

Fifth Semester B.E. Degree Examination, June-July 2009  
**Linear IC's and Applications**

Time: 3 hrs.

Max. Marks: 100

- Note:** 1. Answer any FIVE full questions choosing at least two questions from each part.  
 2. Use of op amp data sheets / resistor charts / capacitor charts are permitted.

**Part A**

1.
  - a. Sketch a high input impedance capacitor coupled voltage follower. Briefly explain its functioning. (08 Marks)
  - b. Design a capacitor coupled inverting amplifier using  $\mu A741$  op-amp, with following specifications : voltage gain = 50, output voltage amplitude = 2.5 V. The frequency range is 40 Hz to 2 kHz and load resistance = 250  $\Omega$ . (06 Marks)
  - c. A difference amplifier has following components  $R_1 = R_3 = 6.8$  K;  $R_2 = R_4 = 68$  K;  $C_1 = 2.2$   $\mu F$ ;  $C_2 = 0.2$   $\mu F$  and output capacitor  $C_3 = 1$   $\mu F$ . Determine the circuit lower cut off frequency and maximum differential input voltage that can be applied if the output is not to exceed 5 volts. (06 Marks)
2.
  - a. What are effects of slew rate on i) Band width ii) Output pulse rise time and iii) Output amplitude. (04 Marks)
  - b. List precautions that should be taken for op amp circuit stability. (08 Marks)
  - c. Explain any one method of external frequency compensation method. (08 Marks)
3.
  - a. With a neat sketch, explain working of a non-saturating type precision half wave rectifier. (07 Marks)
  - b. Name the following circuit and draw the input and output waveforms when  $v_i = 5\sin 314t$  and explain working of circuit. (06 Marks)

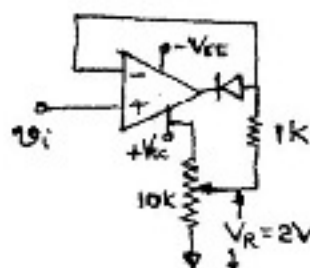


Fig. Q3 (b)

- c. Explain working of capacitor coupled zero crossing detector show waveforms at various points. (07 Marks)
4.
    - a. An inverting Schmitt trigger has following specifications  $V_H = 2V$ ,  $LTP = -2V$ , The input is  $v_i = 5\sin 6283t$ , determine  $T_{ON}$  and  $T_{OFF}$  of the output waveform. Show Hysteresis characteristics. (06 Marks)
    - b. Draw the circuit of an op amp monostable multivibrator show the relevant waveforms. Explain the circuit operation. (07 Marks)
    - c. For an astable multivibrator, show that frequency of output waveform is  $f = \frac{1}{2RC}$  for a symmetric output square wave. Show the circuit. (07 Marks)

## Part B

- 5 a. Compare an RC phase shift oscillator with a wein bridge oscillator. (06 Marks)  
 b. With a neat sketch explain a triangular / rectangular waveform generator, explain how to vary frequency and duty cycle of the output. (10 Marks)  
 c. Design an RC phase shift oscillator with following specifications  $f_o = 3.5\text{kHz}$ , Supply voltage =  $\pm 12\text{V}$ . (04 Marks)
- 6 a. Clearly distinguish between i) Active filter and passive filter ii) Wide band filter and narrow band filter. Explain significance of order of filter. (08 Marks)  
 b. Design a second order Butterworth low pass filter with high cut off frequency of 1 kHz. Show the nature of frequency response. (06 Marks)  
 c. Using 741 op amp design a band pass filter. The centre frequency is 1 kHz and pass band is 967 Hz to 1033 Hz. (06 Marks)
- 7 a. Explain phase lock loop (PLL) with a block diagram. Define the terms i) Lock range ii) Capture range with reference to PLL. (06 Marks)  
 b. Explain theory of operation of a switched capacitor filter. Mention advantages of switched capacitor filter. (05 Marks)  
 c. With neat block diagram explain how to realize second order i) Low pass ii) High pass and Band pass filter. (09 Marks)
- 8 Write short notes on:  
 a. Performance parameter of IC voltage regulator.  
 b. Sample and hold circuits.  
 c. Precision peak detector.  
 d. Voltage follower with single polarity supply. (70 Marks)