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Printed Pages : 4 **TEC-507**

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 3000 Roll No.

B. Tech.

(SEM. V) EXAMINATION, 2007-08

ANALOG INTEGRATED ELECTRONICS

Time : 3 Hours] *[Total Marks : 100*

Note : *(1) Attempt all questions.*

(2) Use semilog paper if required.

1 Answer any **four** questions of the following : **5×4=20**

(a) Why are low closed-loop gains avoided with uncompensated opamps ? – Explain.

(b) Discuss various methods of implementing pole-zero compensation of an opamp.

(c) Draw the circuit which applied lead compensation to an inverting opamp. Verify that a phase lead is introduced by the circuit element added.

(d) Explain the difference between band width, transient response and slew rate. Also derive the slew rate equation for an opamp.

(e) Explain the causes of slew rate in an opamp.

(f) Define the following :

(1) Break frequency

(2) Circuit stability

(3) Unity gain frequency

(4) Frequency response of an opamp.

2 . Answer any **four** questions of the following : **5×4=20**

(a) For an instrumentation amplifier shown in Fig. 1 below, verify that

$$V_0 = \left(1 + \frac{R_2}{R_1} + \frac{2R_2}{R}\right)(V_2 - V_1)$$

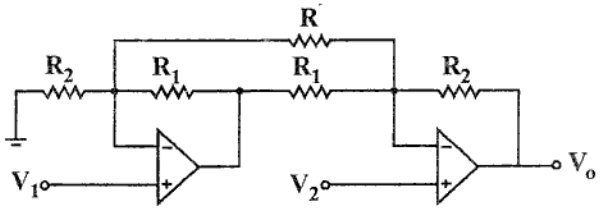

Fig. 1

(b) Explain the operation of an ac amplifier with a single power supply.

(c) Draw the circuit of a voltage to current converter if the load is (1) floating and (2) grounded Is there any limitation on the size of the load when grounded ? Explain its working.

(d) Draw and explain the working of an instrumentation amplifier. Also obtain input and output voltage relationship for an instrumentation amplifier.

(e) Design an opamp differentiator that will differentiate an input signal with $f_{max} = 100\ Hz$. Draw the output waveform for a consine wave of 1V peak at 100 Hz applied to the differentiator.

(f) Identify the following circuit. Obtain v_0 of the following circuit.

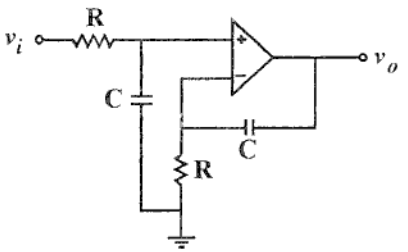

Fig. 2

3 Answer any **four** questions of the following : **5×4=20**

(a) State the three ways filters can be classified and explain the characteristics of each.

(b) Discuss the difference between a Butterworth, a Chebyshev and a Cauer filter and compare their responses.

(c) Design a wide band pass filter with $f_L = 400\ Hz$, $f_H = 2\ kHz$ and a pass band gain = 4. Draw a frequency response plot for the filter on semilog paper. Calculate the value of Q for the filter.

(d) Show that for second order low pass Butterworth filter

$$f_H = \frac{1}{2\pi\sqrt{R_2 R_3 C_2 C_3}}$$

(e) Draw and explain the principle of working of digital to analog converters with R and 2R resistors.

4 Answer any **two** questions of the following : **10×2=20**

(a) Draw that circuit of pulse generator using an opamp. Explain its operation by referring to the capacitor waveform.

(b) Draw the circuit of Astable multivibrator and explain its operation by referring to the capacitor waveform.

(c) Draw the circuit of a fast half-wave rectifier and explain its operation. How is this circuit converted into an average detector ?

5 Write short notes on any **two** of the following : **10×2=20**

(1) PLL

(2) 555 timer and its application

(c) Voltage regulator.