Code No: R31043 **R10** **Set No: 1**

III B.Tech. I Semester Supplementary Examinations, May 2013

LINEAR IC APPLICATIONS

(Common to Electronics and Communications Engineering & Electronics and Instrumentation Engineering & Bio-Medical Engineering & Electronics and Computer Engineering)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1. (a) What are the features of the difference amplifier?
   (b) The specifications of the dual input balanced output differential amplifier are given below. R_C=4.7 KΩ, R_E=4.7 K Ω, R_S=70 Ω, h_{ie}=1.47 K Ω, V_{cc}= 12 V, V_{EE}=-12 V, h_{fe}=75, V_{BE}=0.7 V.
   Determine
   (i) Operating point values.
   (ii) Differential Voltage gain
   (iii) Common mode gain
   (iv) input resistance
   (v) Output Resistance
   (vi) CMRR.

2. (a) Draw the equivalent circuit of the practical op-amp and explain the voltage transfer curve of the op-amp.
   (b) Explain about the following two frequencies compensation techniques. (i) Dominant Pole Compensation (ii) Pole – zero (Lag) Compensation.

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3. (a) Design an op-amp circuit which can give the output V_0= 2 V_1- 3V_2+4 V_3-5 V_4
   (b) Draw the circuit of instrumentation Amplifier? Explain the operation of the same.

4. (a) Explain how the op-amp is used as Schmitt trigger and explain the hysterisis curve.
   (b) What is precision rectifier? Explain the full wave precision rectifier.

5. (a) Draw the second order Butterworth low pass filter and derive the transfer function of the same.
   (b)Design a fourth order Butterworth lowpass filter having upper cutoff frequency 1 kHz.

6. (a) Explain how the 555 timer is used as free running oscillator.
   (b) Design the circuit diagram of astable multivibrator to generate the output signal with the frequency of 1 KHz with the duty cycle of 75 % using OPAMP.

7. (a) Explain how to perform Analog to Digital conversion using dual slope ADC.
   (b)Explain the various sources of errors in DAC.

8. write a short notes on
   (a) Analog multiplexer.
   (b) Phase detector.

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Code No: R31043 **R10** **Set No: 2**

III B.Tech. I Semester Supplementary Examinations, May 2013

LINEAR IC APPLICATIONS

(Common to Electronics and Communications Engineering & Electronics and Instrumentation Engineering & Bio-Medical Engineering & Electronics and Computer Engineering)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1. (a) Obtain the AC analysis of the dual input balanced output configuration? Compare the with the single input balanced output.
   (b) What are the methods to improve CMRR?

2. (a) Listout the characteristics of ideal OPAMP. Explain the concept of virtual short in OPAMP.
   (b) Explain the following terms
   (i) Input offset voltage
   (ii)Output offset Voltage.
   (iii)CMRR
   (iv)Input bias current.

3. (a) Explain how op-amp is used as voltage to current converter with necessary equations.
   (b) Design a practical integrator circuit to properly process input square waveform upto 1KHz. The input amplitude is 10mV.

4. (a) Explain the basic logarithmic amplifier using diodes and transistors.
   (b)Design a op-amp Schmitt trigger with UTP= 2 V, LTP=1 V supply voltages ±12 V and V_{sat}= ±10 V with necessary assumptions.

5. (a) Design the second order low pass butter worth filter with cutoff frequency 1 kHZ.
   (b) Draw the 2^{nd} order high pass filter with Butterworth approximation and derive the transfer function.

6. (a) Explain how the 555 timer is used as monostable multivibrator and derive the equation for pulse width.
   (b) Derive an expression for lock range and capture range of a PLL.

7. (a) What are the different sources of errors in DAC? Draw R- LR ladder DAC Circuit and explain its operation.
   (b) Explain the operation of the dual slope ADC.

8. (a) Explain the functions of balanced modulation using diode.
   (b) Draw the circuit of series, shunt and combination of series and shunt switches and explain the operation of each of them.

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Code No: R31043 **R10** **Set No: 3**

III B.Tech. I Semester Supplementary Examinations, May 2013

LINEAR IC APPLICATIONS

(Common to Electronics and Communications Engineering & Electronics and Instrumentation Engineering & Bio-Medical Engineering & Electronics and Computer Engineering)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1. (a) Explain the properties of differential amplifier in dual input balanced output configuration
   (b) Explain the working of a level translator using a simple diagram.

2. (a) Calculate the cutoff frequency-limited rise time for a voltage follower circuit using a 741 op-amp. Also determine the slew rate-limited rise time if the output amplitude is to be 5V.
   (b) Define input bias current, input offset current and also present the methods of compensation for the same.

3. (a) Design a circuit using an op-amp to generate a output voltage $V_o = -(V_1+0.2V_2+10V_3)/3$, where V_1, V_2, V_3 are input voltages.
   (b) Explain the operation of an instrumentation amplifier using transducer bridge.
   (c) Draw the circuit diagram of a practical integrator showing initial conditions and explain.

4. (a) Discuss the limitations of op-amps as comparators.
   (b) Draw a circuit using op-amp to realize a positive clipper and explain the operation using relevant wave forms.
   (c) Design a square wave oscillator for f=1kHz using a 741 op-amp with supply voltages of ±15V.

5. (a) Explain the characteristics of wide band-pass and narrow band-pass filters using relevant expressions, frequency responses and circuit diagrams,.
   (b) Design a 60 Hz active notch filter and draw the circuit diagram.

6. (a) Explain the operation of linear ramp generator using 555 timer.
   (b) Implement a Schmitt trigger circuit using 555 timer and explain the operation using relevant waveforms.

7. (a) Explain the operation of R-2R ladder DAC with the help of relevant diagrams.
   (b) The analog input signal ranges from -5 to 8V in a 9 bit ADC. How many quantization levels are available with this ADC? What is the resolution in volt per increment? What binary input voltage will be produced when the analog input is zero volt?

8. Write short notes on
   (a)Balanced modulator (b) Sample and Hold Amplifier.

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Code No: R31043 **R10** **Set No: 4**

III B.Tech. I Semester Supplementary Examinations, May 2013

LINEAR IC APPLICATIONS

(Common to Electronics and Communications Engineering & Electronics and Instrumentation Engineering & Bio-Medical Engineering & Electronics and Computer Engineering)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1. (a) Explain the difference between constant current source and a current mirror.
   (b) Draw basic circuit diagram of a differential amplifier and derive the expression for differential mode gain and common mode gain.

2. (a) Determine the maximum undistorted pulse output amplitude for the 741 voltage follower if the output rise time is not to exceed 1μs. Also calculate the minimum output rise time and the maximum pulse amplitude at that rise time for a 741 op-amp circuit with an upper cutoff frequency of 100 kHz.
   (b) Draw the block diagram of op-amp give the detailed explanation of each block.

3. (a) Design a circuit using an op-amp to generate a output voltage $V_o = (V_1+2V_2+V_3)/3$, where V_1, V_2, V_3 are input voltages.
   (b) Explain the working of a transresistance amplifier.
   (c) Draw the circuit diagram of a practical differentiator and write the design steps of a good differentiator.

4. (a) Draw a circuit using op-amp to realize a negative clipper and explain the operation using relevant wave forms.
   (b) Explain the operation of a regenerative comparator using relevant diagrams and waveforms.

5. (a) Draw the circuit diagram of an all pass filter and explain the operation. Obtain the expressions for transfer function. It is also called phase corrector, justify.
   (b) How is frequency scaling accomplished in active filters?
   (c) Explain the characteristics of a band reject filter.

6. (a) Draw the functional block diagram of 555 timer in monostable operation and explain the operation using relevant expressions and waveforms and also explain operation of a missing pulse detector monostable circuit.
   (b) Explain the terms capture range and pull-in time pertaining to PLL.

7. (a) Explain the operation of dual slope ADC with the help of relevant diagrams and sketches.
   (b) Find the conversion time of a 12 bit successive approximation ADC if its input clock is 20MHz.

8. Write short notes on
   (a)Four quadrant multiplier (b) Sample and Hold Amplifier

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