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10EE56

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Linear ICs and Applications

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. ***Use of resistor and capacitor standard values list are permitted.***

PART – A

1 a. With a neat diagram, explain the operation and design of a high input impedance capacitor coupled non inverting amplifier. Also find its input impedance. **(08 Marks)**
b. Sketch the circuit and explain the operation of a capacitor coupled inverting amplifier using single polarity supply. **(06 Marks)**
c. Design a capacitor coupled voltage follower circuit to have a lower cutoff frequency of 120Hz. The load resistance is 8.2kΩ and Op – amp used has a maximum input bias current of 600 nA. **(06 Marks)**

2 a. What is Frequency Compensation? Explain the frequency compensation technique using phase lag network. **(06 Marks)**
b. List the precaution that should be taken for Operational amplifier circuit stability. **(08 Marks)**
c. Discuss the effects of stray capacitance on Op – amp circuit stability and write the equation to determine the value of stray capacitance that might produce circuit instability. **(06 Marks)**

3 a. With a neat circuit diagram, explain the operation and design of a precision full wave rectifier. **(08 Marks)**
b. A 3.3 kHz , ± 2V square wave with a 600Ω source resistance is to have its positive peak clamped at ground level. Using a bipolar Op – amp with supply of ± 12V, design a suitable precision clamping circuit. The tilt on the output is not to exceed 2%. **(06 Marks)**
c. With a neat diagram, explain the operation of successive approximation type Analog to digital converter. **(06 Marks)**

4 a. Draw an Op – amp non inverting Schmitt trigger circuit and explain its operation. **(06 Marks)**
b. Sketch the circuit of an Op – amp a stable multivibrator and explain its operation and show the waveforms. **(06 Marks)**
c. A capacitor coupled zero crossing detector is to handle a 1kHz square wave input with a peak to peak amplitude of 6V. Design a suitable circuit using a 741 Op – amp with a ± 12V supply. Assume $V_B = 0.1V$. **(08 Marks)**

PART – B

5 a. With a neat circuit diagram and waveforms, explain the operation of triangular / Rectangular wave generator which has frequency and duty cycle controls. **(09 Marks)**
b. With a neat diagram and waveforms, explain the operation of Op – amp phase shift oscillator. **(06 Marks)**
c. Using a BIFET Op – amp with a supply of ± 12V, design a Wein bridge oscillator to have an output frequency of 15 KHz. **(05 Marks)**

6 a. Sketch the circuit of a second order low pass filter, explain its working and design steps. **(08 Marks)**

b. Design a second order high pass active filter to have a cutoff frequency of 12KHz. Use a 715 Op – amp, I_{Bmax} for 715 Op – amp is 1.5 μA. **(06 Marks)**

c. With a neat circuit diagram, explain the operation of single stage first order bandpass filter. Show the frequency response. **(06 Marks)**

7 a. With a block diagram, explain FLT – U2 universal active filter. Also explain how it can be realized as second order low pass, high pass and band pass filter. **(08 Marks)**

b. With a block diagram, explain the Operating principle of phase locked loop. **(06 Marks)**

c. Explain the theory of operation of a switched capacitor filter. **(06 Marks)**

8 a. With a neat circuit diagram, explain the operation of a precision voltage regulator. **(06 Marks)**

b. Explain the terms line regulation , load regulation and ripple rejection for a dc voltage regulator. **(06 Marks)**

c. With a neat schematic, explain the salient features of a 723 IC regulator. Show how it can be connected to function as positive and negative voltage regulator and explain. **(08 Marks)**

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