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10EE56

Fifth Semester B.E. Degree Examination, Feb./Mar.2022
Linear IC's and Applications

Time: 3 hrs.

Max. Marks:100

Note: *Answer any FIVE full questions, selecting at least TWO questions from each part.*

PART – A

1 a. Analyse and name the circuit shown in Fig. Q1 (a). Assume that $R_1 = R_2 = R_3 = R_4 = R$. **(05 Marks)**
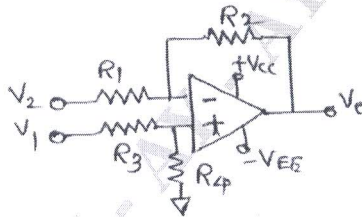

Fig. Q1 (a)

   b. Draw the circuit of High Input impedance capacitor coupled voltage follower and list the design steps. Also derive the expression for input impedance.. **(08 Marks)**

   c. A capacitor coupled non-inverting amplifier is to operate with +24 V supply. Voltage gain = 100 and output voltage $V_0 = 5$ V. Lower cut off frequency $f_l = 75$ Hz and minimum load resistance $R_L = 5.6$ KΩ. Using a 741 op-amp design a suitable circuit. **(07 Marks)**

2 a. Explain phase lag compensation network used for an op-amp circuit with reference to frequency response. **(06 Marks)**

   b. Calculate cut off frequency limited rise time for a voltage follower circuit using 741 op amp. Also determine slew rated limited rise time if output amplitude is 5 V. When op amp upper cut off frequency is 100 kHz, determine maximum output rise time and the maximum pulse amplitude at that rise time. (Assume SR = 0.5 V/μsec).. **(08 Marks)**

   c. List precautions to be taken for op-amp circuit stability operation. **(06 Marks)**

3 a. Explain a full wave precision Rectifier circuit using a summing circuit and a precision half wave rectifier. Show the waveforms. **(08 Marks)**

   b. A ± 5V 10 kHz square wave from a signal source with a resistance of 100 Ω is to have it's positive peak clamped precisely at ground level. Tilt on the output is not to exceed 1% of peak amplitude of the wave. Design a suitable op-amp circuit with supply of ± 12V. **(06 Marks)**

   c. With a neat circuit, explain working of a sample and hold circuit. **(06 Marks)**

4 a. Explain a capacitor coupled zero crossing detector circuit summarize design steps and show the waveforms. **(06 Marks)**

   b. Draw an inverting Schmitt Trigger circuit with different UTP and LTP. Explain its operation show the hysteresis characteristic and waveforms. **(08 Marks)**

   c. Draw an opamp based monostable circuit. Draw waveforms at various points. Write an expression for the output pulse width. Clearly mention various terms that appear in the expression. **(06 Marks)**

PART – B

5 a. Draw a triangular / rectangular waveform generator using op-amps. Explain the operation of circuit. Also explain how frequency and duty cycle of output can be achieved. **(09 Marks)**

   b. Compare a RC phase shift oscillator with a wein bridge oscillator. **(05 Marks)**

   c. Design a RC phase shift oscillator with following specifications :
   frequency of output = 3.5 kHz, supply voltage = ±12 V. **(06 Marks)**

6 a. Compare a wide band pass filter with a narrow band pass filter. **(05 Marks)**

   b. Design a band pass filter using a single 741 op amp. The centre frequency is to be 1 kHz and pass band ± 33 H on either side of centre frequency. **(08 Marks)**

   c. By means of block diagram, show the implementation of a band reject filter using, (i) High pass filter and low pass filter (ii) Band pass filter. Show the frequency response of Bond reject filter. **(07 Marks)**

7 a. What is a Universal filter? Briefly outline the procedure for implementing a desired filter function. **(08 Marks)**

   b. With a neat circuit, explain operation of a phase locked loop based frequency multiplier circuit. **(06 Marks)**

   c. What is a switched capacitor filter? Explain how it can be used to simulate a resistor. **(06 Marks)**

8 a. Define performance parameters of voltage regulator. **(04 Marks)**

   b. With a neat circuit, explain voltage follower type regulator. **(08 Marks)**

   c. For a voltage follower regulator designed with $V_s = V_{CC} = 12$ V, $V_O = 6.3V$, $R_1 = 270$ Ω. The zener diode Z has $V_Z = 6.3$ V and $Z_Z = 7$ Ω with $I_{L\,max} = 42$ mA. Source resistance is 25 Ω. Determine (i) Line regulation (ii) Load regulation (iii) Ripple rejection for the circuit. Draw the circuit. **(08 Marks)**

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