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RM-7085-R

B. E. - III (Sem. VI) (ECC) Examination

May / June – 2010

Analog Integrated Circuit

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

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. - 3 (Sem. 6) (ECC)**

Name of the Subject :

☛ **Analog Integrated Circuit**

☛Subject Code No. : **7 0 8 5** ☛Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Attempt all questions.
(3) Assume necessary data if required.
(4) Figures to the right indicate full marks.

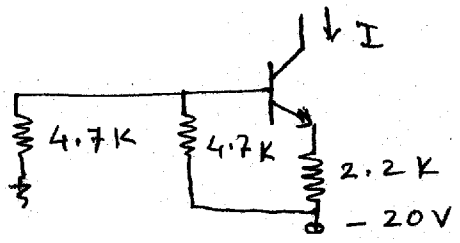
SECTION - I

1 (a) Attempt all questions : **20**

(i) Write the condition required to use 555 times in monostable mode as a frequency divide by N. Draw i/P and o/P waveform. **3**

(ii) In second order low pass filter the value of R_1 = 2K and the R_F = 10 K then what will be the pass band gain? This data is possible? **2**

(iii) Find the value of I in given figure. **3**



(iv) The common mode input to a certain differential amplifier, having differential gain of 125 is $(4 \sin 200\ \pi t)$v. Determine the common mode output if CMRR is 60 dB. **4**

(v) Explain binary weighted DAC and derive the equation for analog output voltage. **6**

(vi) Which type of ADC is used for high speed application? Justify the answer. **3**

2 Attempt any **two** : **16**

(i) Explain different applications of astable multivibrator using 555 timer.

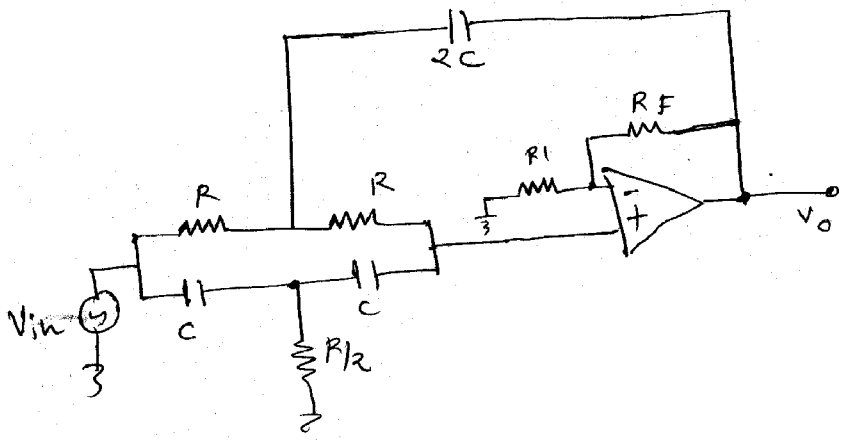
(ii) Derive the cutoff frequency for second order high pass filter. Draw frequency response.

(iii) For a differential amplifier circuit operated from $\pm$10V, assume matched pair of transistor with V_{BE} = 0.7 V. The R_C = 47 KΩ. Calculate R_E so that the V_{CEQ} = 8.6 V for each transistor. Assume h_{fe} = 100.

3 Attempt any **two** : **14**

(i) Explain double integrator type ADC with necessary equations and waveforms.

(ii) Find the application of given circuit and its frequency response with values of frequencies.



(iii) Draw a circuit diagram of Timer using 555 IC. Calculate the component values if the controlled door should remain open for 15 sec. after a trigger signal is applied. V_{CC} = 15V Take C = 100 μF.

SECTION - II

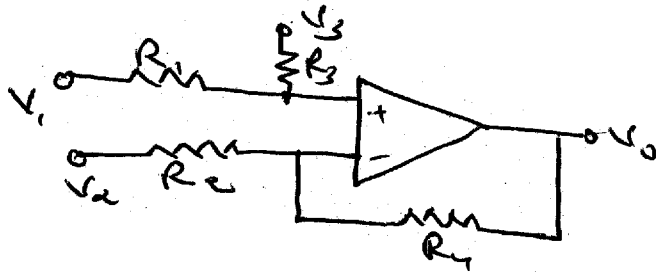
4 (a) Atttempt the following : **10**

(i) In the circuit shown in fig (1) show that

$V_o = a_1 v_1 + a_2 v_2 + a_3 v_3$.

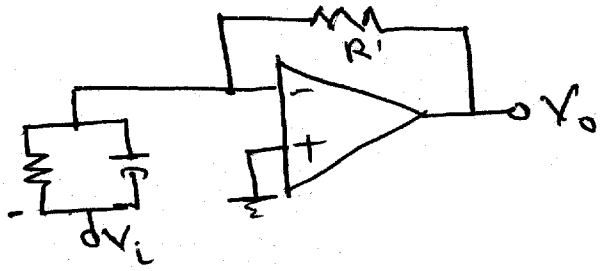
Determine the value of a_1, a_2 and a_3 and compute the value of V_o if

(a) R_y is S/C (b) R_y is removed (c) R_i is S/C



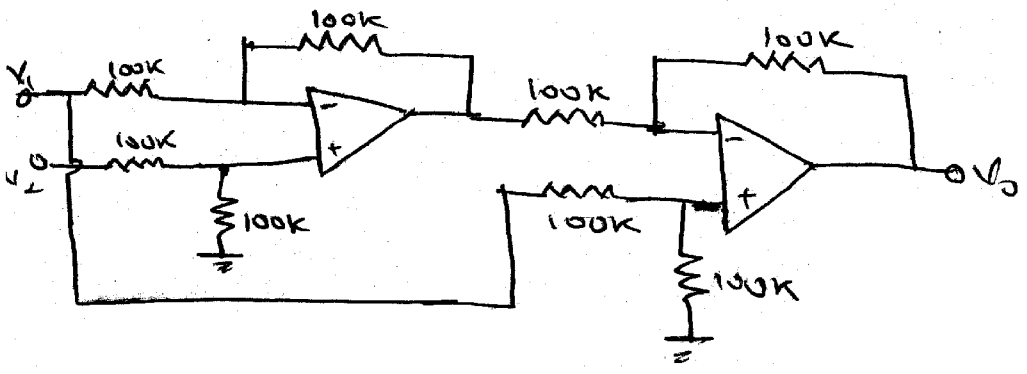
(ii) Design an inverting amplifier where gain is variable from unity to 100 for DC applications. Suggest some method to convert it into a non-inverting amplifier with the same gain variation.

(iii) Derive $V_o = -\alpha R'C - \alpha(R'/R)t$ for the circuit shown in figure (2) if $V_i = \alpha t$.



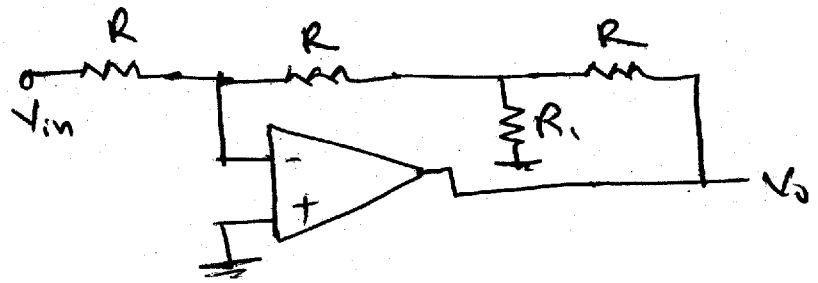
(iv) Design an op-amp circuit, which gives an output eo = sin t – cost from the available inputs e_1 = sin t and e_2 = cost. Give all the component values and make the reasonable assumptions whenever require.

(v) Find V_o for the circuit shown in Fig. 3.



(b) Design a phase shift oscillator using op-amp and find out frequency of oscillation for the same. **5**

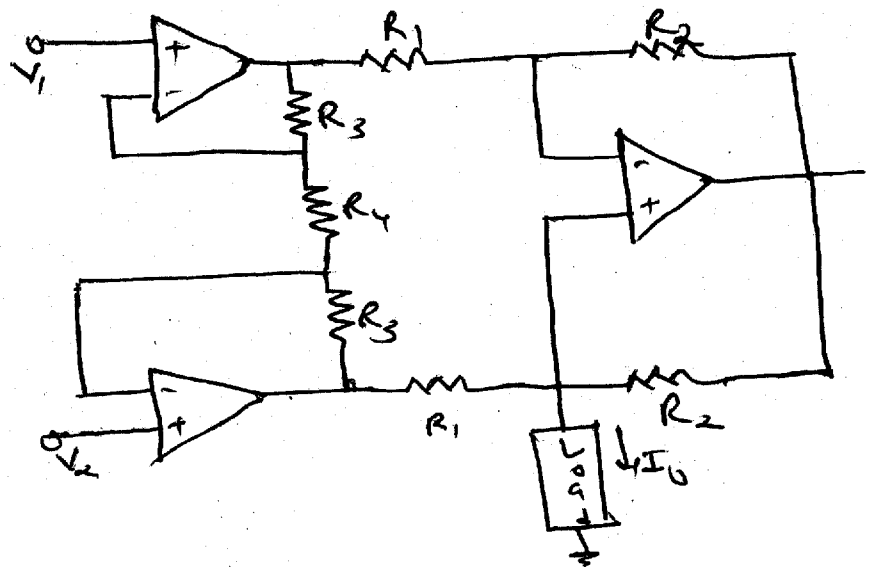
(c) For the circuit shown in figure (4) R = 10 KΩ. Find R_1 so that $V_o = -100\ V_{in}$. **5**



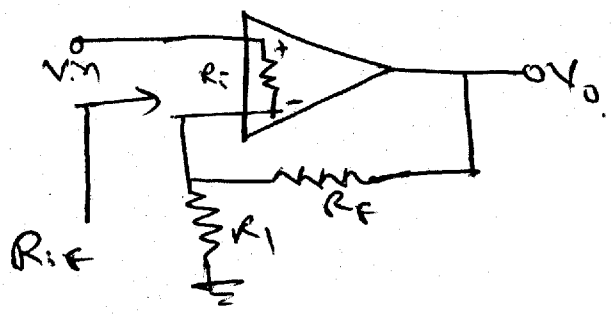
2 Attempt any **two** : **16**

(i) For the circuit shown in figure (5), prove that $i_L = -2\frac{V_{in}}{R_1}$,

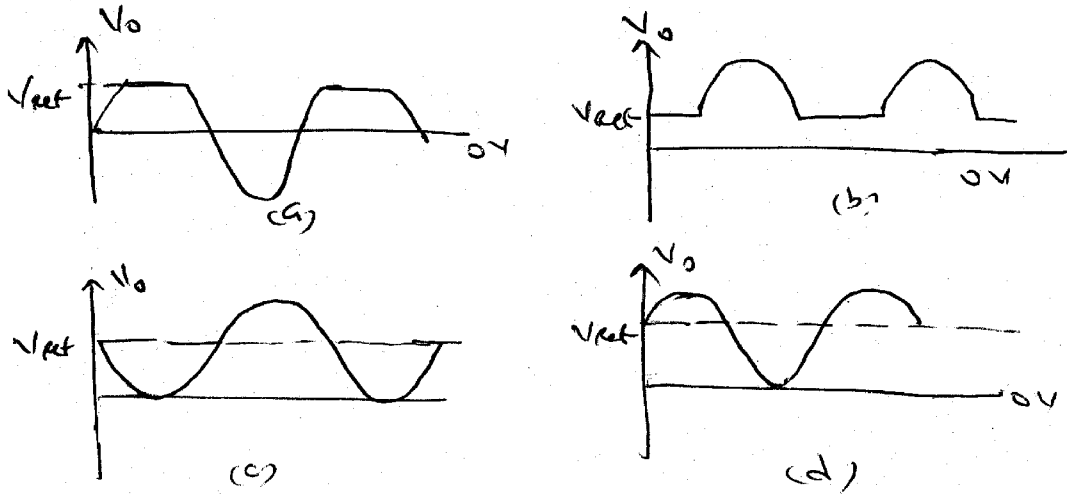
where $\frac{1}{R} = \left(1+\frac{2R_3}{R_4}\right)\cdot\frac{1}{R_1}$



(ii) Show that input impedence for the noninverting amplifier shown in figure (6) is $R_{if} = R_i \left\{ 1 + \frac{R_1}{R_1 + R_f} A_v \right\}$



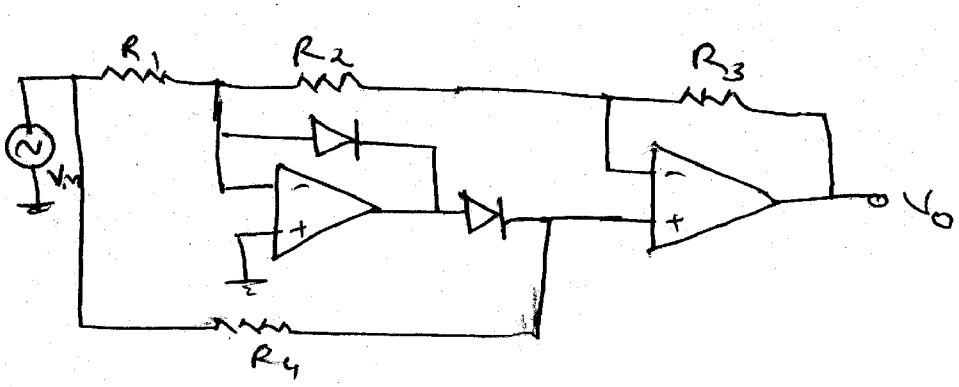
(iii) Design a circuit for the waveforms shown in figure (7) for sinusoidal input.



3 Attempt any **two** : **14**

(i) Design a differentiator circuit, which perform the mathematical operation of differentiation. Mention the drawbacks of basic differentiator and give the remedy to overcome the same.

(ii) Design a circuit of figure (8) in such a manner that output is full wave rectification of sinusoidal input signal.



(iii) Design a circuit for the monostable multivibrator using op-amp.