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10EC46

Fourth Semester B.E. Degree Examination, Dec.2014/Jan.2015
Linear ICs and Applications

Time: 3 hrs.

Max. Marks:100

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

PART – A

1. a. Define the following terms as applied to op-amp and mention their typical values for IC741:
i) CMRR; ii) Slew rate; iii) PSRR; iv) Input off set voltage. (08 Marks)
- b. Sketch an op-amp direct coupled difference amplifier circuit. Explain the operation of the circuit and derive an equation for the output voltage. (07 Marks)
- c. Design a direct coupled non inverting amplifier to amplify 100mV signal using IC741 to a level of 4 volts. (05 Marks)
2. a. With a neat circuit diagram, explain capacitor coupled voltage follower with relevant design steps. (07 Marks)
- b. Explain how the upper cutoff frequency can be set for inverting amplifiers. (07 Marks)
- c. Design a capacitor coupled inverting amplifier using a IC741. Op-Amp to have a voltage gain of 75 output voltage amplitude of 3 Volts and a signal frequency range of 20Hz to 12 kHz. The load resistance is 470Ω . (06 Marks)
3. a. Explain Miller effect compensation. (08 Marks)
- b. List the precautions to be observed for Op-Amp stability. (06 Marks)
- c. Using an LM108 Op-Amp, design an inverting amplifier to amplify a 100mV signal by a factor 3. Select suitable frequency compensation ($I_{B(max)}$ for LM108 is 2nA). (06 Marks)
4. a. With neat circuit diagram and waveforms at various points, explain the working of high input impedance full wave precision rectifier. (10 Marks)
- b. Compare the performance of a differential input/output amplifier with that of a difference amplifier. (04 Marks)
- c. Design a precision voltage source to get an output of 8.5V using 741 Op Amp. The supply voltage is $\pm 15V$ and zener diode has a tolerance of $\pm 5\%$. (06 Marks)

PART – B

5. a. With neat circuit diagram and waveforms, explain the working triangular/rectangular waveform generator with frequency and duty cycle control. (10 Marks)
- b. With neat circuit diagram, explain basic log amplifier and derive an expression its o/p voltage. (05 Marks)
- c. Using a 741 Op Amp with a supply of $\pm 12V$, design a phase shift oscillator to have an output frequency of 3.5kHz. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42-8 = 50, will be treated as malpractice.

- 6 a. With neat circuit diagram and waveforms, explain the circuit operation of an Op Amp inverting Schmitt trigger circuit. (08 Marks)
- b. With neat circuit diagram and waveforms, explain the operation of Op Amp astable multivibrator. (06 Marks)
- c. Using a 741 Op Amp, design a second order active high pass filter for a cut off frequency of 4.5 kHz. (06 Marks)
- 7 a. List and explain the characteristics of three terminal IC regulators. (06 Marks)
- b. Explain the principle of switching regulator. Mention its advantages. (07 Marks)
- c. Design a voltage regulator using IC723 to get voltage output of. (07 Marks)
- 8 a. Explain 555 timer as monostable multivibrator with relevant circuit diagram, waveforms and expressions. (08 Marks)
- b. With a neat diagram, explain the working of weighted resistor DAC. (06 Marks)
- c. Draw the block diagram of PLL and explain its operation. (06 Marks)
