

**B.Tech. – VIEP – ELECTRICAL ENGINEERING
(BTELVI)**

Term-End Examination

June, 2015

00066

BIEEE-012 : ACTIVE FILTER DESIGN

Time : 3 hours

Maximum Marks : 70

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- Note :** (i) *Attempt any seven questions.*
(ii) *All questions carry equal marks.*
(iii) *Use of calculator is permitted.*
(iv) *Missing data may be suitably assumed.*
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1. Design a single amplifier biquad with $f_0 = 12.5$ kHz, $Q_0 = 10$, midband gain $H = 26$ dB and $C = 5$ nF. Draw the resulting circuit. 10

2. The following specifications are given for a Chebyshev low pass filter :

$$\omega_p = 1, \omega_s = 2.33, \alpha_{\max} = 0.5 \text{ dB}, \alpha_{\min} = 22 \text{ dB}$$

What is the degree of the filter which realises these specifications ? Compare this degree with the degree of maximally flat filter with same specifications. 10

3. Write short notes on any **two** of the following : 5+5=10

- (a) Sallen-Key Low Pass Filter
- (b) KHN filter
- (c) Cascading of filters

4. Determine the input impedance (Z_{in}) for the circuit shown in Figure 1. Also draw the passive equivalent of the circuit. 10

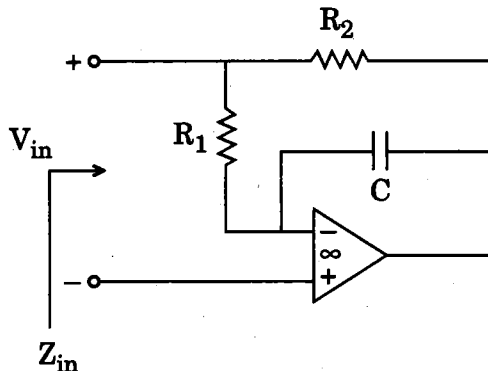


Figure 1

5. Design a 2-pole Butterworth low pass filter with cut-off frequency ~ 60 kHz. What is the formula for its gain as a function of frequency? What is the attenuation (in dB) at $f = 3 f_c$? 10

6. What is Q enhancement and pole frequency error problem in Op-Amp filters? Explain how these problems can be removed. 10

7. Draw the circuit diagram of a Generalized Impedance Converter (GIC) as given by Antoniou and show how a grounded inductor can be simulated using the above circuit. 10
 8. Explain the basic ideas of method of realization of higher order filters (RC and SC) other than cascading technique. 10
 9. Discuss the leapfrog technique and write down the steps of leapfrog design of a low pass filter. 10
 10. Explain the various non-idealities in the Op-Amp filter. What are the main advantages and disadvantages of the cascading techniques in the filter ? 10
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