BE | ETRX | VII (CBSGS) 26 | 11 | 12
Filter design

25 2nd half-12 (b) JP

Con. 8390-12. KR–1029

(3 Hours) [Total Marks : 100

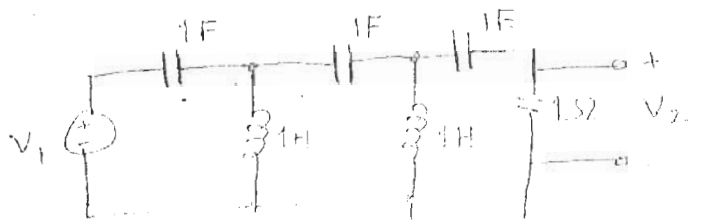
N.B.: (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from remaining **six** questions.
(3) Assume **suitable** data wherever **necessary**.

1. (a) Give difference between Butterworth. Chebyshev and elliptic filters. **5**
(b) Describe basic principles of working of switched capacitor filter with example. **5**
(c) What is adaptive filter, explain with the help of suitable example. **5**
(d) Explain multirate signal processing. Why antialiasing / antiimaging filter required ? **5**

2. (a) Design an analog bandpass filter for following specificatios :— **15**
(i) Passband 200 rad/s – 800 rad/s
(ii) Stopband 0 rad/s 100 rad/s and
1600 rad/s onwards
(iii) Passband attenuation 3dB
(iv) Stopband attenuation 10 dB
(v) Chebysher filter.
(b) Explain basic Weiner filter. **5**

3. Design a Butterworth, digital lowpass filter for following specifications. Plot pole-zero plot also. Use bilinear transformation (BLT) method : **20**
(i) Passband 0 – 1 KHz
(ii) Stopband 3 KHz – onwards
(iii) Passband attenuation 2·3 dB
(iv) Stopband attenuation 18 dB
(v) Sampling frequency 12 KHz
(vi) Low-pass filter
(vii) Plot pole-zero plot of analog filter only.

4. (a) What is inductance simulation. explain. **5**
(b) Realize/synthesize following passive network using synthetic (simulated) inductor. **5**



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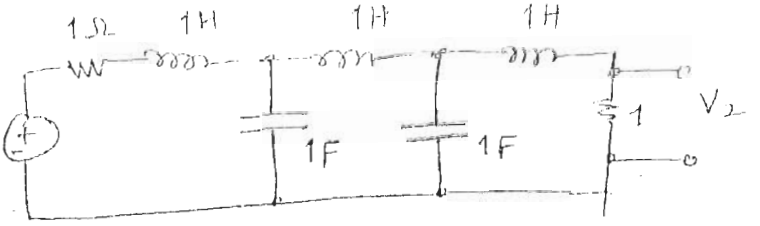
(c) Explain Leap frog realization technique with suitable example. 5

(d) Realize following passive network using FDNR (frequency dependent negative resistor). 5



5. (a) Design a FIR filter for $\delta_p = 0{\cdot}01$, $\delta_s = 0{\cdot}1$, $W_p = 0{\cdot}2$, $W_s = 0{\cdot}6$ using any suitable window. 10

(b) Design a frequency sampling filter for following specification $|H(k)| = \{1, 1, 0, 0, 0, 1\}$. 10

6. (a) For i\p sampling rate of 50 KHz and output sampling rate of 1 KHz, give 2-stage decimation scheme. Compare the filter order required for antialising filters of two stage implementation with single single stage implementation. Comment on the results. 10

(b) Explain with suitable example polyphase interpolation. comment/compare with single phase interpolation. 10

7. Write short notes on (a) and (b). Attempt any **three** :

(a) MMSE criterion in adaptive filter 6

(b) LMS and RLS algorithm in adaptive filtering 7

(c) Design an active lowpass, second order filter for $W_n = 1$ KHz and $Q = 0{\cdot}707$. 7

(d) What is subband conding and quadrature mirror filtering, explain. 7