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Fourth Semester B.E. Degree Examination, June/July 2013
Linear IC's and Applications

Time: 3 hrs.

Max. Marks:100

**Note: 1. Answer FIVE full questions, selecting
 at least TWO questions from each part.
 2. Use $I_{Bmax} = 500nA$ for 741 opamp.**

PART – A

1.
 - a. With a neat circuit diagram, explain the basic opamp circuit. (06 Marks)
 - b. Give definitions of the following opamp parameters and give their typical values for 741 opamp: i) CMRR; ii) Input offset voltage; iii) PSRR. (06 Marks)
 - c. Draw a neat circuit diagram for a direct coupled noninverting opamp circuit and explain the design steps. (04 Marks)
 - d. Two signals each ranging from 0.1V to 1V are to be summed. Using 741 opamp design a suitable inverting summing circuit. (04 Marks)

2.
 - a. Draw a neat circuit diagram and give design steps for a i) capacitor coupled voltage follower; ii) Capacitor coupled inverting amplifier. (08 Marks)
 - b. What is meant by setting upper cutoff in a capacitor coupled opamp? Explain how it is done in an inverting opamp. (06 Marks)
 - c. A capacitor coupled noninverting opamp is to have $A_F = 100$ and $V_O = 5V$ with $R_L = 10K\Omega$ and $f_i = 100$ Hz. Design suitable circuit. (06 Marks)

3.
 - a. Define gain margin and phase margin and explain how they help for stability check. (06 Marks)
 - b. What is meant by frequency response compensation? Why it is required? Explain the working of a phase lag compensation network. (08 Marks)
 - c. Define: i) Slew rate effect; ii) UGB. Determine the maximum distortion free output amplitude for a voltage follower when 741 opamp is used with $f_2 = 800$ kHz and $S = 0.5$ V/ μ S. (06 Marks)

4.
 - a. What are the advantages of precision rectifier over ordinary rectifier? Explain the working of a precision halfwave rectifier. (06 Marks)
 - b. Draw the circuit of an instrumentation amplifier using opamp, explain the working and derive the expression for output. (10 Marks)
 - c. Draw the circuit and explain the working of an opamp limiter to have voltage levels $V_Z + V_D$ for negative cycle of input and $-v_{sat}$ for positive cycle of input. (04 Marks)

PART – B

5.
 - a. Write a brief note on following opamp applications:
 - i) Negative clamper using opamp. (12 Marks)
 - ii) Log-amplifiers using opamp. (08 Marks)
 - b. Explain the working of Weinbridge oscillator using opamp. (08 Marks)

- 6 a. Explain how opamp can be used as inverting and noninverting comparator. What are the limitations? Explain how the limitations can be overcome using a Schmitt trigger. (10 Marks)
- b. An inverting Schmitt trigger circuit is to have $UTP = 0V$, $LTP = -1V$. Design a suitable circuit using bipolar opamp with $\pm 15V$ supply. (05 Marks)
- c. Design a second order active lowpass filter for a cutoff frequency of 7 kHz. (05 Marks)
- 7 a. Mention the advantages of IC voltage regulators. Draw the internal schematic for IC723 regulator and briefly explain the working. (10 Marks)
- b. Explain briefly about 78XX and 79XX series voltage regulators. (10 Marks)
- 8 a. Draw the internal schematic of 555 IC, configuring it for astable operation, explain the working. (08 Marks)
- b. Explain the working of D to A converter using R-2R network. (06 Marks)
- c. Explain the working of A to D converter using successive approximation method. (06 Marks)

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