Lib: 23/11 (M)

Roll No.:.....

# 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 **(4X5)**

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 $V_0 = V_{in} \quad for\ \omega = \frac{10^3 rad}{sec}$.

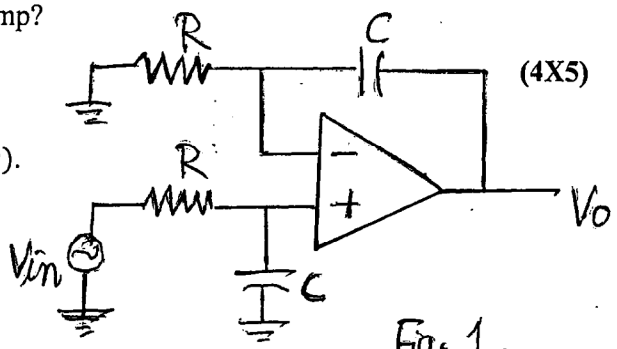


Fig. 1.

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

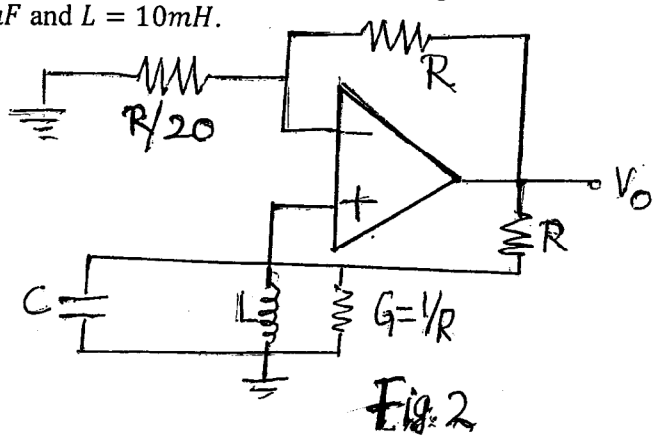


Fig. 2

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.

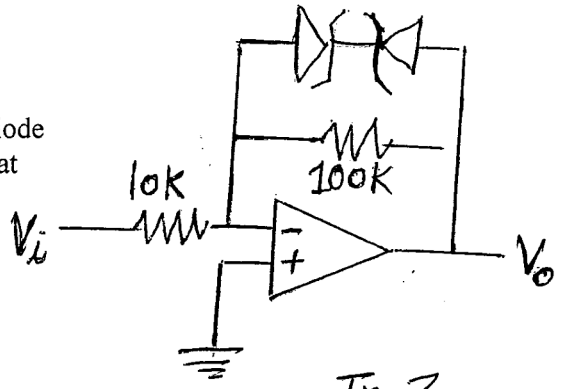


Fig. 3

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.

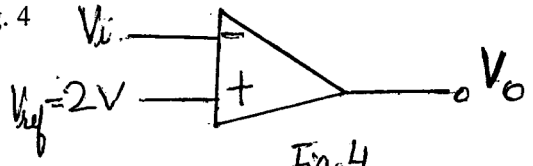


Fig. 4

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, $I_0 = 1\mu m$ and $v_T = 26mV$.

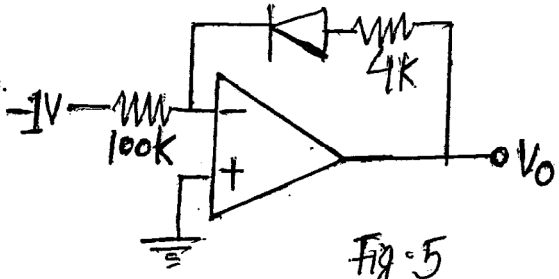


Fig. 5

(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 $R_{comp}$.