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10EE56

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

Linear ICs and Applications

Time: 3 hrs. 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 zin 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 12kΩ. **(06 Marks)**

2 a. With neat sketches, explain the operation of a phaselog 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 zin mod 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 fullwave precision rectifier. Draw the voltage waveforms at various points in the circuit and write the appropriate equations to show that fullwave rectification is performed. **(12 Marks)**

b. Design a non-saturating precision halfwave rectifier to produce 2V peak output from a sinewave input with a peak value of 0.5V and frequency of 1MHz. Use a bipolar op-amp with a supply voltage of ± 15V. **(08 Marks)**

4 a. With a neat circuit diagram and waveforms, explain the operation of invering 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 ± 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 ± 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 phaseshift oscillator. Draw the output voltage and feedback voltage waveforms of the circuit. **(06 Marks)**

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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