Code No: R05310401 **Set No. 1**

III B.Tech I Semester Regular Examinations, November 2007
LINEAR IC APPLICATIONS
(Electronics & Communication Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the use of constant bias circuit in operation of differential amplifier.
   (b) Analyze the dual input balanced output configuration of differential amplifier using DC. [8+8]
2. (a) Explain how the input offset voltage compensated for?
   (b) How fast can the output of an op - amp change by 10V, if its slew rate is 1 V/μs.
   (c) Define thermal drift & slew rate. [6+4+6]
3. (a) Design a differentiator to differentiate an input signal that varies in frequency from 10 Hz to about 1KHz. If a sine wave of 1V peak at 1000 Hz is applied to this differentiator draw the output waveforms.
   (b) Why active differentiator circuits are not used in analog computer to solve differential equations. [10+6]
4. (a) Explain, How to obtain triangular wave using a square wave generator.
   (b) With the help of a neat circuit diagram explain the working of a logarithmic amplifier. [8+8]
5. (a) Define Bessel, Butterworth and Chebysher filters, and compare their frequency response.
   (b) Sketch the circuit diagram of band elimination filter and design a wide band-reject having f_H=200Hz and f_L=1KHz. Assume necessary data. [8+8]
6. Explain an application in which the 555 timer can be used as Astable multivibrator. [16]
7. (a) Compare R - 2R and weight resistor types of DACs.
   (b) Write short notes on A/D converters.
   (c) Define the following terms as related to DAC:
      i. Linearity
      ii. Resolution. [8+4+4]
8. What are all basic blocks of analog multiplexer? Explain how the data selections process is performed it. [16]

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Code No: R05310401 **Set No. 2**

III B.Tech I Semester Regular Examinations, November 2007
LINEAR IC APPLICATIONS
(Electronics & Communication Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain how large open circuit voltage gain of an op - amp can be obtained by using cascading of differential amplifier stages.
   (b) Explain ac analysis of differential amplifier. [8+8]
2. (a) Discuss the Pole - Zero and Dominant pole compensation techniques for an op - amp.
   (b) An op - amp has a slew rate of 1.5V/μs. What is the maximum frequency of an output sinusoid of peak value 10 V at which the distortion sets in due to the slew rate limitation? [8+8]
3. (a) Design a differentiator to differentiate an input signal that varies in frequency from 10 Hz to about 1KHz. If a sine wave of 1V peak at 1000 Hz is applied to this differentiator draw the output waveforms.
   (b) Why active differentiator circuits are not used in analog computer to solve differential equations. [10+6]
4. (a) Describe the operation of logarithmic amplifier using op - amp.
   (b) List the conditions for oscillation in all the three types of oscillators, namely, RC phase shift, Wien - bridge and quadrature oscillators. [8+8]
5. (a) Draw the wide band reject filter circuit and also the frequency response of it.
   (b) Draw the schematic diagram of an all pass filter and determine the phase shift ϕ between the input and output at f = 2kHz. [8+8]
6. (a) Configure a 555 timer as a Schmitt trigger and explain.
   (b) Explain frequency translation and FSK demodulation using 565 PLL. [8+8]
7. (a) Explain the difference between Analog to Digital converter and Digital to Analog converters through underlying equations.
   (b) Illustrate one application each of Analog to Digital and Digital to Analog converters. [6+10]
8. (a) Explain the function of a typical adjustable voltage regulator. How can you increase the current driving capacity of the regulator?
   (b) Describe the principle of working of a balanced modulator using op - amp. Give the applications of it. [6+10]

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Code No: R05310401 **Set No. 3**

III B.Tech I Semester Regular Examinations, November 2007
LINEAR IC APPLICATIONS
(Electronics & Communication Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain how large open circuit voltage gain of an op - amp can be obtained by using cascading of differential amplifier stages.
   (b) Explain ac analysis of differential amplifier. [8+8]
2. (a) Calculate the effect of variation in power supply voltages on the output offset voltage for an op - amp circuit.
   (b) Why frequency compensation is required for an op - amp and explain frequency compensation technique using suitable diagrams. [6+10]
3. (a) Design a differentiator to differentiate an input signal that varies in frequency from 10 Hz to about 1KHz. If a sine wave of 1V peak at 1000 Hz is applied to this differentiator draw the output waveforms.
   (b) Why active differentiator circuits are not used in analog computer to solve differential equations. [10+6]
4. (a) Derive the expression of the output voltage of an antilog amplifier using op - amp.
   (b) Design a saw tooth wave form generator using op - amp and plot the waveforms for the given specifications frequency: 5kHz, $V_{sat} = \pm$ 15V (Assume necessary data). [8+8]
5. (a) For the all pass filter, determine the phase shift ϕ between the input and output at f = 2kHz. To obtain a phase shift ϕ , what modifications are necessary in the circuit?
   (b) Derive the expression for the transfer function of 2^{nd} order High pass filter. [8+8]
6. (a) Explain the operation of Monostable multivibrator using 555 timer. Derive the expression of time delay of a Monostable multivibrator using 555 timer.
   (b) Design monostable multivibrator using 555 timer to produce a pulse width of 100 m sec. [10+6]
7. (a) What are the basic blocks preceding an Analog to Digital converter in a typical application like digital audio recording?
   (b) With the help of a neat circuit diagram and waveforms, explain the operation of a dual slope ADC. What are its special features? [6+10]
8. Write short notes on:

(a) IC 1496 and its applications

(b) Sample and hold circuit. [16]

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Code No: R05310401 **Set No. 4**

III B.Tech I Semester Regular Examinations, November 2007
LINEAR IC APPLICATIONS
(Electronics & Communication Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Discuss the differences between the differential amplifiers used in the first two stages of op - amp.
   (b) Compare and contrast an ideal op - amp and practical op - amp.
   (c) Draw an ideal voltage transfer curve of an op - amp. [8+5+3]
2. (a) What are the three factors that effect the electrical parameters of an op - amp
   (b) Compare and contrast an ideal op - amp and practical op - amp.
   (c) What are the features of 741 op - amp and also draw the pin diagram.[3+6+7]
3. (a) Draw the circuit diagram of a two input non-inverting type summing amplifier and derive the expression for the output voltage.
   (b) Briefly explain why negative feedback is desirable in amplifier applications.
   (c) How does negative feedback affect the performance of an inverting amplifier? [7+5+4]
4. (a) Derive the expression of the output voltage of an antilog amplifier using op - amp.
   (b) Design a saw tooth wave form generator using op - amp and plot the waveforms for the given specifications frequency: 5kHz, $V_{sat} = \pm$ 15V (Assume necessary data). [8+8]
5. (a) List the conditions for oscillation in all the three types of oscillators, namely, RC phase shift, Wien - bridge and quadrature oscillators.
   (b) Design an op ? amp based relaxation oscillator and derive the frequency of oscillation. [8+8]
6. (a) Draw the circuit of PLL as frequency multiplier and explain its working.
   (b) Explain with neat diagram how 555 timers can be used as a Schmitt trigger. [8+8]
7. (a) Sketch and explain the transfer characteristic of a DAC with necessary equations.
   (b) LSB of a 9 - bit DAC is represented by 19.6mv. If an input of 9 zero bits is represented by 0 volts.
      i. Find the output of the DAC for an input 10110 1101 and 01101 1011.
      ii. What is the Full scale reading (FSR) of this DAC? [8+8]

8. (a) Describe the operation of four quadrant multiplier with neat diagram.
   (b) Explain the operation of IC 1496 as mixer circuit. [8+8]

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