QP CODE : 22615

(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.

Q.1 Attempt **any four** out of the remaining **five** [20]
a) Compare striplines and Microstrip lines.
b) Explain how Richard's transformation and unit elements are useful in RF filter designing.
c) Explain near field and far field radiation related to antenna.
d) Write briefly about antenna array.
e) What are characteristics of Horn antenna ?

Q.2 a) Explain with equivalent circuits the RF behaviour of resistor, capacitor and inductor. [10]
b) Design a low pass composite filter with cut-off frequency 3 MHz and impedance of 75 Ω. Place infinite attenuation pole at 3.08 MHz. [10]

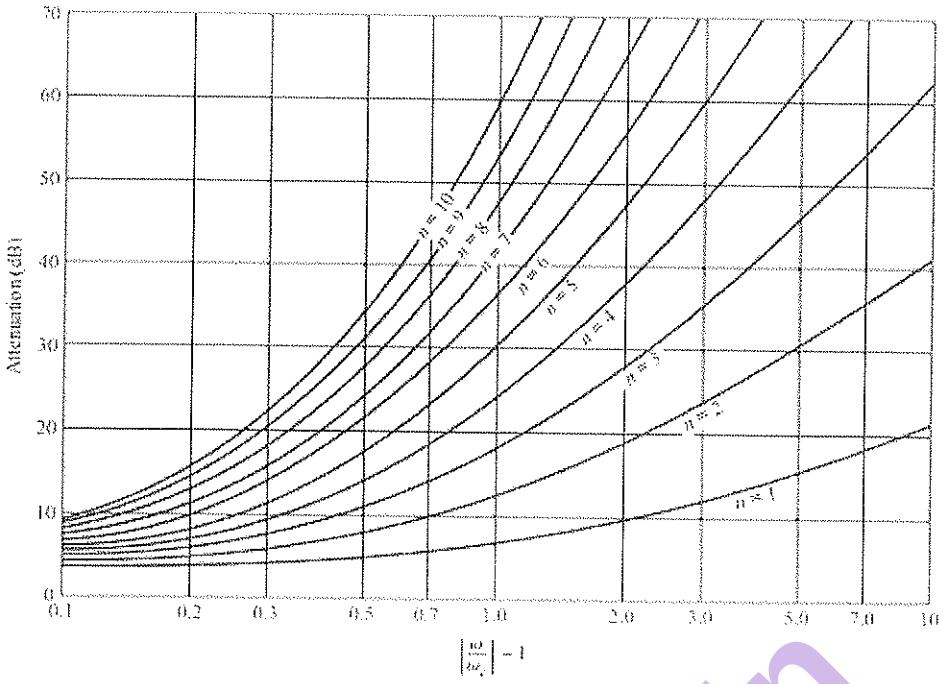
Q.3 a) Design a maximally flat low pass filter with a cut-off frequency of 2 GHz, impedance of 50 Ω, and at least 15 dB insertion loss at 3 GHz with discrete LC components. [10]
b) Explain the following terms related to basic antenna concepts with relevant equations. [10]
[i] Gain and Directivity
[ii] Radiation Pattern
[iii] Radiation Resistance
[iv] Antenna Efficiency
[v] Effective aperture

Q.4 a) Derive radiation resistance of infinitesimal dipole. [10]

b) Find the radiation pattern of an array of 2 isotropic point sources fed with same amplitude and opposite phase and spaced λ/2 apart. Find its HPBW and FNBW. [10]

Q.5 a) Explain working principle of Yagi-Uda antenna and draw its radiation pattern. Mention its applications. [10]
b) Draw the structure of microstrip antenna. Discuss its characteristics, limitations and applications. [10]

Q.6 Write short notes on the following : [20]
a) Hazards of electromagnetic radiation
b) Friss transmission formula
c) Loop antenna
d) Principle of parabolic reflector antenna



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

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