* 5 4 9 1 / 5 4 9 2 *

5491/5492

B. E. III (Electro & Communi.) (Sem. VI) Examination

October / November – 2005

Analog Integrated Ckts

Time : 3 Hours] [Total Marks : 70

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. III (Sem. VI) (Electro. & Communi.)**

Name of the Subject :

☛ **Analog Integrated Ckts**

☛ Subject Code No. : 5 4 9 1 ☛ Section No. (1, 2,.....) : NIL

Seat No. :

Student's Signature

(2) Attempt **all** questions.

(3) Assume suitable data wherever necessary.

(4) Each section must be answered in **separate** answer book.

(5) Right side fig. indicate full marks.

1 (a) For the single input, balanced output differential amplifier shown in **fig.1**. 8

Determine :

(i) The operating point values (I_{CQ} and V_{CEQ})

(ii) The voltage gain

(iii) The input resistance

(iv) The maximum peak to peak output voltage

Assume that $\beta_{ac} = \beta_{dc} = 100$, $V_{BE} = V_{DI} = 0.715V$, $V_Z = 6.2V$ and $I_{zt} = 41mA$.

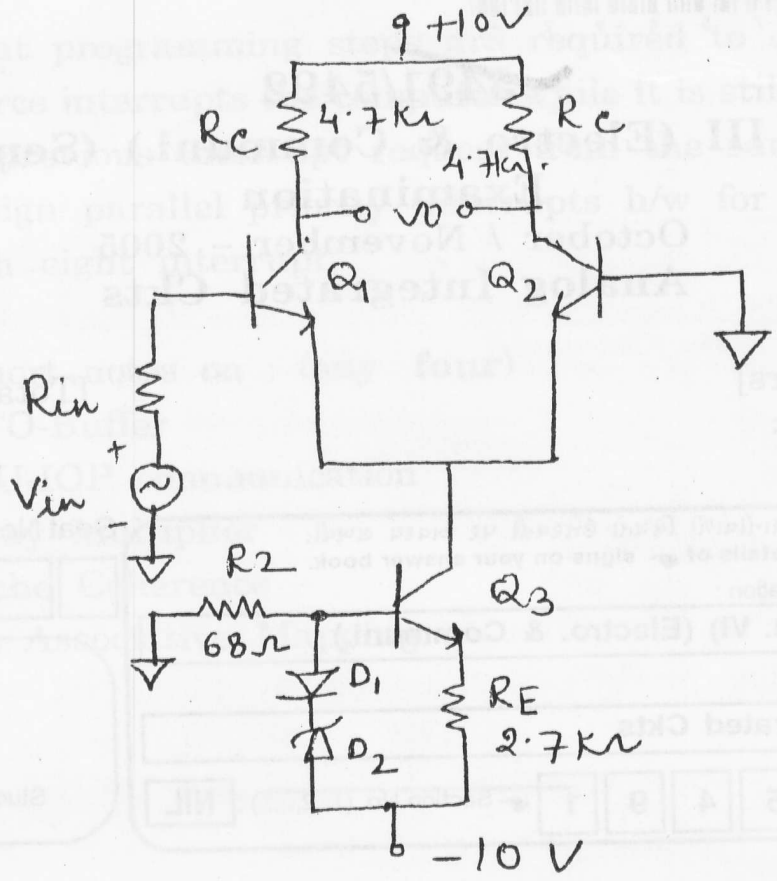


Fig.1

(b) What is level translator ? Why is it used with cascaded differential amplifier ? Draw and explain various circuits which work as a level translator. 6

(c) When a pulse is applied to an OPAMP, the output voltage goes from -8V to 7V in $0.75\,\mu s$. What is the slew rate ? Also define the slew rate. 4

2 (a) Design a wide band pass filter with $f_L = 400\,Hz$, $f_H = 2\,kHz$ and passband gain = 4. Also draw an appropriate frequency response for the filter. 5

(b) Why are active filters preferred ? 3

(c) Draw notch filter using twin 'T' network and prove that notch filter $f_N = \dfrac{1}{2\pi RC}$. 8

OR

2 (a) Draw the circuit diagram for a second order high pass Butterworth filter using an OPAMP and derive the relation for cutoff frequency. 8

(b) For the circuit shown in **fig. 2**. Assume $R_1 = QR$ and $W_o = \frac{1}{RC}$. Show that, $\frac{V_2}{V_1} = \frac{2s(w_o/Q)}{S^2 + \left(\frac{w_o}{Q}\right)s + w_0^2}$ 8

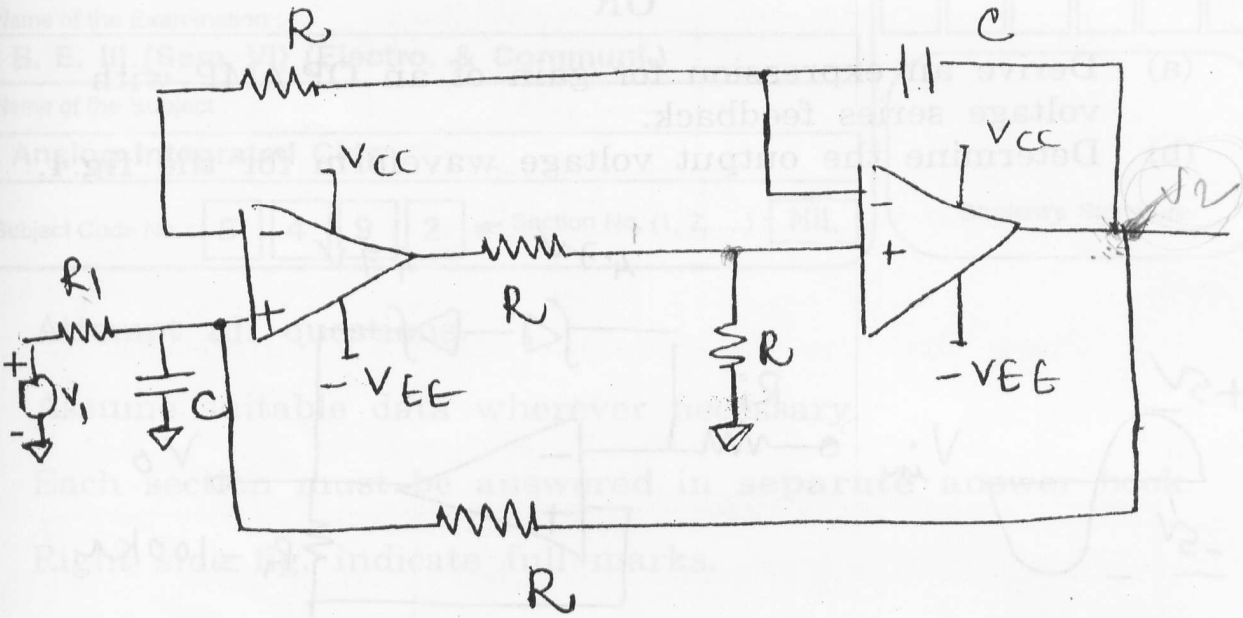


Fig. 2

3 (a) The instrumentation amplifier of **fig.3** is used to amplify the output of a balanced microphone. The output of the microphone is 6 mV peak and a common mode hum signal is induced into the lines at 10 mV peak. If the system has a CMRR of 100 dB, what are output levels of the desired signal and the hum signal. 8

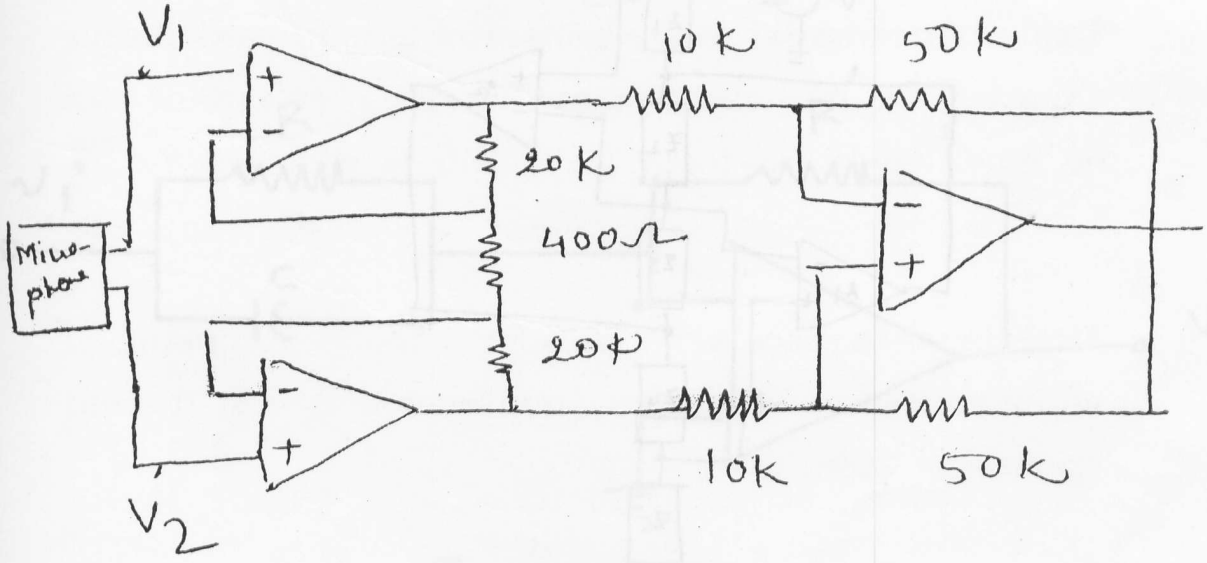


Fig. 3

(b) What is the input offset voltage for an OP AMP ? Design an offset voltage compensating network for an OP AMP. 6

(c) Define following terms : 2
(i) PSRR (ii) Input offset current.

OR

3 (a) Derive an expression for gain of an OP-AMP with voltage series feedback. 4

(b) Determine the output voltage waveform for the fig.4. 4

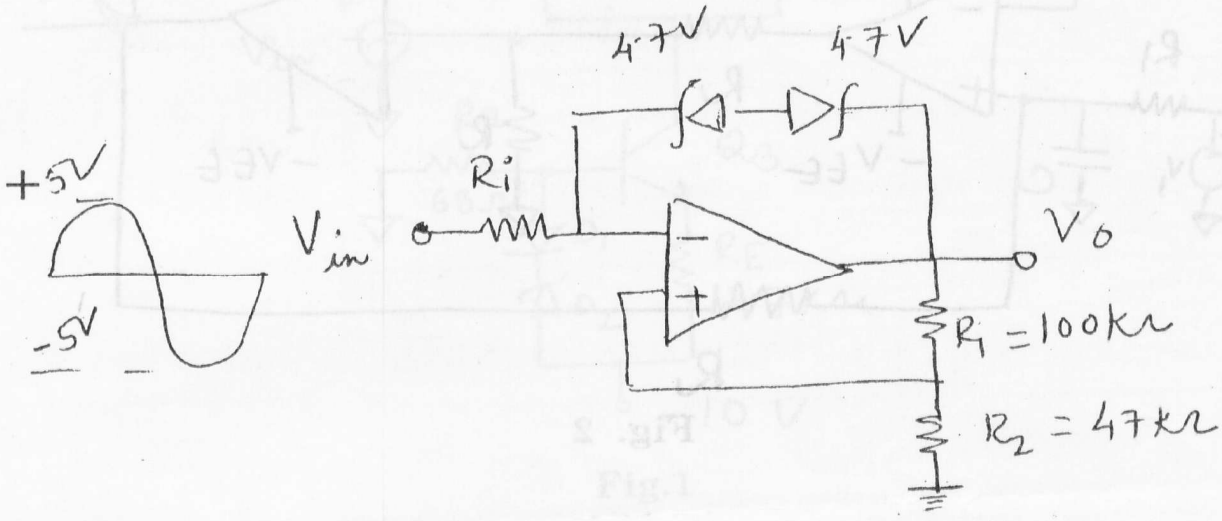


Fig.4

(c) Find the equivalent impedance of a generalized impedance converter (GIC) towards ground for the fig. 5. Also explain how it can be used to implement inductor. 8

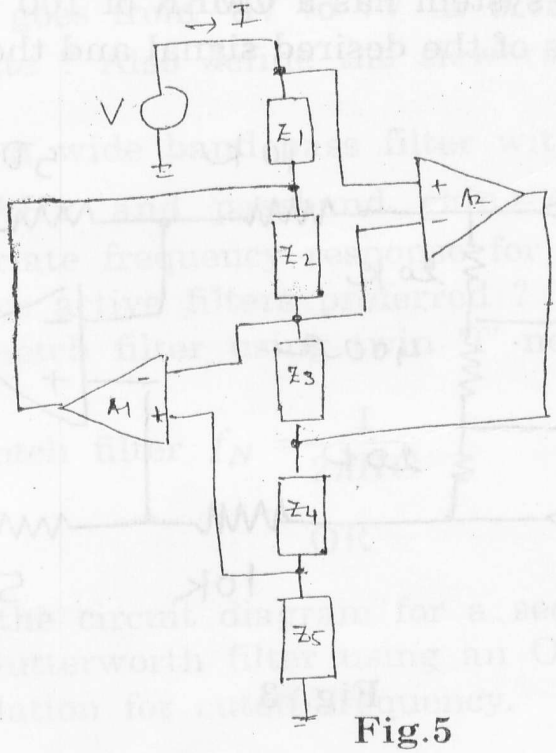


Fig.5

5492

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. III (Sem. VI) (Electro. & Communi.)

Name of the Subject :

☛ Analog Integrated Ckts

☛ Subject Code No. : 5 4 9 2 ☛ Section No. (1, 2,.....) : NIL

Seat No. :

Student's Signature

(2) Attempt **all** questions.

(3) Assume suitable data wherever necessary.

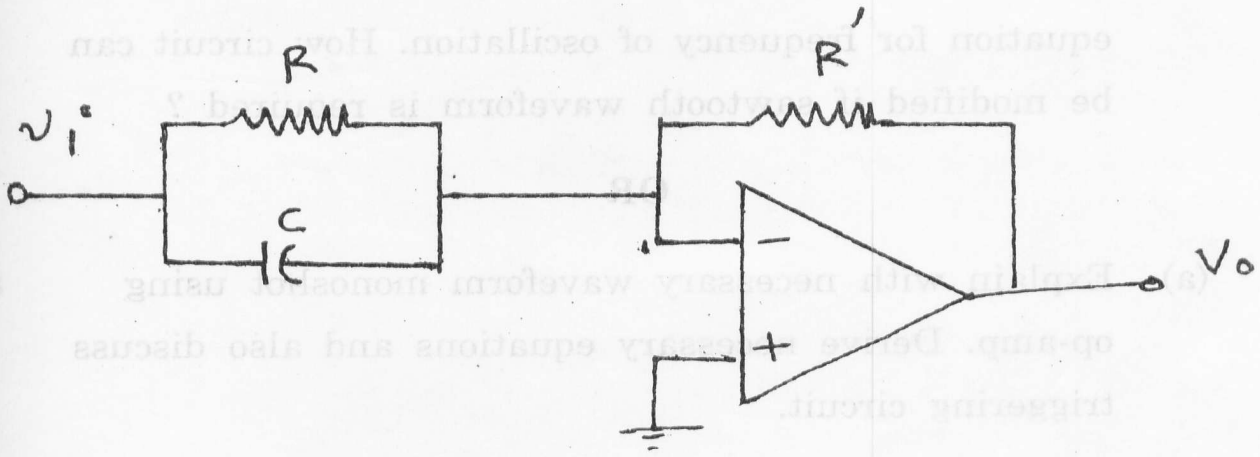
(4) Each section must be answered in **separate** answer book.

(5) Right side fig. indicate full marks.

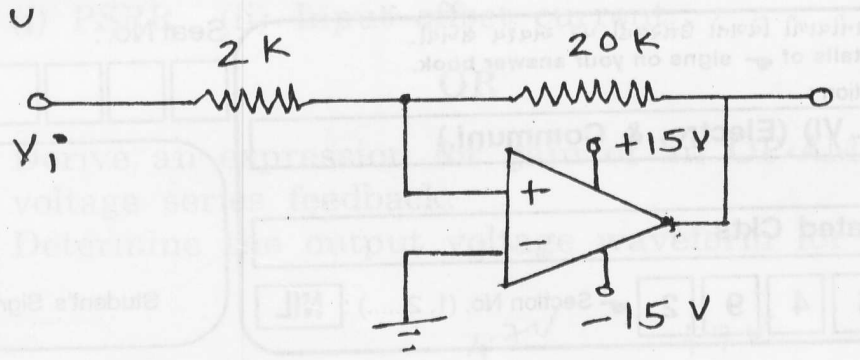
4 (a) Explain basic integrator circuit. Why practically modifications are required ? Derive equations for *fa* and *fb* and plot frequency response. **6**

(b) In the given circuit input is a sweep voltage $v_i = \alpha t$. Show that the output is given by **6**

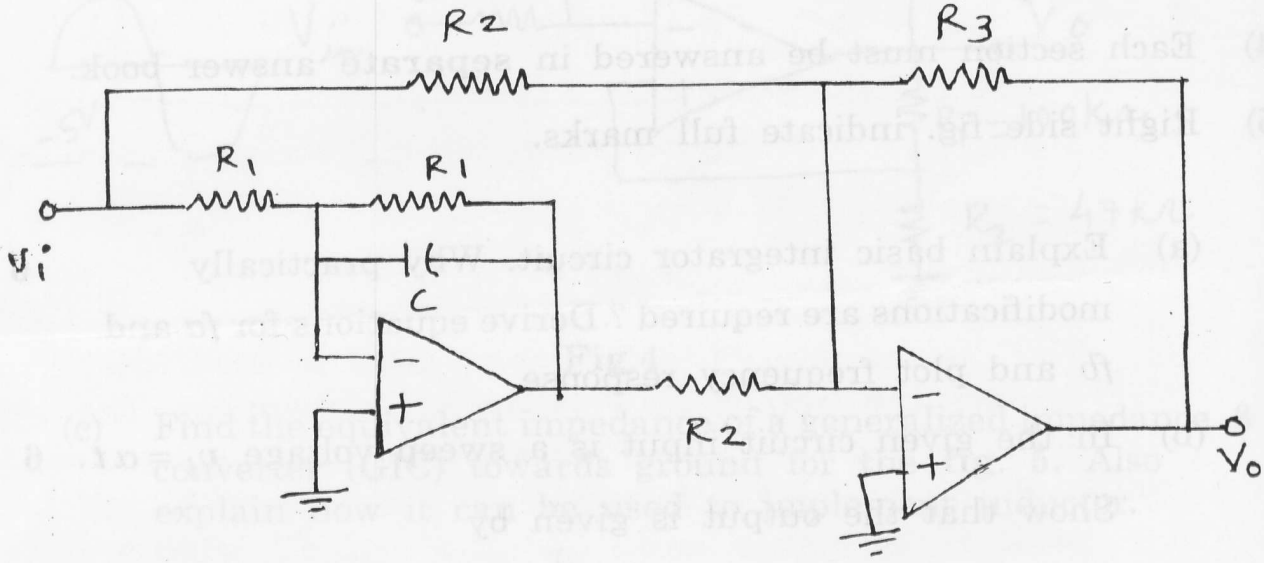
$$v_o(t) = -\alpha R' c - \alpha \frac{R'}{R} t$$



(c) Sketch the output waveform for the given circuit if the input signal is a 5V peak sine wave. 6



5 (a) Show that the given circuit acts as a differentiator. 8

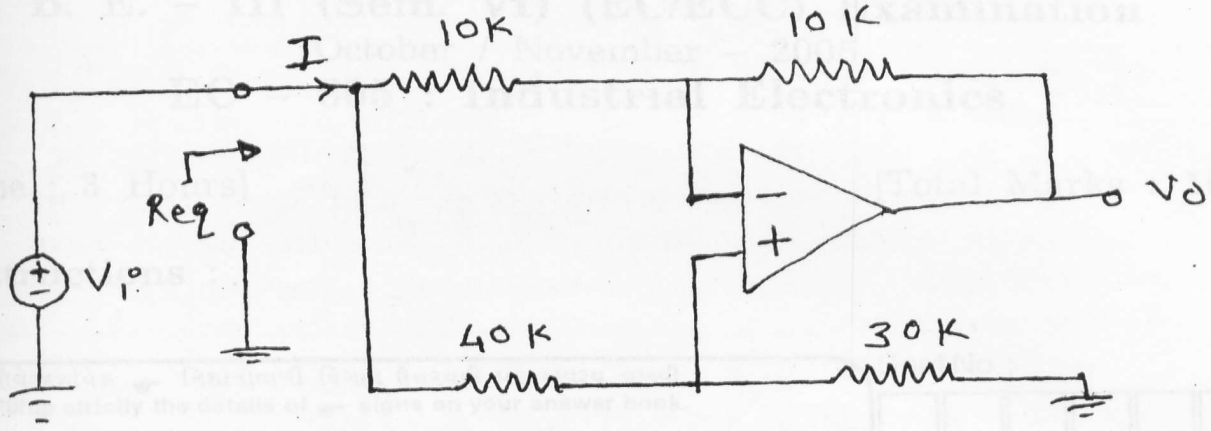


(b) State the basic conditions required for oscillations. Explain triangular wave generator circuit and derive equation for frequency of oscillation. How circuit can be modified if sawtooth waveform is required ? 8

OR

5 (a) Explain with necessary waveform monoshot using op-amp. Derive necessary equations and also discuss triggering circuit. 8

(b) Find Req. in the circuit of **figure** given below : 8



6 Attempt any **two** : 16

(a) Explain different applications of 555 timer IC as a Astable multivibrator.

(b) Design a circuit using 555 timer to divide the frequency of a train of pulses of 10 kHz by 3.

(c) Classify different methods for analog to digital conversion. Explain dual slop A to D convertor in detail.
