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06EC46

Fourth Semester B.E. Degree Examination, June 2012
Linear IC's and Applications

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain the working of basic operational amplifier circuit using transistors. **(05 Marks)**

b. Write the circuit diagram of 3 input inverting summing amplifier and derive the expression for the out put voltage. Explain how you can convert it into an adder and averager. **(08 Marks)**

c. A direct coupled non inverting amplifier is to amplify a 200mV signal to a level of 6V using an op-amp. Design a suitable circuit using op-amp 741. Given: For 741 $I_{b(max)}$ = 500nA and $V_{cc} = \pm 15V$. **(05 Marks)**

d. An op-amp with slew rate of 0.5 V/μs is used. Find the minimum time required for the circuit to change the output by 10V. **(02 Marks)**

2 a. Write the circuit diagram of a capacitor coupled voltage follower. Explain how you can increase the input impedance of that circuit and obtain the expression for the input impedance. **(07 Marks)**

b. Design a capacitor coupled inverting amplifier to have a gain of 100 and to operate in between 100Hz to 10 kHz. Assume signal voltage of 20mV, load resistance of 3.9 KΩ and $I_{b(max)}$ = 500nA. **(06 Marks)**

c. Design a capacitor coupled non-inverting amplifier using single polarity power supply. The specifications are V_{cc} = 20V, Gain =100, V_O = 4V, f_L = 100Hz, R_L = 4.7KΩ, $I_{b(max)}$ = 500nA. **(07 Marks)**

3 a. Explain Z_{in} mod technique of frequency compensation in op-amp. **(07 Marks)**

b. List 5 precautions to be taken for op-amp circuit stability. **(05 Marks)**

c. Explain slewrate effect on band width and output amplitude of an op-amp circuit. **(06 Marks)**

d. The gain-band width product of an op-amp circuit is 800 kHz. Calculate the upper cut off frequency if the closed loop gain is 100. **(02 Marks)**

4 a. Write the circuit diagram of three op-amp instrumentation amplifier and explain the working by deriving the expression for gain. **(07 Marks)**

b. Explain the working of peak clipper circuit using op-amp. **(05 Marks)**

c. Design a precission full-wave rectifier to produce a 2V peak output from a sinewave input with a peak value of 0.5V and a frequency of 1 MHz. Use supply of ±15V. Given $I_{b(max)}$ = 500nA. **(08 Marks)**

PART – B

5 a. Explain the working of positive clamper circuit using op-amp. **(04 Marks)**

b. Using block diagram of log and antilog amplifier explain the working of analog multiplier circuit. How you can convert it into a squarer? Explain. **(08 Marks)**

c. Design a phase shift oscillator using op-amp 741 to have an output frequency of 15kHz. The output amplitude is to be stabilized at ±14V, for the given op-amp $I_{b(max)}$ = 500nA. **(05 Marks)**

d. Write the circuit diagram of triangular rectangular wave generator with duty cycle and frequency controls. **(03 Marks)**

6 a. Write the circuit diagram and derive the expression for the voltage gain of the first order high pass filter using op-amp. Hence explain its working. **(08 Marks)**

b. Explain the working of inverting Schmitt trigger circuit. Explain how you can modify this circuit to get different trigger level with UTP ≠ LTP. **(07 Marks)**

c. Design an astable multivibrator to have ±9V output with a frequency of 1kHz, for the given op-amp $I_{b(max)}$ = 500nA. **(05 Marks)**

7 a. Write the functional diagram and explain the low voltage regulator using general purpose regulator IC723. **(06 Marks)**

b. State and explain the following terms with respect to 3 pin IC regulators:
   i) Load regulation
   ii) Source regulation
   iii) Drop out voltage. **(06 Marks)**

c. Describe how you can use 3 pin IC regulator as a current source. **(04 Marks)**

d. Design an adjustable voltage regulator circuit to get V_O =7.5V with load current of 25 mA using 7805 regulator IC. Given I_Q = 4.2 mA. **(04 Marks)**

8 a. Explain the principle of switch type analog phase detector. **(06 Marks)**

b. With circuit diagram, explain the working of Schmitt trigger using 555 timer IC. **(04 Marks)**

c. Explain basic DAC techniques. Hence describe the construction and working of R-2R ladder DAC. **(06 Marks)**

d. Explain the working of servo tracking A/P converter. **(04 Marks)**

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