

ANALOG INTEGRATED CIRCUITS

PAPER CODE : TEC 502

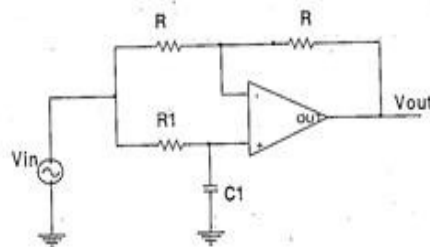
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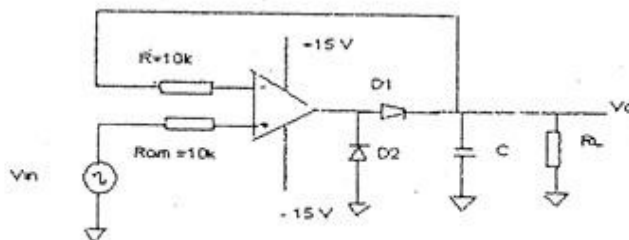
Note: Attempt any Five

- 1 (a) What are the three factors that affect the electrical parameters of an Op-Amp? List the parameters that should be considered for an ac and dc applications.
- (b) Derive the transfer function for the circuit shown below. From the given transfer function obtained, find the magnitude and phase response. Also discuss the nature of the circuit and identify the function performed by the circuit



- (c) An Op-Amp is used in a particular application. The change in Op-Amp's input offset voltage V_{io} caused by variations in the supply voltages is $60 \mu\text{V}$. Determine the change in the supply voltages. Assume that SVRR for given Op-Amp is 104 dB.
- 2 (a) Briefly explain the differences between the two operating modes of 555 timer. What must be the relationship between the pulse width t_p and the period T of the input trigger signal if the 555 is to be used as a divide-by-4 network?
- (b) Draw the schematic diagram of a Wien bridge oscillator. A certain Wien bridge oscillator uses $R = 4.7 \text{ k}\Omega$, $C = 0.01 \mu\text{F}$ and $R_F = 2 R_1$. What is the frequency of oscillation?
- 3 (a) What are various steps used in the designing of second order low pass Butterworth filter. Design a second order low pass Butterworth filter at a high cutoff frequency of 1kHz.
- (b) A certain narrow band-pass filter has been designed to meet the following specifications: $f_c = 2 \text{ kHz}$, $Q = 20$ and $AF = 10$. What modifications are necessary in the filter circuit to change the center frequency f_c to 1 kHz, keeping the gain and bandwidth constant?

- 4 (a) How the peak value of non sinusoidal input waveform can be detected ? Briefly explain its operation? In the following peak detector circuit , $C= 0.01 \mu\text{F}$, $R_L= 1\text{M}\Omega$ and $v_{in} = 2\text{-V pp}$ square wave at 1 kHz, draw the approximate output waveform.(assume the resistance of the forward-biased diode $R_d=100\Omega$)



- (b) What is a sample and hold circuit? Why is it needed? Draw the circuit diagram of a sample and hold circuit and explain its working .Draw the input and output waveforms.
- 5 (a) What is the voltage regulator? What are the advantages of a adjustable voltage regulators over the fixed voltage regulators.
- (b) Using the 7805C voltage regulator , design a current source that will deliver a 0.25 A current to a 48Ω , 10 W load.
- 6 (a) The cutoff frequency of a certain first order low-pass filter is 2 kHz. Convert this low pass filter to have a cutoff frequency of 3 kHz by using the frequency scaling technique.
- (b) Design the square wave oscillator so that $f_o = 1\text{kHz}$. The Op-Amp is a 741 with dc supply voltage = $\pm 15 \text{V}$.
- 7 Write short notes on (any four)
- Instrumentation Amplifier
 - PLL
 - Sallen-Key equal component filter
 - Precision rectifier
 - Analog multiplier
 - OTA