Total No. of Questions : 8] SEAT No. :

P1318 [Total No. of Pages : 4

[4858] - 1053
T.E. (Electronics) (Semester - I)
NETWORK SYNTHESIS
(2012 Pattern)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) What is positive real function? Give necessary and sufficient condition for a function to be positive real. **[6]**

b) Synthesize the following network function using foster - I and cauer - I form;

$$Z(s)=\frac{(s+1)(s+4)}{s(s+2)}$$ **[6]**

c) Synthesize the following transfer function

$$Z_{21}(s)=\frac{s^3}{s^3+3s^2+4s+2}$$ **[8]**

OR

Q2) a) Test whether $F(s)=\frac{s^2+6s+5}{s^2+9s+14}$ is positive real function. **[6]**

b) State the properties of LC driving point immitance function and also explain the reactance curve for LC Driving point immittance function. **[6]**

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c) What is constant resistance network? And also synthesize th following voltage transfer function

$$\frac{V_2}{V_1}=\frac{S^2+2}{S^2+3S+2}$$ **[8]**

Q3) a) State the properties of Butterworth Approximation. **[4]**

b) Write a short note on: Frequency and Impedance scaling **[4]**

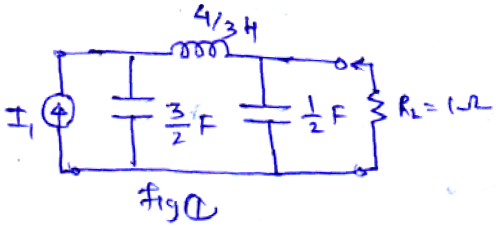
c) Obtain a system function H(s) that exhibits a Chebyshev characteristics with not more than 1dB ripple in passband and attenuation of 20dB at W = 2 rad/sec. **[8]**

OR

Q4) a) State the properties of Chebyshev Approximation. **[4]**

b) Determine the order of low pass butterworth filter that is to provide 40dB attenuation at a frequency which is twise of cut-off frequency. **[6]**

c) Normalized third order low pass filter is shown in fig(1). Design the corresponding high pass filter with cut-off frequency WC=10^6rad/sec and the impedance level of 500Ω **[6]**



fig(1)

Q5) a) Write a short note on RC - CR Transformation. **[4]**

b) Design sallen and key 2nd order butterworth low pass filter having upper cut-off frequency 1kHz. **[6]**

c) Explain the different biquad feedback topologies used in active filter designing and list the important observation. **[6]**

OR

Q6) a) Synthesize a second order Low pass filter to have a pole frequency of 2kHz and a pole Q of 10. Use sallen and key circuit based on positive feedback topology. **[8]**

b) Synthesize the following high pass filter function using RC-CR transformation

$$H(s)=\frac{k.s^2}{s^2+s+16}$$ **[8]**

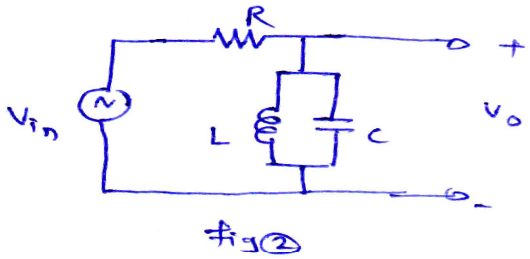
Q7) a) Prove the following sensitivity relationships **[6]**

i) $S_{\sqrt{x}}^{p} = 2S_x^{\,p}$

ii) $S_x^{y+a} = \frac{y}{s+a} s_x^{\,y}$

iii) $S_x^{\sqrt{p}} = \frac{1}{2} S_x^{\,p}$

b) For the parallel LC network shown in Fig(2) find the transfer function $\frac{V_o}{I_{in}}$ and compute the sensitivities of K, Wp and Q with respect to the passive element R, L and C **[6]**



c) Explain the effect of the following op-amp characteristics on the active filter **[6]**

i) Slew rate

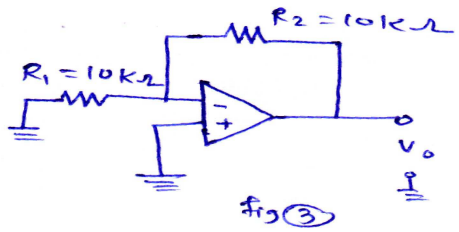
ii) CMRR

iii) Dynamic range

OR

Q8) a) What is gain sensitivity? Explain various factor affecting gain sensitivity? **[6]**

b) The op-amp used in the inverter of fig(3) has an input bias current of 500nA and input offset current that can range between $\pm$ 100nA. Find the resulting maximum output offset voltage **[6]**



c) Write a short note on multi element deviations. **[6]**

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