

*Note: All questions are compulsory. Marks are indicated against each question in square brackets.*

### SHORT ANSWERS

1.

- In FLT U2 the low pass gain is always \_\_\_\_\_ higher than band pass gain.
- What are the voltage levels that should be provided at pin 4 and pin 2 of an IC 555 monostable multivibrator?
- Define capture stage of Phase locked loop.
- What are the modes of operation of timer?
- Ruchi wants to design window detector. Which circuit she will use?

[5, CO2, CO3, CO4, CO5]

### LONG ANSWERS

- (a) Realize a circuit to obtain  $V_{out} = - [2V_1 + 3V_2 + 4V_3]$  using an operational amplifier. Use minimum value of resistance as  $10k\Omega$ .

(b) For the circuit shown in Fig 1, evaluate  $V_{out}$  for 50ms for both conditions (switch open and closed).

[2 + 3, CO2]

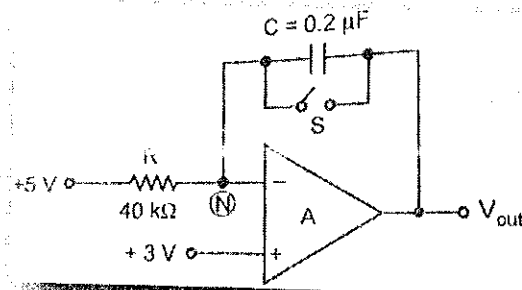


Fig 1

3. (a) For the basic op-amp comparator with positive and negative output voltage limiters,  $v_{in} = 100\text{mV}$  peak sine wave at 100 Hz,  $R = 1\text{k}\Omega$ , and  $D_1$  and  $D_2$  are 6.2V zeners. The op-amp is working at a supply voltage of  $\pm 12\text{V}$ . Draw the output voltage waveform.

(b) For the inverting comparator,  $v_{in} = 1\text{V}$  pp sine wave at 500 Hz,  $R = 100\Omega$ , and supply voltages =  $\pm 15\text{V}$ . Draw the waveform if  $V_{ref} = 0.2\text{V}$ , and  $V_{ref} = 0\text{V}$ .

[2 + 3, CO2]

4. (a) Design the 555 timer as a mono-stable multivibrator that generates time as 5 ms.

(b) An astable multivibrator is to be designed for getting rectangular waveform with  $t_{ON} = 0.6\text{ms}$ . Draw the circuit diagram with various component values. Also calculate frequency of oscillations and duty cycle. Assume total time period to be 1ms.

[2 + 3, CO3]

5. (a) Why is one shot known as mono-stable multivibrator?

(b) Can operational amplifier used for non-linear applications. Explain any three circuits in support of your answer.

[2 + 3, CO2, CO3]

6. (a) Help Aditya in understanding the functioning of FLT-U2? List important features of this device.

(b) Explain the circuit that lock its output frequency or phase to the frequency and phase of the input signal.

[2.5 + 2.5, CO4, CO5]

7. Why Binary weighted resistor D/A converter is not used. Explain which circuit is used to overcome this issue.

[5, CO5]