(b) Design a 400 Hz active notch filter. Draw the frequency response. Obtain the transfer function for band reject filter.

(c) Draw the schematic of second order narrow band pass filter. Obtain expression of the gain and Q at resonance. Draw its frequency response.

4 Attempt any **two** parts of the following : **10×2=20**

(a) (i) Draw the circuit of a log-amplifier using two op-amps and explain its working.

(ii) Set-up a computer simulation to solve the differential equation :

$$\frac{d^2y}{dt^2} + 5.4\frac{dy}{dt} + 0.58y = u(t)$$

(b) (i) Draw a sample and hold circuit. Explain its operation and indicate its uses.

(ii) Name the circuit that is used to detect the peak value of the non-sinusoidal waveforms. Explain the operation.

(c) What is an absolute value output circuit ? Draw its circuit and explain its working and also explain how it can be used as full wave rectifier ?

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

(a) Op-amp regulator

(b) Fixed voltage regulator

(c) SMPS.

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Printed Pages : 4 TEC-502

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

PAPER ID : 3086 Roll No.

B. Tech.

(SEM. V) EXAMINATION, 2008-09
ANALOG INTEGRATED CIRCUITS

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

Note : *(1) Attempt **all** questions.*

(2) Use semilog paper, if required.

1 Attempt any **four** parts of the following : **5×4=20**

(a) Explain with proper reasons, why :

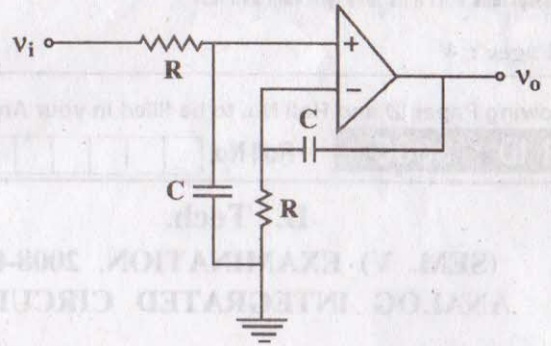
(i) The input offset voltage exists in all op-amps.

(ii) The R_E in an emitter-coupled differential amplifier replaced by a constant current source.

(iii) The CMRR is infinite if a true constant current source is used in a symmetrical emitter coupled differential amplifier.

(iv) The gain of the op-amp to roll-off after a certain frequency is reached.

(b) Explain the working of the following circuit and obtain an expression for its output voltage (v_o) :

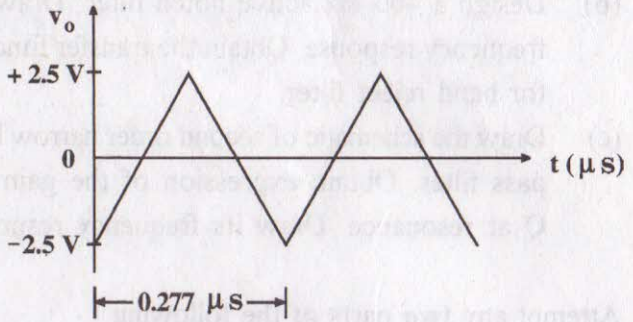


(c) Obtain an expression for the common-mode and difference-mode gain of an op-amp.

(d) Design an op-amp differentiator that will differentiate an input signal with $f_{max} = 100\ Hz$. Also draw the output waveform for a sine wave of 1 V peak at 100 Hz applied to the differentiator.

(e) Explain the input bias current characteristics of op-amp in detail.

(f) Define slew rate, when an 8 V peak to peak square wave of 3.6 MHz frequency is the input to a voltage follower, the output is a triangular wave, as shown below. What is the slew rate of the op-amp ? What must the minimum slew rate of the op-amp be in order to get the square wave output ?



2 Attempt any **two** parts of the following : **10×2=20**

(a) Explain the operation of monostable multivibrator by drawing the negative going triggering signal, capacitor waveform and output voltage waveform.

(b) Draw the circuit of a PLL AM detector and explain its operation. Calculate output frequency f_o, lock range Δf_L and capture range Δf_C of a **565 PLL** if $R_T = 10\ k\Omega$, $C_T = 0.01\ \mu F$ and $C = 10\ \mu F$.

(c) Draw the circuit of Schmitt trigger using 555 timer and explain its operation. Design a monostable multivibrator using 555 timer to produce a pulse width 100 ms.

3 Attempt any **two** parts of the following : **10×2=20**

(a) Design a wide- band reject filter using first order high-pass and low-pass filter having $f_L = 2\ kHz$ and $f_H = 400\ Hz$, respectively and pass band gain is 2. Draw its frequency response on semilog paper.