Time: 3 hour Max Marks: 80

Note: 1.Each question carries 20 marks
2: Question no 1 is compulsory
3: Solve any 3 out of remaining
4: Assume suitable data wherever required.

Q1. Solve any four **20**

A What is the stability in Amplifier? Why the stability parameter μ is required though Δ and K are there?

B Explain the power amplifier performance parameters

C Explain Richard's Transformation

D Explain working principal of Image Reject Mixer.

E Draw one port oscillator circuit.Find value of $R_L$which maximizes oscillator power .

Q2 A) Design a low pass filter whose input and output are matched to a 50 Ω impedance with cut off frequency of 3 GHz, equi-ripple of 0.5 dB and rejection of at least 40 dB at approximately twice the cut-off frequency. **10**

B) Design an amplifier for a power gain of 15 dB at a frequency of 3 GHz, if the selected bipolar transistor with V_{CE} = 4V and Ic = 5 mA has following S parameters. **10**

$S11 = 0.7\angle -155^0$, $S12 = 0$, $S21 = 4\angle 180^0$, $S22 = 0.51\angle -20^0$

Q3 A) An amplifier is having gain of 11 dB at 4 GHz. Plot constant gain circles for Gs =2 dB and 3 dB and G_L = 0 dB and 1dB using following S parameters. **10**

$S11 = 0.75\angle -120^0$, $S12 = 0$, $S21 = 2.5\angle 80^0$, $S22 = 0.6\angle -70^0$

B) An N =3 Chebyshev band pass filter is to be designed with 3 dB pass band ripple. The centre frequency is at 2.4 GHz and the filter has to meet bandwidth requirement of 20%. The filter has to be inserted into 50Ω characteristics line impedance. Find the inductive and capacitive elements. **10**

Q4 A) What is the indirect frequency synthesis? What is the effect of choice of reference frequency (fr) on the performance of frequency synthesizer? **10**

B) Explain in detail phase noise and its effect on oscillator design. **10**

Q5. A) Explain LISN in detail and how it is useful in conducting EMI tests. **10**

B) What is shielding? Explain shielding effectiveness. **10**

Q6. A) Explain variable modulus along with its expression. **10**

B) What is ESD? Model ESD waveform and explain equivalent circuit model for ESD. **10**

TABLE 8.4 Element Values for Equal-Ripple Low-Pass Filter Prototypes ($g_0 = 1, \omega_c = 1, N = 1$ to 10, 0.5 dB and 3.0 dB ripple)

0.5 dB Ripple											
N	g_1	g_2	g_3	g_4	g_5	g_6	g_7	g_8	g_9	g_{10}	g_{11}
1	0.6986	1.0000									
2	1.4029	0.7071	1.9841								
3	1.5963	1.0967	1.5963	1.0000							
4	1.6703	1.1926	2.3661	0.8419	1.9841						
5	1.7058	1.2296	2.5408	1.2296	1.7058	1.0000					
6	1.7254	1.2479	2.6064	1.3137	2.4758	0.8696	1.9841				
7	1.7372	1.2583	2.6381	1.3444	2.6381	1.2583	1.7372	1.0000			
8	1.7451	1.2647	2.6564	1.3590	2.6964	1.3389	2.5093	0.8796	1.9841		
9	1.7504	1.2690	2.6678	1.3673	2.7239	1.3673	2.6678	1.2690	1.7504	1.0000	
10	1.7543	1.2721	2.6754	1.3725	2.7392	1.3806	2.7231	1.3485	2.5239	0.8842	1.9841
3.0 dB Ripple											
N	g_1	g_2	g_3	g_4	g_5	g_6	g_7	g_8	g_9	g_{10}	g_{11}
1	1.9953	1.0000									
2	3.1013	0.5339	5.8095								
3	3.3487	0.7117	3.3487	1.0000							
4	3.4389	0.7483	4.3471	0.5920	5.8095						
5	3.4817	0.7618	4.5381	0.7618	3.4817	1.0000					
6	3.5045	0.7685	4.6061	0.7929	4.4641	0.6033	5.8095				
7	3.5182	0.7723	4.6386	0.8039	4.6386	0.7723	3.5182	1.0000			
8	3.5277	0.7745	4.6575	0.8089	4.6990	0.8018	4.4990	0.6073	5.8095		
9	3.5340	0.7760	4.6692	0.8118	4.7272	0.8118	4.6692	0.7760	3.5340	1.0000	
10	3.5384	0.7771	4.6768	0.8136	4.7425	0.8164	4.7260	0.8051	4.5142	0.6091	5.8095

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