Set No: 1

Code No: RR-310404

III B.Tech I-Semester Regular Examinations, November 2004

LINEAR IC APPLICATIONS

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 80

Answer any FIVE questions

All questions carry equal marks

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1. a) What are the different linear IC packages?
   b) What is the input impedance of a non-inverting op-amp amplifier?
   c) Design an inverting amplifier with an input resistance of 10KΩ and a gain of -5.

2. a) Explain the effect of frequency on the behavior of the virtual grand in an inverting configuration of an op-amp.
   b) Mention some applications of an instrumentation amplifier.

3. a) What is the effect of finite gain of the op-amp on the output of an active integrator?
   b) Design a differentiator that will differentiate an input signal with f_{max}=100 H_z.

4. a) Design a first order high pass filter at a cutoff frequency of 400Hz and a pass band gain of 1.
   b) What is the Butter worth response?

5. Write short notes on:
   a) Frequency of oscillation of a square wave generator.
   b) Triangular wave generator using a square wave generator.

6. Draw the functional diagram of a 555 times IC and explain the function of each internal block to obtain astable multivibrator operation.

7. a) Explain the operation of an op-amp based weighted resistor Digital to Analog Converter through a neat circuit diagram.
   b) Design a 4-bit weighted resistor DAC whose full-scale output voltage is –10Volts. Assume R_f= 10 kΩ logic '1' level as + 5volts and logic '0' level as 0 volts. What is the output voltage when the input is 1011.

8. a) Define the terms, 'Resolution', 'Linearity' and 'Conversion time' of an Analog to Digital converter.
   b) Describe in detail the operation of a dual slope Analog to digital converter.

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Set No: 2

Code No: RR-310404

III B.Tech I-Semester Regular Examinations, November 2004

LINEAR IC APPLICATIONS

(Electronics and 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 open loop and closed loop operations of an op-amp.
   b) Explain different methods to increase the input resistance of an op-amp.

2. a) What are the advantages of instrumentation amplifier? Derive an expression for the transfer function of an instrumentation amplifier.
   b) Explain the use of reference terminal provided in an integrated circuit instrumentation amplifiers.

3. a) Design a practical integrator circuit to process the sinusoidal input waveform up to 1 KH_z The input amplitude is10mv.
   b) What are the different modes of operation of an active integrator?

4. a) What is an all pass filter? Where and why is it needed?
   b) Design and obtain the frequency response of a band pass filter with f_L= 400Hz, f_H= 1KHz and the pass band gain =1.

5. Write short notes on:
   a) Sawtooth waveform generator
   b) Voltage-to-Frequency converter.

6. a) Draw the block schematic of 555 times IC.
   b) Derive an expression for the output pulse width 'T' when the timer is operated in a stable multivibrator configuration.

7. a) Explain the operation of a multiplying DAC and mention its applications.
   b) A 12-bit D to A converter has a full-scale range of 15 volts. Its maximum differential linearity error is ± ½ LSB.
      i) What is the percentage resolution?
      ii) What are the minimum and maximum possible values of the increment in its output voltage?

8. a) Define the terms 'Aperture time' and 'Droop rate' of a sample & hold circuit.
   b) With a neat circuit diagram explain the operation of an OP-amp based sample & hold circuit.
   c) Indicate one monolithic sample & hold IC of any manufacturer.

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Code No: RR-310404

Set No 3

III B.Tech I-Semester Regular Examinations, November 2004

LINEAR IC APPLICATIONS

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 80

Answer any FIVE questions

All questions carry equal marks

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1. a) Define common mode rejection ratio (CMRR)? Explain why $CMRR \to \infty$ for an emitter coupled differential amplifier where $R_E \to \infty$.
   b) Why is cascade configuration used in an op-amp?
   c) Explain with the figures how two supply voltages V^+ and V^- are obtained from a single supply.

2. a) Explain with a neat circuit diagram the working of voltage to current converter with floating load.
   b) Design a circuit to convert a 4 mA-to 20mA input current to a 0V-to-10V output voltage. The circuit is powered from ± 15V regulated supplies.

3. a) In the differentiator circuit the input is a sine wave with a peak-to-peak amplitude of 3V at 200 Hz. Sketch the output waveform.
   b) Determine the output voltage produced by the cascaded integrator at t = 0.5 sec.

4. a) A certain narrow band-pass filter has been designed to meet the following specification: f_C= 2KHz, Q=20, and A_F =10. What modifications are necessary in the filter design to change f_c to 1KHz keeping gain and bandwidth constant?
   b) What are the advantages of active filter over passive ones?

5. Write short notes on:
   a) Asymmetric square wave generator.
   b) Monostable multivibrator.

6. a) Draw the block schematic of a 566 voltage controlled oscillator IC.
   b) Derive an expression for the voltage to frequency conversion factor of 566 VCO.

7. a) Explain how the deficiencies of weighted resister type DAC can be overcome through an R-2R ladder type network. Explain the conversion procedure in R-2R ladder type DAC
   b) The logic levels used in an 8-bit R-2R ladder type DAC are logic '1'=+5 volts and logic '0'= 0 volts. Find the output voltage for an input of 10110110.

8. a) Define the terms 'Accuracy' and 'settling time' of an Analog to Digital converter.
   b) Explain in detail with a neat circuit diagram the operation of a parallel comparator type Analog to Digital converter.

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Set No: 4

Code No: RR-310404

III B.Tech I-Semester Regular Examinations, November 2004

LINEAR IC APPLICATIONS

(Electronics and 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 the input off-set voltage compensated for?
   b) How fast can the output of an op-amp change by 10V, if its slew rate is $1V/\mu s$.
   c) Define thermal drift.

2. a) With the help of a neat circuit diagram explain the working of a logarithmic amplifier.
   b) Derive the output voltage of an antilog amplifier.

3. a) Discuss important characteristics of a comparator and the limitations of op-amps as comparators.
   b) Explain the operation of Schmitt trigger circuit.

4. a) For the all-pass filter, determine the phase shift ϕ between the input and output at f = 2KHz. To obtain a positive phase shift ϕ, what modifications are necessary in the circuit?
   b) What is a pass band and a stop band for a filter? How are filters classified?

5. Write short notes on the operation of any two:
   a) Quadrature oscillator b) RC phase shift oscillator
   c) Wien- bridge oscillator.

6. a) Draw the block schematic of a PLL describing the function of each block briefly.
   b) What is the purpose of low pass filter in a phase locked loop? Describe different types of law pass filters used in a PLL.

7. a) Explain the basic technique utilized in Digital to Analog conversion using suitable mathematical expressions.
   b) In an inverted R-2R ladder type Digital to Analog Converter R= 10kΩ V_{REF} = + 20 volts. Find the current in each 20 kΩ resister and the maximum current passing into the feedback resistor of the op-amp.

8. a) Define the terms 'Resolution', 'Conversion time' and 'Linearity' of an Analog to Digital converter.
   b) Indicate the fastest Analog to Digital converter specifying its conversion time with a representative example.
   c) What is the resolution of a 11 bit Analog to Digital converter for a full scale input voltage of 10.24 volts?

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