No. of Printed Pages : 4

BIEL-002

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

Term-End Examination

December, 2017

00559

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.*

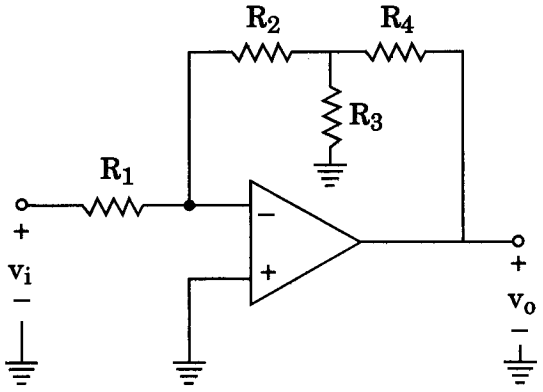
1. (a) Write the characteristics of an ideal op-amp. *5*

(b) Why are differential amplifiers preferred over single-ended amplifiers ? Explain. *5*

2. (a) Derive the expressions of closed loop gain in both, inverting and non-inverting configurations. *5*

(b) Discuss the various Grounding and Shielding techniques. *5*

3. (a) Assuming the op-amp to be ideal, derive an expression for the closed-loop gain v_o / v_i of the circuit as shown below.



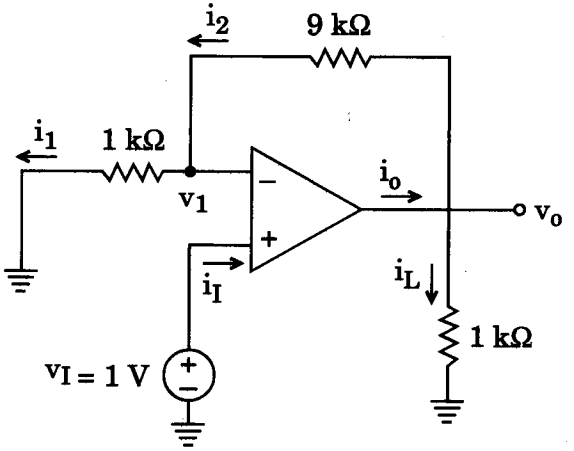
Use this circuit to design an inverting amplifier with a gain of 100 and an input resistance of 1 MΩ. Assume that for practical reasons it is required not to use resistors greater than 1 MΩ. *5*

(b) Draw the voltage follower circuit using op-amp, and show that the gain is unity. Draw its equivalent circuit model. *5*

4. (a) Draw the circuit diagram of the instrumentation amplifier using op-amp, and explain its operation principle by deriving the expression of gain. *5*

(b) Design a circuit using op-amp to get the output voltage $v_o = 6v_1 + 4v_2$. *5*

5. (a) For the circuit as shown below, find the values of i_1, i_I, v_1, i_2, v_o, i_L and i_o. Also find the voltage gain v_o / v_I, the current gain i_L / i_I and the power gain P_L / P_I. *8*



(b) Define Common Mode Rejection Ratio of op-amp. *2*

6. (a) Design a differentiator circuit using op-amp. Also derive its transfer function. *5*

(b) Explain the practical considerations of a differentiator circuit and its limitations. *5*

7. (a) Design a Sample and Hold Circuit using op-amp. Explain its operation principle. *5*

(b) Design a Clipper Circuit and Clamper Circuit using op-amp. *5*

8. (a) Design a circuit for generation of sawtooth waves using op-amp. 5

(b) Design an op-amp based multivibrator circuit and explain its operation. 5

9. (a) What is the difference between Difference Amplifier and Comparator Circuit ? What are the limitations of op-amp as a comparator ? 5

(b) Classify the types of Filters. Draw the circuit diagram of a 2^{nd} order Sallen-key low pass filter. 5

10. Write short notes on any ***two*** of the following : *2×5=10*

(a) Log/Antilog Amplifier

(b) Voltage Controlled Oscillator (VCO)

(c) Phase Locked Loop (PLL) as FM Demodulator