

**B.Tech. – VIEP – ELECTRICAL ENGINEERING
(BTELVI)****Term-End Examination****December, 2015****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. Give the circuit diagram of a single amplifier biquad, obtain its transfer function and identify the filter parameters. 10

2. Design a 4-pole Butterworth high pass filter with cut-off frequency ~ 30 kHz. What is the formula for its gain as a function of frequency ? What is its attenuation (in dB) at $f = f_c / 2$? 10

3. Determine the transfer function V_2/V_1 for the circuit shown in Figure 1 considering non-ideal op-amp with $A = \omega t/s$. Identify the nature of filter response and determine the filter parameters. 10

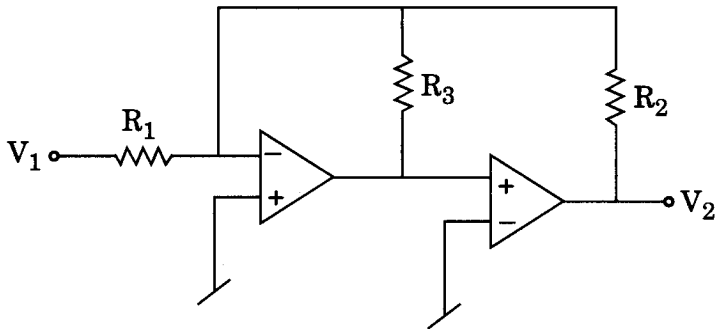


Figure 1

4. Design a Sallen-Key low pass filter with the following specifications :

$$f_c = 4.8 \text{ kHz}, Q = 5 \text{ and d.c. gain } H = 3.$$

Also explain the concept of cascading technique in higher order filters. 10

5. Design a fourth order Butterworth filter with half power frequency of $\omega_0 = 2,00,000 \text{ rad/sec}$ (31.8 kHz); source load is $R = 3 \text{ k}\Omega$. The design should make use of FDNRs. 10
6. Design a KHN (Universal Active Filter) with its transfer function and all necessary filter parameters. 10

7. Write short notes on any *two* of the following : 5+5
- (a) Chebyshev Approximation
 - (b) Phase Error Compensation
 - (c) Frequency-Dependent Negative Resistors
8. 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
9. Explain the method of synthesis of LC ladder network using gyrator. Discuss the leap-frog design technique of low pass filters. 10
10. The following specifications are given for a Chebyshev low pass filter :
- $\omega_p = 1$, $\omega_s = 2.33$, $\alpha_{\max} = 0.5$ dB, $\alpha_{\min} = 22$ dB
- What is the degree of the filter which realises these specifications ? Compare this degree with the degree of a maximally flat filter with same specifications. 10
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