

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5810

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Unique Paper Code : 2512042302

Name of the Paper : Operational Amplifiers and Applications

Name of the Course : **B.Sc (H) Instrumentation**

Semester : III

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **five** questions. Questions no. 1 is compulsory.
3. **All** questions carry equal marks.

- Q.1 (a) Define CMRR and Slew rate. (3)
(b) What is the difference between a basic comparator and Schmitt trigger circuit? (3)
(c) What is a zero-crossing detector? Draw its circuit diagram (3)
(d) Explain the Concept of Virtual ground. (3)
(e) The output of an Opamp circuit changes by 20 V in 10 seconds. Calculate slew rate. (3)
(f) What is duty cycle? Write mathematical formula to calculate duty cycle of output waveform of an Astable multivibrator. (3)
- Q.2 (a) Derive the expression for voltage gain and differential input resistance of dual input balance output differential amplifier. (8)
(b) What is level translator? Draw and explain any one circuit which is used as level translator. (6)
(c) Write the differences between Ideal and Practical Op-Amp. (4)
- Q.3 (a) What is Instrumentation amplifier? Draw its circuit and obtain the expression for output voltage. (8)
(b) Draw circuit diagram, input and output waveforms for Integrator. Also obtain expression for output voltage. (6)
(c) Explain working of logarithmic amplifier with a diagram. (4)
- Q.4 (a) Design a second order high pass filter with a cut off frequency of 3 kHz. Also draw it's circuit and frequency response. (6)
(b) What is a band reject Filter? Explain working of notch filter with suitable diagram. (6)
(c) Explain working of Sample and Hold circuit. (6)

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- Q.5 (a) Explain inverting and non-inverting comparator. Draw the input-output waveforms. (6)
 (b) Derive the expression for frequency of oscillation for a Wein bridge oscillator. (6)
 (c) What is 555 timer? How it can be used as monostable multivibrator. (6)
- Q.6 (a) Design a Summing amplifier using inverting configuration of Op-amp having inputs $V_1 = 7V$, $V_2 = -6V$ and $V_3 = 2V$. (6)
 (b) Draw equivalent circuit of Op-amp. Plot the ideal voltage transfer curve of Op-amp. (6)
 (c) What is an all pass filter? Draw its circuit diagram and state its applications? (6)
- Q.7 (a) Draw the circuit diagram along with input and output waveform of a sawtooth generator. (6)
 (b) What is Quality factor for Active Filter? What is the Value of Quality factor for Wide band pass filter and narrow band pass Filter? (6)
 (c) Determine the output Voltage of the following circuit : (6)

