

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 50Ω 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.

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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 $I_c = 5 \text{ mA}$ has following S parameters.
 $S_{11} = 0.7 \angle -155^\circ$, $S_{12} = 0$, $S_{21} = 4 \angle 180^\circ$, $S_{22} = 0.51 \angle -20^\circ$

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Q3 A) An amplifier is having gain of 11 dB at 4 GHz. Plot constant gain circles for $G_s = 2 \text{ dB}$ and 3 dB and $G_L = 0 \text{ dB}$ and 1 dB using following S parameters.

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$S_{11} = 0.75 \angle -120^\circ$, $S_{12} = 0$, $S_{21} = 2.5 \angle 80^\circ$, $S_{22} = 0.6 \angle -70^\circ$

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.

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

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

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

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B) What is shielding? Explain shielding effectiveness.

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

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

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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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