

National Institute of Technology, Delhi

Name of the Examination: B. Tech. / M. Tech. / Ph.D.

Branch : ECE

Semester : V

Title of the Course : Linear Integrated Circuits

Course Code : EC 303

Time: 3 Hours

Maximum Marks: 50

Note : All parts of section A are compulsory and carrying of 01 mark each.

Attempt any 4 questions from Section B each carrying 5 marks.

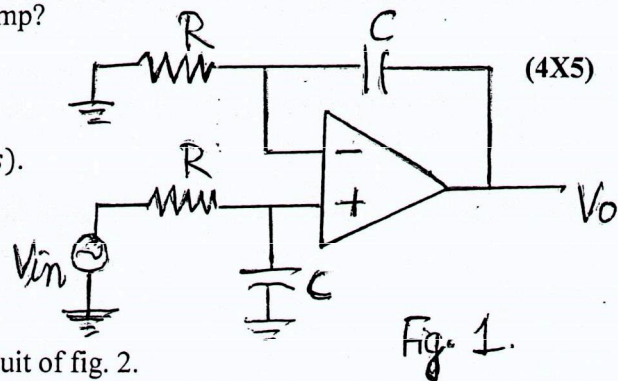
Attempt any 2 questions from section C each carrying of 10 marks.

Section A

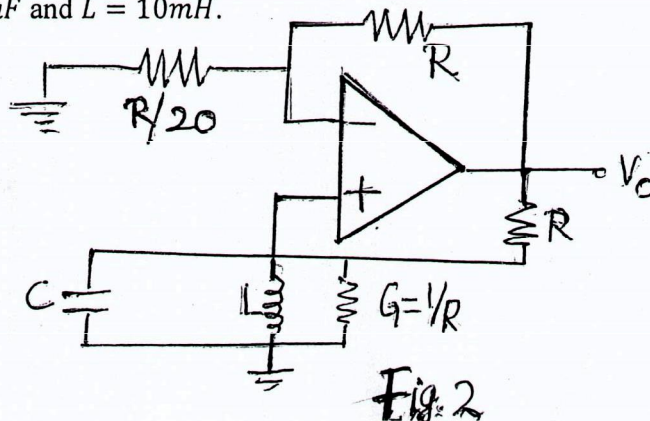
- Q 1. (a) Why active filters are preferred over passive filters? (1X10)
- (b) How virtual ground is different from ordinary ground.
- (c) If the input to differentiator is triangle waveform, what will be its output?
- (d) What is the cause of input offset voltage?
- (e) Explain the important application of voltage follower using op amp.
- (f) Why an ideal op amp requires infinite bandwidth?
- (g) In the saw tooth wave generator, how does potentiometer affect the frequency and amplitude of the wave ?
- (h) What is thermal drift?
- (i) Which frequency related parameter is of greater significance large signal condition?
- (j) What is the need of power supplies for op amp?

Section B

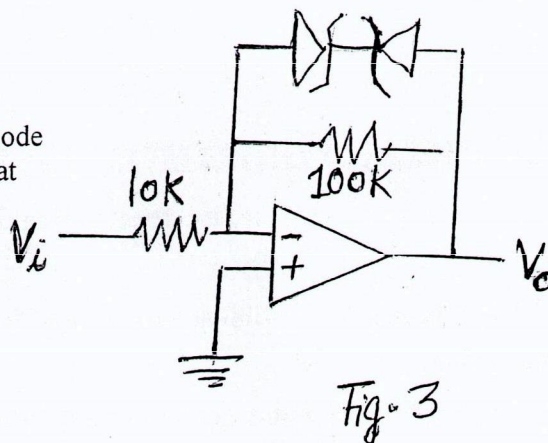
- Q 2. (a) Show that the circuit of fig. 1 is a non inverting integrator with $V_{0(s)} = \frac{1}{j\omega CR} V_{in(s)}$.
- (b) Specify component values so that $V_0 = V_{in}$ for $\omega = \frac{10^3 \text{ rad}}{\text{sec}}$.



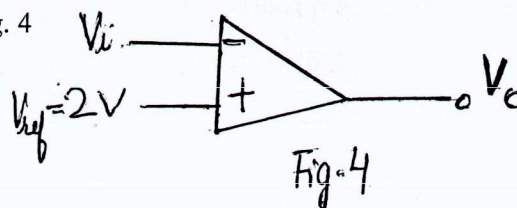
- Q 3. Calculate the frequency of oscillation of the circuit of fig. 2.
Given : $C = 0.01 \mu\text{F}$ and $L = 10 \text{ mH}$.



- Q 4. Consider the circuit of fig. 3. Both the zener diode Diodes having $V_Z = 5.1V$ and $V_D = 0.7V$. What Will be input voltage limit.



- Q 5. If the input to the ideal comparator shown in fig. 4 is a sinusoidal (peak to peak) without any DC component, then find out the duty cycle of the output of the comparator.



- Q 6. Draw the circuit of an antilog amplifier with temperature compensating network and explain its operation.

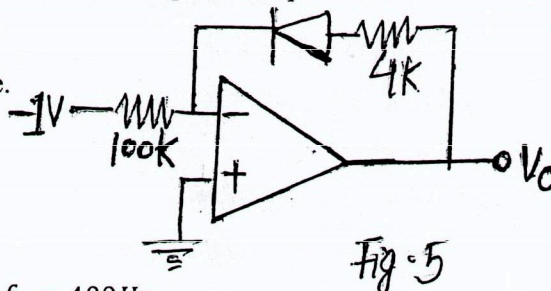
Section C

(2X10)

- Q 7. Draw the pin and circuit diagram of the following using 555 timer and explain its operation.
(a) Monostable and (b) Astable multivibrator.

- Q 8. (a) In the circuit of fig. 5, calculate the output voltage.

Given : $I = I_0 e^{v/v_T}$, Where, $I_0 = 1\mu A$ and $v_T = 26mV$.



- (b) Design a wide band reject filter having $f_L = 2KHz$ and $f_H = 400Hz$.
- Q 9. (a) (i) Design a differentiator to differentiate an input signal that varies in frequency from 10 Hz to 1KHz. (ii) If a sine wave of 1V peak at 1000 Hz is applied to the differentiator of part (i), draw its output waveform.
- (b) Define input bias current and how it is compensated using resistor R_{comp} .