

JK Lakshmipat University Jaipur

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination, May 2019

B. Tech. in Electrical and Electronics Engineering, Semester IV

Roll No.....

ECE489: ANALOG LINEAR INTEGRATED
CIRCUITS

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1a Why is compensating resistor (R_{comp}) not needed in differential amplifier? 04

LO2

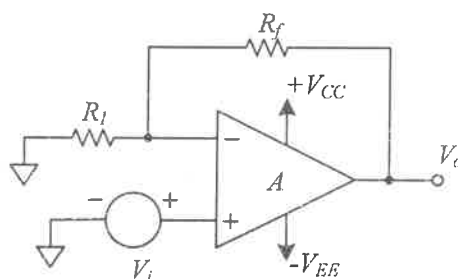
Q.1b Does increasing the compensating capacitor increase or decrease unity-gain band-width? 04

LO2

Q.1c How fast can the output of an op-amp change by 10 V, if its slew rate is 1V/ μ s. 02

Q.2a For the non-inverting amplifier as shown in figure, $R_1 = 1\text{ k}\Omega$ and $R_f = 10\text{ k}\Omega$. Calculate the maximum output offset voltage due to V_{ios} and I_B . The op-amp is LM307 with $V_{ios} = 10\text{ mV}$ and $I_B = 300\text{ nA}$, $I_{os} = 50\text{ nA}$. 05

LO3

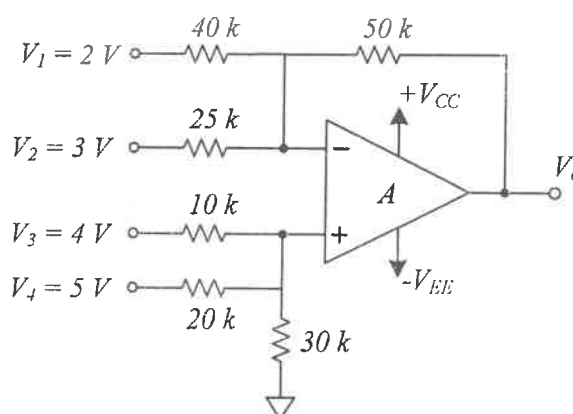


Q.2b A non-inverting amplifier with a gain of 100 is nulled at 25°C. What will happen to the output voltage if the temperature rises to 50°C for an offset voltage drift of 0.15 mV/°C? 05

LO3

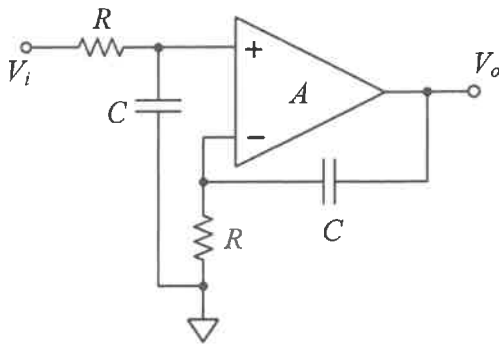
Q.3 Find V_o for the adder-subtractor shown in figure.

10
LO5

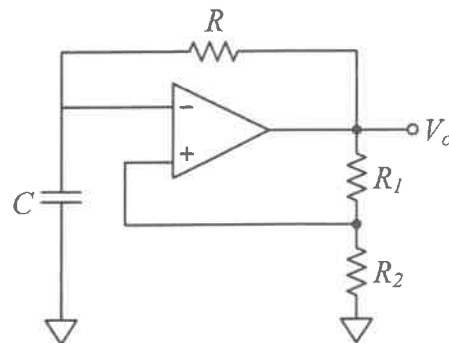


- Q.4 Design an op-amp differentiator that will differentiate an input signal with $f_{max} = 100 \text{ Hz}$. Then draw the output waveform for a sine wave of 1 V peak at 100 Hz applied to the differentiator. 10
LO4

- Q.5 Given figure shows a non-inverting integrator circuit. Find out V_o . 10
LO6



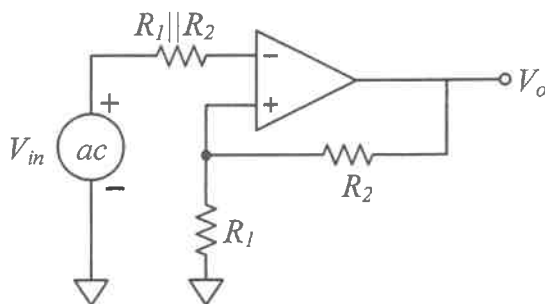
- Q.6 An op-amp circuit with R, C, R_1 and R_2 is shown in figure. Is this circuit able to generate square waveform? Support your answer with proper derivation and waveforms.



OR

- A Schmitt trigger with the upper threshold level $V_{UT} = 0 \text{ V}$ and hysteresis width $V_H = 0.2 \text{ V}$ converts a 1 kHz sine wave of amplitude $4V_{pp}$ into a square wave. Calculate the time duration of the negative and positive portion of the output waveform. 10
LO7

- Q.7 In the circuit shown in figure, $R_1 = 100 \Omega$ and $R_2 = 56 \text{ k}\Omega$, $V_{in} = 1 \text{ V}_{pp}$ sine wave, and the op-amp is type 741 with supply voltages $= \pm 15 \text{ V}$. Determine the threshold voltages V_{ut} and V_{lt} and draw the output waveform. 10
LO7



- Q.8 Can phase locked loop be used in place of 555 timers? Explain thoroughly by making their circuit diagrams and input-output waveforms. 30
LO8