

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

00364

Term-End Examination

June, 2014

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

Time : 3 hours

Maximum Marks : 70

Note : Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is permitted.

1. (a) Draw the circuit diagram of a differential amplifier. Identify the inputs and outputs for inverting, non-inverting and single ended configuration. 5
- (b) Explain the concept of current mirror and state its use. 5
2. (a) Draw the schematic block diagram of the basic Op-Amp. Explain the significance of virtual ground in the basic inverting amplifier. 5
- (b) Draw the inverting and non-inverting amplifier circuits of an Op-Amp in closed loop configuration. Obtain expression for closed loop gain in these circuits. 5

3. (a) Draw the circuit diagram that shows how the Op-Amp may be used to obtain the sum of two input voltages. Derive the expression of output voltage. What precautions must be observed in the use of this circuit? 5
- (b) Explain how Op-Amp is used as a difference amplifier. Show that drift is reduced in a difference amplifier.
4. (a) Draw the schematic diagram of classic 3-Op-Amp instrumentation amplifier. Explain its operation when the input is of differential and common mode signals. 5
- (b) A 5 mV, 1 kHz sinusoidal signal is applied to the input of an Op-Amp integrator for which $R = 100 \text{ k}\Omega$ and $C = 1 \text{ }\mu\text{F}$. Find the output voltage. 5
5. (a) Explain how Op-Amp is used as comparator. Give limitations of Op-Amp as comparator. 5
- (b) Draw schematically an Op-Amp Schmitt trigger and explain its working. Name an application of Schmitt trigger. 5
6. (a) Draw the circuit of a square wave generator using Op-Amp. Explain its operation, by showing the capacitor voltage waveform. 5
- (b) Explain the working of precision rectifier and peak detector with circuit diagrams. 5

7. (a) What is the saw tooth wave generator ? Explain how Op-Amp is used as saw tooth wave generator and also explain its working. 5
- (b) Explain the use of IC-555 as Astable Multivibrator. 5
8. (a) What is an active filter ? Give the advantages of an active filter over a passive filter. 5
- (b) Explain Butterworth low pass filter. How does the response characteristic of Butterworth filter change with increasing order of filter ?
9. (a) Draw the block diagram of PLL and explain the basic idea of locking onto the incoming frequency. 5
- (b) Explain working of Log and Antilog amplifiers using Op-Amp. 5
10. Write short notes on the following : $2 \times 5 = 10$
- (a) Multivibrators
- (b) Applications of PLL
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