**BE V Semester Mid Term Examination (September 2009)**

| Course No. EC/COE/ICE 304 | Title: Linear Integrated Circuits |
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Time : 90 Minutes Max. Marks : 20

Notes:

- In all, **five** questions are to be attempted. All carry equal marks.
- Part A is compulsory for all students from which **three** questions are to be attempted.
- COE/ICE students have to attempt **remaining two** questions from Part-B; (whereas ECE students will do the same from Part-C, however, there is no bar on COE/ICE students to attend the fourth and fifth questions from Part C if they so desire).
- Missing data/information, if any, may be assumed.

**Part –A**
**(Compulsory to ECE/COE/ICE students)**

Attempt any **three** from the following:-

[1] A scheme for realisation of a difference amplifier given by $V_0 = k(V_1-V_2)$ is shown in Fig. 1 Analysis the circuit to find an expression for K. Is the scheme valid for all positive values of k? If yes, design the circuit (i.e. indicate appropriate values for all resistors) for k=2. If no, suggest an alternative configuration using one or more op-amps.

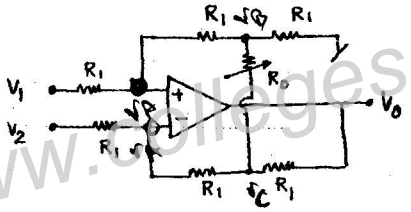


Fig. 1

[2] Verify that the circuit of Fig. 2 has $Z_{in}(s) = - sCR^2$. Draw an op-amp circuit, based upon the circuit of Fig. 2, which should have $Z_{in}(s)=+sCR^2$.

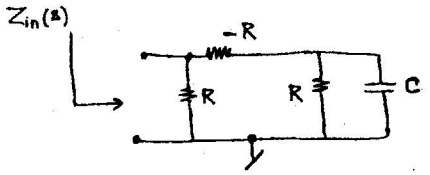


Fig. 2

[3] An inverting differentiator utilizes an ideal op-amp, a 10 kΩ resistor and a 0.1 $\mu$f capacitor. What is the frequency $f_o$ (in $H_z$) at which its input and output sine-waves have equal magnitudes? What is the output signal for 1-V (peak to peak) sinewave input of frequency equal to $10f_0$?

[4] Find the current gain $I_o/ I_{oin}$ of the current amplifier shown in Fig. 4, assuming ideal op-amp.

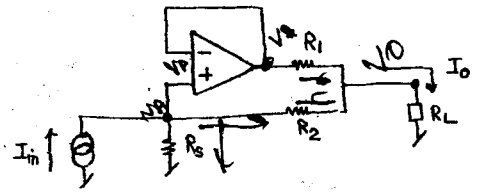


Fig. 4

**Part –B**
**(For COE/ICE students only)**

Attempt any **two** from the following:-

[5] Using ideal op-amps and resistors, devise a circuit for implementing the VCVS shown in Fig-5.

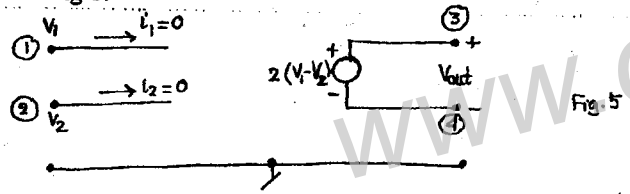


Fig. 5

[6] Using ideal op-amps, determine the expression for the input impedance $Z_{in}(s)$ of the circuit shown in Fig. 6 and show its passive equivalent.

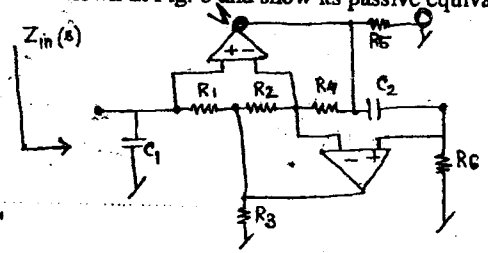


Fig. 6

[7] Consider the circuit of Fig. 7. Analyze the circuit to determine what values of $R_1$ and $R_2$ will give the transfer function as:

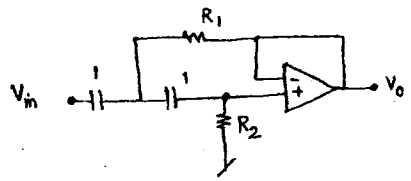


Fig. 7

$$T(s) = \frac{V_o}{V_{in}} = \frac{s^2}{s^2 + \frac{1}{Q_o}s + 1}$$

**Part –C**
**(For ECE students only)**

Attempt any **two** from the following:-

[8] Using the exponential relation between collector current $I_c$ and the base to-emitter voltage $V_{BE}$, derive an expression for the differential output current $Io = -(Io_1 - Io_2)$ as a function of differential input voltage $V_{id} = V_1 - V_2$ for the circuit of Fig. 8 and hence, determine the expression for the small signal transconductance $g_m$ of the circuit.

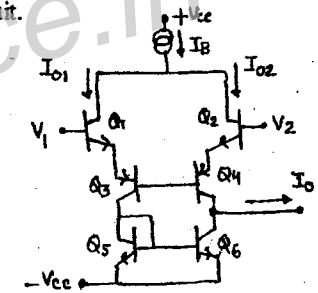


Fig. 8

[9] Find out the condition of oscillation and frequency of oscillation for the oscillator circuit shown in Fig. 9.

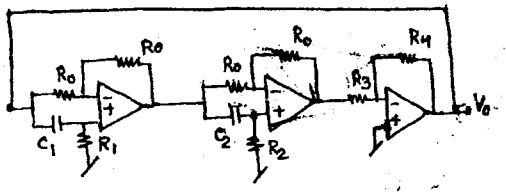


Fig. 9

[10] Explain the significance of input bias current as applicable to a bipolar op-amp. Give suitable example to illustrate how one can take care of the finite non zero input bias current by proper design in op-amp circuits.

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**FIFTH SEMESTER** **B.E. (ECE/COE/ICE)**

B.E. MID SEM. EXAMINATION, Sept. 2009

**EC/COE/IC-305 : I.O.M.E.**

Time: 1:30 Hrs. Max. Marks: 20

***Note:*** *Attempt any four questions.*
*Assume suitable missing data, if any.*

**1.** Describe the propositions and criticisms of neo-classical theory of management. Who developed it and what was the basis? Differentiate between contingency approach and systems approach of management. What was the contribution of Hawthorne Studies for the development of human resource?

**2.** Explain the advantages, limitations and suitability of following layouts:
**[a]** Product layout
**[b]** Process layout
**[c]** Fixed layout
**[d]** Cellular layout.

**3.** Differentiate among the following structures of the organization:
**[a]** Line type organization
**[b]** Line and staff organization
**[c]** Functional organization
**[d]** Matrix organization.

**4.** What were the contributions of Henry Fayol, Fredrick Taylor, and Max Weber to management theories.

**5.** The annual sales for an item is Rs.10,000. The ordering cost for procuring the item is Rs.25 per order. The carrying costs amount to 12.5% of average inventory. Determine
**[a]** E.O.Q.
**[b]** Number of orders per year
**[c]** Carrying cost per year
**[d]** Ordering cost per year, and
**[e]** The annual cost of acquiring and holding the inventory.

**6.** Differentiate between CPM & PERT. The precedence relationship for nine activities is given below. Find critical path and slack for different activities.

| Activity | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| Duration | 9 | 9 | 10 | 4 | 7 | 3 | 8 | 7 | 0 |
| Precedence | - | - | - | A | B | C | D,E,F | C | G,H |

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