Code No: RR310404 **Set No.1**

III B.Tech. I Semester Regular Examinations, November -2005
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) For the circuit shown below figure1 calculate I_1, I_L and V_0 with $R_1 = 10K\Omega$, $R_f = 100K\Omega$, $V_i = 1V$, $R_L = 25K\Omega$.

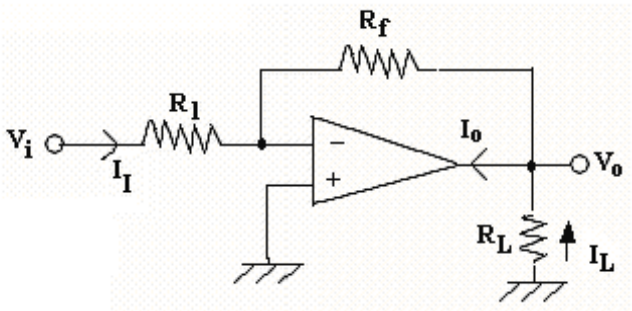

Figure 1:

(b) Derive the expressions for A_V and input impedance of a practical inverting amplifier.

[8+8]

2. (a) For the non-inverting a.c amplifier
Rin = 50Ω,c_i = 0.1μf,R_1 = 1KΩ,R_0 = R_3 = 820Ω,R_F = 5.6KΩ and R_l = 10KΩ Determine the gain & band width of the amplifier.

(b) What is an instrumentation amplifier? List any three applications of the instrumentation amplifier.

[8+8]

3. (a) Discuss important characteristics of a comparator and the limitations of op-amps as comparators.

(b) Explain the operation of Schmitt trigger circuit.

[8+8]

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 filter?

[8+8]

5. (a) Define the conditions on the feedback circuit of an amplifier to convert it in to an oscillator.
   (b) Design an RC phase shift oscillator for 300HZ frequency using IC μA 741 and $\pm$15 Volt power supplies. Assume necessary component values.
   (c) Suggest a method to reduce the output voltage swing to $\pm$6.5 Volts.

   [6+6+4]

6. (a) Explain with neat circuit diagram how a 555 timer can be used as a Linear Ramp generator?
   (b) In which mode should the timer be operated for obtaining Pulse Width Modulation (PWM)? Explain.

   [8+8]

7. (a) Explain the generation of Frequency modulation (FM) using Voltage controlled oscillator IC NE 566.
   (b) Explain the procedure to demodulate FM with the help of a neat circuit diagram using PLL IC NE565?

   [8+8]

8. Write short notes on:
   (a) Sample and Hold circuit for Analog to Digital converter
   (b) Charge balancing type Analog to Digital converter

   [8+8]

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Code No: RR310404 **Set No.2**

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

Answer any FIVE Questions
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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/μs.
   (c) Define thermal drift.

   [6+6+4]

2. (a) Draw the circuit of a typical instrumentation amplifier. Why do we use two stage op-amp circuit as an instrumentation amplifier. Explain
   (b) List out the advantages of instrumentation amplifier.

   [10+6]

3. (a) Design a non-inverting comparator with output levels stabilizes at ±5V and V_{TL}= 0 and V_{TH}= 2.5V (TL: Lower threshold, TH: upper threshold) as shown in the figure2
   (b) For the given inverting Schmitt trigger, calculate its higher and lower trigger levels.

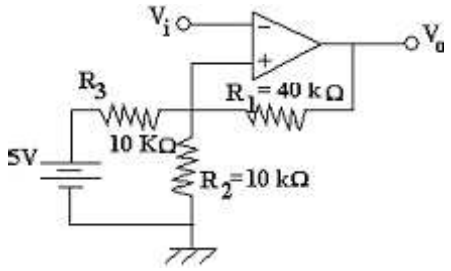

Figure 2:

   [8+8]

4. (a) Draw the band pass filter circuit with its frequency response curve. Explain its working.
   (b) Derive the expression for the transfer function of II order High pass filter.

   [8+8]

5. (a) Design a triangular wave generator using a comparator block and an integrator block to oscillate at 4KHz and V_o(P-P)=7 Volts use an op-amp with ±15 volt power supplies. Make necessary assumptions.

(b) What is the purpose of back-to -back set of two zenerdiodes?

(c) What is the main advantage of comparator based triangular wave generator over free running astable multivibrator based circuit?

[8+4+4]

6. (a) Draw the dc voltage versus phase difference characteristic of balanced modulator phase detector of a PLL indicating all important regions.

(b) Draw the dc out put voltage of VCO versus frequency characteristic of a PLL indicating the capture and lock range clearly.

(c) State the relationship between lock range and capture range through a mathematical expression.

[6+6+4]

7. Write short notes on

(a) Limitations of weighted resister type Digital to Analog Converter

(b) FSK demodulation using PLL IC NE 565.

(c) Resolution of a converter circuit.

[6+6+4]

8. (a) Explain the operation of a dual slope type Analog to Digital converter.

(b) A dual slope Analog to Digital converter uses a 16-bit counter and operates at 4MHz clock rate. The maximum input voltage is +8volts. Find the value of integrator resistor resistor 'R' if the maximum output voltage of the integrator is-6 volts after 2^n counts for an integrator capacitor of 0.1μF.

[8+8]

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Code No: RR310404 **Set No.3**

III B.Tech. I Semester Regular Examinations, November -2005
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) Derive an expression for output impedance of a practical inverting amplifier.
   (b) Draw the equivalent circuit diagram of non-inverting amplifier using low frequency model and explain its working.

   [8+8]

2. (a) What is the principle used in the design of an antilog amplifier explain?
   (b) Draw the basic logarithmic multiplier circuit and explain how it multiplies two voltages.

   [8+8]

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.

   [8+8]

4. (a) Explain the advantages of active filter. Explain different configurations of active filter. Discuss their merits and demerits.
   (b) Design a Band Pass filter with Butterwarth response for the following specifications f_0 = 10 KHz, Q = 10 and Pass band gain $\geq$10.

   [10+6]

5. (a) With suitable circuit diagram explain the operation of an RC phase shift oscillator.
   (b) Is it possible to obtain any shaped waveform as output for a basic oscillator?

   [12+4]

6. (a) Describe the 555 time monostable multivibrator applications in
      i. pulse stretching
      ii. Frequency
      iii. Pulse Width Modulation
   (b) Describe Pulse Position Modulation (PPM) using 555 timer astable multivibrator.

   [12+4]

7. (a) Describe any two applications of NE565 PLL IC with relevant Circuit diagrams.
   (b) List important specifications and characteristics of a monolithic Digital to Analog converter IC MC1408.

[12+4]

8. (a) Explain the operation of an 8-bit tracking type Analog to Digital converter.
   (b) Compare the conversion times and efficiencies of 8-bit tracking type and successive approximation type Analog to Digital converters.

[8+8]

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Code No: RR310404 **Set No.4**

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

Answer any FIVE Questions
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1. (a) Draw and explain the internal block schematic of an operational amplifier.
   (b) Explain how the voltage follower is dirived from a special case of non-inverting amplifier.

   [8+8]

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 0V-to-10V output voltage. The circuit is powered from ±15V regulated supplies.

   [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 1000Hz is applied to this differentiator draw the output wave forms.
   (b) Why active differentiator circuits are not used in analog computer to solve differential equations?

   [10+68]

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.

   [8+8]

5. (a) With necessary external components to a VCO IC NE556, Explain the generation of a triangular wave.
   (b) Determine the component values for a control voltage V_c=9 volts and a frequency of oscillation=10KHz. Make necessary assumptions.

   [10+6]

6. Describe any two applications of 555 timer in
   (a) Astable multivibrator configuration.
   (b) Monostable multivibrator configuration.

   [8+8]

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 ± 1/2 LSB.

i. What is the percentage resolution?

ii. What are the minimum and maximum possible values of the increment in its output voltage?

[8+8]

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 an example.

(c) What is the resolution of a 11 bit Analog to Digital converter for a full scale input voltage of 10.24 volts?

[6+4+6]

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