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10EC46

Fourth Semester B.E. Degree Examination, June/July 2016
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. What is CMRR in an operational amplifier? A 741 op-amp is used in a non inverting amplifier with a voltage gain of 50. Calculate the typical output voltage that would result from a common mode input with a peak level of 100 mV. **(06 Marks)**

b. Design a non-inverting direct coupled amplifier using a bipolar op-amp. Write the circuit diagram. **(07 Marks)**

c. Design an inverting amplifier using a 741 op-amp. The voltage gain is to be 50 and the output voltage amplitude is to be 2.5 V. **(07 Marks)**

2 a. Explain about the High input impedance capacitor coupled voltage follower circuit, with relevant equations. **(07 Marks)**

b. The inverting designed (say $A_V = 50$ and $V_0 = 2.5V$) is to be capacitor coupled and to have a signal frequency range of 10 Hz to 1 kHz. If the load resistance is 250 Ω. Calculate the required capacitor values. **(06 Marks)**

c. Explain about capacitor coupled voltage follower using a single polarity supply, with circuit diagram. **(07 Marks)**

3 a. i) Calculate the slew rate limited cut off frequency for a voltage follower circuit using a 741 op-amp if the peak of sinewave output is to be 5V.

ii) Determine the maximum peak value of the sinusoidal output voltage that will allow the 741 voltage follower circuit to operate at the 800 kHz unity-gain cut off frequency.

iii) Calculate the maximum peak value of sine wave output voltage that can be produced by the amplifier in part (i) equation and the op-amp is a 741 and f_2 is 8 kHz. **(09 Marks)**

b. Explain briefly about input impedance modification (Z_{in} Mod) technique of frequency compensation with circuit diagram. **(06 Marks)**

c. Explain the 'circuit stability precautions' for the operational amplifier using the manufacturer's recommended compensating components. **(05 Marks)**

4 a. Explain the 'current amplifier' circuit using operational amplifier. **(06 Marks)**

b. Explain the instrumentation amplifier with differential input/output which accepts a differential input voltage and amplifies it to produce a differential output using op amps. **(08 Marks)**

c. Design a non saturating precision half wave rectifier, which produce a 2 V peak output from a sinewave input with a peak value of 0.5 V and frequency of 1 MHz. Use a bipolar op-amp with a supply voltage of ±15V. **(06 Marks)**

PART – B

5 a. Explain the multiplier circuit with schematic symbol. **(06 Marks)**

b. Explain the operation of the phase-shift oscillator circuit with relevant waveforms. **(08 Marks)**

c. Using a BIFET op-amp with a supply of ±12V, design a wein bridge oscillator to have an O/P frequency of 15 kHz. **(06 Marks)**

6 a. Explain the operation of the Astable multivibrator circuit using operational amplifier with relevant waveforms. **(08 Marks)**

b. Explain the operation of the first order active low pass filter circuit with frequency response characteristics using operational amplifier. **(06 Marks)**

c. Design a first order high pass active filter circuit to have a cut off frequency of 5 kHz. Use an LM108 op amp and estimate the highest frequency can be passed. **(06 Marks)**

7 a. Explain the following terms such as (i) Line regulation (ii) Load regulation (iii) Ripple rejection briefly. **(06 Marks)**

b. Explain the operation of the 723 integrated circuit voltage regulator contains a reference voltage sources (D_1) an error amplifier (A_1), a series pass transistor (Q_1) and a current limiting transistor (Q_3). **(07 Marks)**

c. Calculate the resistances of R_1 and R_2 for the LM217 voltage regulator to produce an output voltage of 9 V. (Assume $C_1 = 0.1\ \mu F$ and $C_2 = 1\ \mu F$) **(07 Marks)**

8 a. Explain the 555 Timer circuit used as astable multivibrator, with relevant waveforms. **(08 Marks)**

b. Explain the operating principles of phase locked loop with relevant diagram. **(07 Marks)**

c. Write a short notes on voltage controlled oscillator. **(05 Marks)**

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