National Institute of Technology, Delhi

Name of the Examination: B.Tech.

End Semester Examination (Autumn, 2019)

Branch	: EEE/ECE	**Semester**	: V
Title of the Course	: IC Applications	**Course Code**	: ECB 304

Time: 3 Hours   Maximum Marks: 50

SECTION A: All questions are compulsory. (1*10)

1. Give two examples of how negative feedback is used in everyday life.
2. What is virtual ground?
3. List difference between characteristics of ideal and practical opamps.
4. What is a peak detector?
5. What is 3dB bandwidth?
6. What is CMRR?
7. What is the purpose of all pass filter?
8. Define the Barkhausen criterion.
9. Draw block diagram of opamp.
10. What is difference between clipper and clamper?

SECTION B: Attempt any four questions. (5*4)

1. Express v_o in terms of v_1 and v_2 for Fig. 1 circuit.

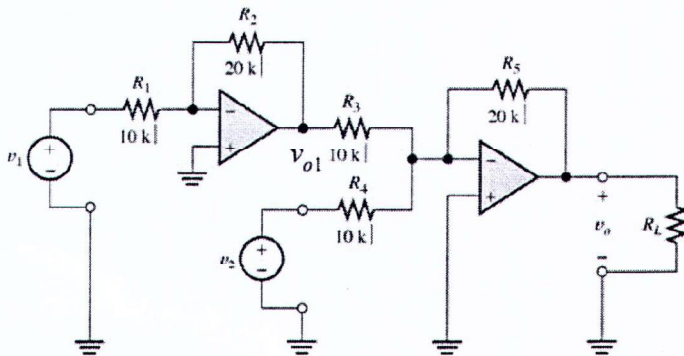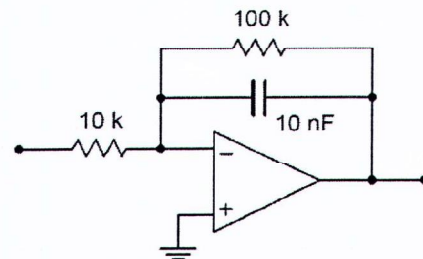**Fig. 1**   **Fig. 2**

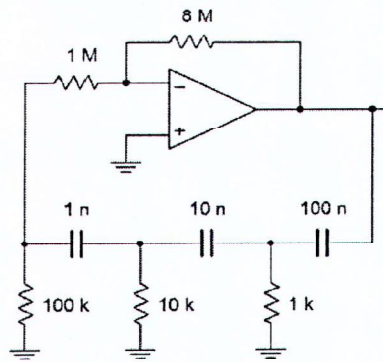2. Determine the equation for V_{out}, and the lower frequency limit of integration for the circuit of Fig. 2.
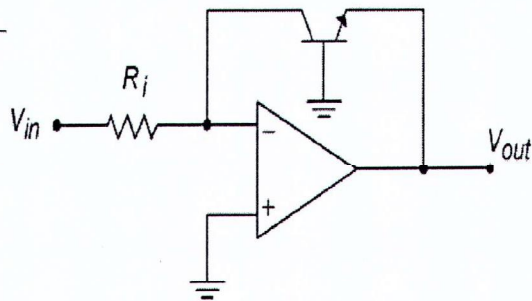
Fig. 3

Fig. 4

3.
(a) Design a second order low pass filter at a high cut-off frequency of 1kHz. C =0.0047uF.
(b) Draw the frequency response of the network in part (a)

4. Show how positive voltage clipper works.

5. Determine the frequency of oscillation of given oscillator in Fig. 3.

SECTION C: Attempt any TWO questions. (10*2)
1. Determine the output voltage for the circuit of Fig. 4. if Vin = 1 V, Ri = 50 kΩ, and Is = 30 nA. Assume T = 300 Kelvin. Also determine the output for inputs of .5 V and 2 V.

2. For the circuit shown below, V1 = 10sin(200t) and V2 = 15sin(200t) . The op amp is ideal with infinite gain.
(a) What is V_{out} for given circuit?
(b) What will beV_{out} if R1 is shorted?
(c) What will beV_{out} if R2 is shorted?
(d) What will beV_{out} if C_f is shorted?
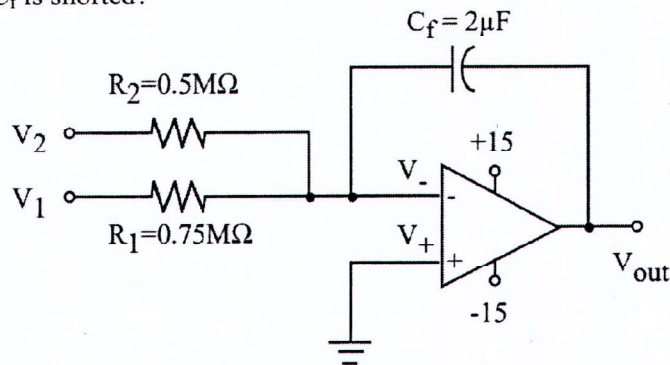
3. What is difference between triangular and saw tooth waveforms? Discuss methods to generate both waveforms using opamps.