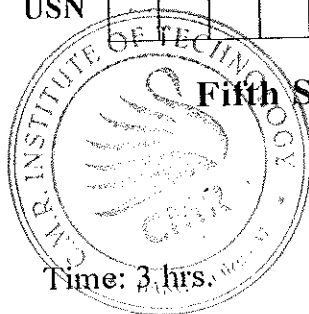


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Fifth Semester B.E. Degree Examination, June/July 2016

## Linear ICs and Applications

Max. Marks: 100

- Note: 1. Answer FIVE full questions, selecting at least TWO questions from each part.  
2. Datasheets of typical resistors, capacitors and op-amps are permitted.

### PART – A

- 1
  - a. With a neat circuit diagram, explain the operation of a high input impedance capacitor coupled voltage follower. Obtain the expression for input impedance of the circuit. (08 Marks)
  - b. Sketch the circuit of a capacitor coupled non-inverting amplifier using a single polarity power supply. Briefly explain its operation. (06 Marks)
  - c. Using LF353 BIFET op-amp, design a high  $z_{in}$  capacitor-coupled non-inverting amplifier to have a low cutoff frequency of 200Hz. The input and output voltages are to be 15mV and 3V respectively, and the minimum load resistance is 12k $\Omega$ . (06 Marks)
- 2
  - a. With neat sketches, explain the operation of a phase-lead frequency compensation network. (06 Marks)
  - b. Discuss the effect of slew rate on bandwidth and output amplitude. (08 Marks)
  - c. With a neat circuit, explain the zero-pole method of frequency compensation. Write the equation for the feedback factor. (06 Marks)
- 3
  - a. With a neat circuit diagram, explain the operation of high input impedance full-wave precision rectifier. Draw the voltage waveforms at various points in the circuit and write the appropriate equations to show that full-wave rectification is performed. (12 Marks)
  - b. Design a non-saturating precision half-wave rectifier to produce 2V peak output from a sine wave input with a peak value of 0.5V and frequency of 1MHz. Use a bipolar op-amp with a supply voltage of  $\pm 15V$ . (08 Marks)
- 4
  - a. With a neat circuit diagram and waveforms, explain the operation of inverting Schmitt trigger circuit with different LTP and UTP. (06 Marks)
  - b. Draw an op-amp based monostable multivibrator circuit. Explain its operation showing all relevant waveforms. (08 Marks)
  - c. Using a BIFET op-amp, design an astable multivibrator to have  $\pm 9V$  output with a frequency of 1KHz. (06 Marks)

### PART – B

- 5
  - a. With a neat circuit and waveforms, explain the operation of triangular/rectangular waveform generator which has frequency and duty cycle controls. (10 Marks)
  - b. Using a BIFET op-amp with a supply of  $\pm 12V$ , design a Weinbridge oscillator to have an output frequency of 15KHz. (04 Marks)
  - c. With a neat circuit diagram explain the operation of RC phase shift oscillator. Draw the output voltage and feedback voltage waveforms of the circuit. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

- 6 a. With a neat circuit and frequency response, explain the working of second order highpass filter. (06 Marks)
- b. Design a second order lowpass active filter using a 741 op-amp to have a cutoff frequency of 1KHz. (for 741,  $I_{B(max)} = 500nA$ ). (08 Marks)
- c. Design a single stage bandpass filter having a voltage gain of 1 and a passband from 300Hz to 30KHz. (06 Marks)
- 7 a. With a block diagram, explain the operation of a phaselocked loop. (06 Marks)
- b. Explain the theory of operation of the switched capacitor filter. List out the advantages of a switched capacitor filter. (08 Marks)
- c. What is an universal active filter? List the salient feature of FLT – U2 specialized IC filter. (06 Marks)
- 8 a. With a neat sketch explain the working of a dc voltage regulator. Write the equation for the line regulation, load regulation and ripple rejection. (10 Marks)
- b. With a neat circuit diagram, explain the operation of adjustable output regulator. (06 Marks)
- c. Calculate the resistances of  $R_1$  and  $R_2$  for the LM217 voltage regulator to produce an output voltage of 9V. (04 Marks)

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