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BIEL-002

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

00180 **Term-End Examination**

December, 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 a Differential Amplifier with a differential input and single ended output. Explain its working in both the cases. 5

(b) Explain the concept of current mirror. State its application. 5

2. (a) Describe the characteristics of an ideal Op-Amp. How do the characteristics of an ideal Op-Amp differ from that of actual Op-Amp ? 5

(b) Draw the circuit diagram of an inverting amplifier using an Op-Amp. "A virtual ground exists at the input of the proper amplifier." Explain. 5

3. (a) Describe the use of an operational amplifier as an adder. What type of feedback is used in an Op-Amp adder ? Justify your answer. *5*

(b) Sketch the circuit of summer using Op-Amp to get *5*

$$V_0 = -[-V_1 + 2V_2 - 3V_3].$$

4. (a) Write a note on the use of Op-Amp as a differentiator and an integrator. *5*

(b) Draw the circuits of voltage-to-current and current-to-voltage converters using Op-Amps and explain their operations. Mention the use of these circuits. *5*

5. (a) Explain the working of sample and hold circuit. *5*

(b) Draw and explain peak to peak detector circuit that gives *5*

$$V_0 = V_i\,(\max) - V_i\,(\min).$$

6. (a) Explain the working and construction of an Op-Amp as

(i) a comparator

(ii) a precision rectifier. *5*

(b) Explain how triangular waveforms are produced using Op-Amps. *5*

7. (a) What is a multivibrator ? Draw the circuit diagram of an astable multivibrator and explain its operation. Show the collector voltage waveforms. *5*

(b) Explain the working of V to F and F to V converters using Op-Amps. *5*

8. (a) Describe five approximations used in filter design. Use sketches as needed to show passband and stopband behaviour of the filter. *5*

(b) Give classification of filters. Explain the working of Sallen-Key low pass filter. *5*

9. (a) Draw the block diagram of PLL and explain its working. Draw and explain transfer characteristics of PLL. *5*

(b) Draw the block diagram of PLL IC-565. Explain how PLL can be used in FM demodulator. *5*

10. Write short notes on any ***two*** of the following :

(a) Ideal (AC and DC) Op-Amp behaviour and its effect on performance *5*

(b) Saw tooth wave generators *5*

(c) Precision Rectifiers *5*
