

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

- 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 $8.2k\Omega$ 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, \pm 2V square wave with a 600 Ω source resistance is to have its positive peak clamped at ground level. Using a bipolar Op amp with supply of \pm 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 \pm 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 \pm 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 μ A. (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)
