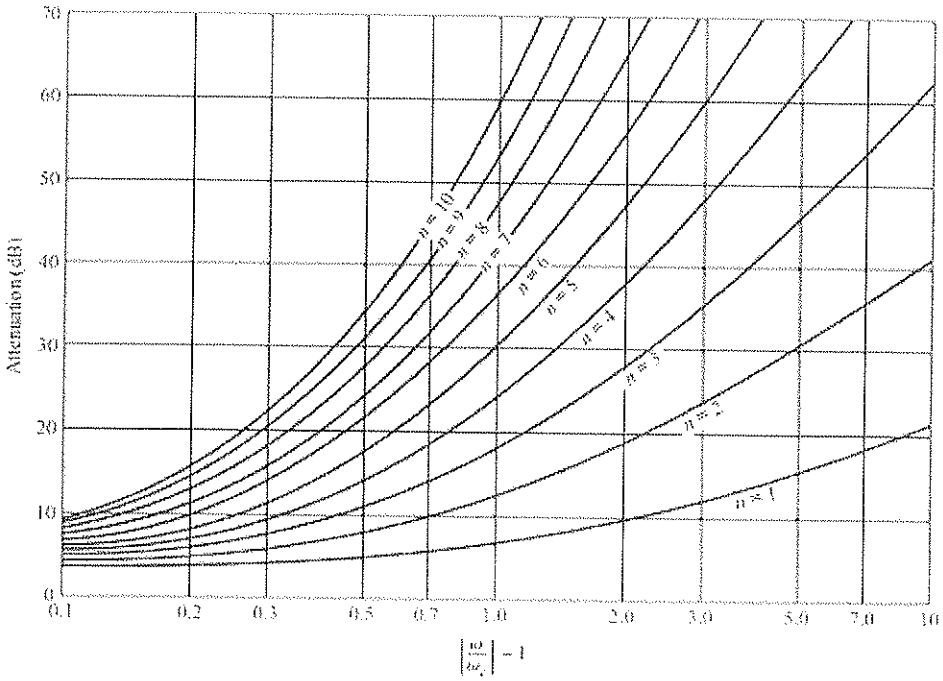

Attenuation versus normalized frequency for maximally flat filter prototypes.

Adapted from G. L. Matthaei, L. Young, and E. M. T. Jones, *Microwave Filters, Impedance-Matching Networks, and Coupling Structures*, Artech House, Dedham, Mass., 1980, with permission.

Element Values for Maximally Flat Low-Pass Filter Prototypes ($g_0 = 1$, $\omega_c = 1$, $N = 1$ to 10)

N	$g1$	$g2$	$g3$	$g4$	$g5$	$g6$	$g7$	$g8$	$g9$	$g10$	$g11$
1	2.0000	1.0000									
2	1.4142	1.4142	1.0000								
3	1.0000	2.0000	1.0000	1.0000							
4	0.7654	1.8478	1.8478	0.7654	1.0000						
5	0.6180	1.6180	2.0000	1.6180	0.6180	1.0000					
6	0.5176	1.4142	1.9318	1.9318	1.4142	0.5176	1.0000				
7	0.4450	1.2470	1.8019	2.0000	1.8019	1.2470	0.4450	1.0000			
8	0.3902	1.1111	1.6629	1.9615	1.9615	1.6629	1.1111	0.3902	1.0000		
9	0.3473	1.0000	1.5321	1.8794	2.0000	1.8794	1.5321	1.0000	0.3473	1.0000	
10	0.3129	0.9080	1.4142	1.7820	1.9754	1.9754	1.7820	1.4142	0.9080	0.3129	1.0000

Source: Reprinted from G. L. Matthaei, L. Young, and E. M. T. Jones, *Microwave Filters, Impedance-Matching Networks, and Coupling Structures*, Artech House, Dedham, Mass., 1980, with permission.

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