

**B.Tech. – VIEP – ELECTRONICS AND
COMMUNICATION ENGINEERING
(BTECVI)**

Term-End Examination

00464

June, 2017

**BIEL-002 : ANALOG AND INTEGRATED CIRCUITS
DESIGN**

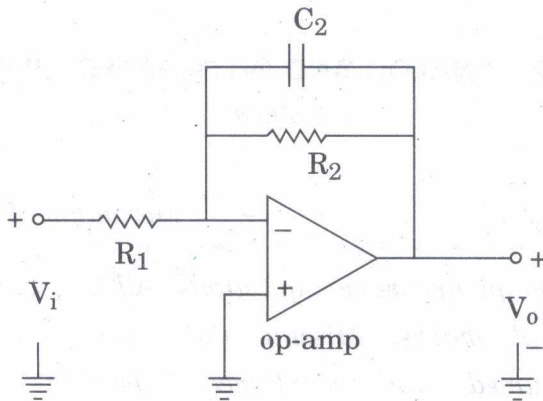
Time : 3 hours

Maximum Marks : 70

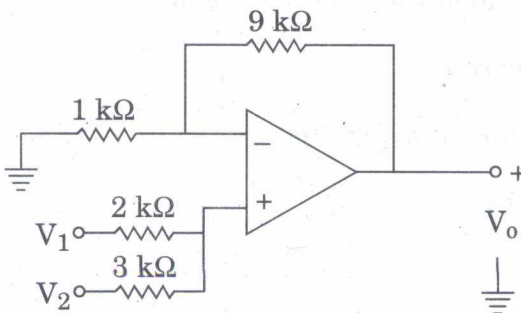
Note : *Attempt any **seven** questions. All questions carry equal marks. Missing data may be suitably assumed and mentioned. Use of scientific calculator is permitted.*

1. Define the following terms of op-amp : $5 \times 2 = 10$
- (a) Slew rate
 - (b) Gain bandwidth product
 - (c) CMRR
 - (d) Virtual ground concept
 - (e) Voltage follower

2. (a) Explain the effect of finite open-loop gain on inverting configuration of op-amp. 5
- (b) For the circuit as shown below, derive an expression for its transfer function. Find the DC gain and the 3 dB frequency. Design the circuit to obtain a DC gain of 40 dB, a 3 dB frequency of 1 kHz and an input resistance of 1 k Ω . 5



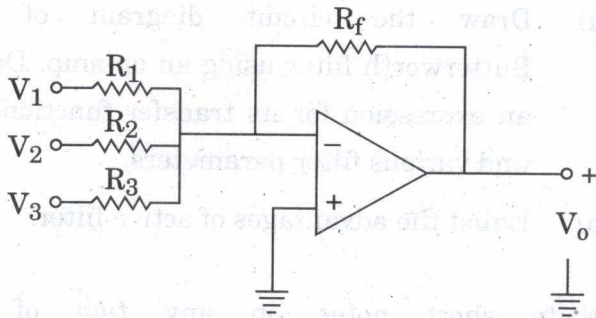
3. (a) Find the output voltage of the circuit as shown below.



If the $1\text{ k}\Omega$ resistor is disconnected from the ground and connected to a third signal source ' V_3 ', then determine the new output voltage.

2+3=5

- (b) Realize an integrator circuit using op-amp and find its transfer function. 5
4. (a) Draw the inverting and non-inverting configurations of a closed loop op-amp circuit. Derive the expression of its closed loop gain in both the configurations. 5
- (b) Find the output voltage of the following circuit : 5



5. (a) Explain the high frequency response characteristics of a differential amplifier. 5
- (b) Design the circuit of a differential amplifier with current-source loads. Find its differential voltage gain. 5

6. (a) Explain the limitations of op-amp as comparator. 5
- (b) Describe the operation of Schmitt trigger circuit using op-amp. 5
7. (a) Design a sine wave generator circuit using op-amp. 5
- (b) Design a triangular wave generator circuit using op-amp. 5
8. Draw and explain the circuit diagram of Log and Antilog amplifier with necessary expressions and waveforms. 10
9. (a) Draw the circuit diagram of the Butterworth filter using an op-amp. Derive an expression for its transfer function and find various filter parameters. 5
- (b) Enlist the advantages of active filter. 5
10. Write short notes on any **two** of the following : $2 \times 5 = 10$
- (a) Phase Locked Loop (PLL)
- (b) Voltage Controlled Oscillator (VCO)
- (c) DC Level Shifter