

**SARDAR PATEL UNIVERSITY V.V.NAGAR**  
[72] **B.Sc.(III SEM.) INSTRUMENTATION (V)**  
**6<sup>th</sup> JANUARY-2021 EXAMINATION**  
**SUBJECT- Operational amplifiers and Filters**  
**SUB.CODE-US03CINV22**

**TIME: 02:00 pm to 04:00 pm****MARKS-70****Q-1 Choose correct answer. [10]**

1. An ideal operational amplifier has \_\_\_\_\_.  
(A) infinite output impedance (C) infinite bandwidth  
(B) zero input impedance (D) None of above
2. Which factor determine the output voltage of an op-amp?  
(A) Positive saturation (C) both (A) and (B)  
(B) Negative saturation (D) None of above
3. Op-amp integrator uses \_\_\_\_\_ feedback element.  
(A) capacitor (C) inductor  
(B) resistor (D) None of above
4. OP-Amp operates at \_\_\_\_\_.  
(A) High voltage(100 KV) (C) Low voltage(12V)  
(B) medium voltage( 220 V) (D) None of above
5. OP-Amp is a/an \_\_\_\_\_.  
(A) Oscillator (C) Rectifier  
(B) Differential Amplifier (D) None of above
6. Name the filter that has two stop bands?  
(A) band pass filter (C) high pass filter  
(B) low pass filter (D) None of above
7. An electrical filter is a \_\_\_\_ circuit.  
(A) Frequency selective (C) Phase selective  
(B) Filter selective (D) None of above
8. What is the loss the filter introduces to the signals in the pass band called?  
(A) pass band (C) insertion  
(B) attenuation (D) None of above
9. A basic generalized form of comparator is \_\_\_\_\_.  
(A) zero crossing detector (C) both (A) and (B)  
(B) sine to square wave generator (D) None of above
10. What are the features of instrumentation amplifier?  
(A) low noise (C) low thermal and time drift  
(B) high gain accuracy (D) All of above

**Q-2 Filling the black and true /false [08]**

1. When the two terminals are to be at same potential hence two input terminal are said to be \_\_\_\_\_.
2. The gain of an OP-Amp voltage follower is \_\_\_\_\_.
3. The input impedance of an ideal op-amp is \_\_\_\_\_.
4. In op-amp IC 741 has input of pin no.2 is \_\_\_\_\_.

**True or False**

- 5 Signal conditioner is used for boosting the voltage.
- 6 Telephone wire is the application of all-pass filters .
- 7 The monostable multivibrator has one quasi-stable state and one unknown state.
- 8 Notch filters and band reject filters are the same.

**Q-2 Short answer type question. (Any Ten)**

**[20]**

1. Explain ideal characteristics of an op-amp.
2. Draw the circuit diagram current to voltage converter of an op-amp .
3. Briefly explain basic comparator of an operational amplifier.
4. Briefly explain and Draw the square wave generator.
5. Differentiate between active filter and passive filter.
6. Draw block diagram of an op-amp.
7. Briefly explain Notch filter.
8. Explain: Schmitt trigger circuit
9. Define open loop frequency response.
10. Draw square wave generator circuit.
11. Briefly explain and draw phase detector circuit.
12. Write full name CMRR of an operational amplifier and explain it.

**Q.4 Long answer type Question. [ANY FOUR]**

**[32]**

- 1 Explain summing op-amp with necessary diagram in detail.
- 2 Draw circuit diagram of inverting amplifier and derive necessary expression for it with feedback.
- 3 Explain integrator circuit diagram and wave form of an operational amplifier in detail.
- 4 Explain voltage to current converter using op-amp with necessary diagram.
- 5 Explain Astable multivibrator with diagram and waveform.
- 6 Explain zero crossing detector in detail.
- 7 Define instrumentation amplifier and explain it with circuit diagram.
- 8 Explain low pass filter

