Printed Pages: 2

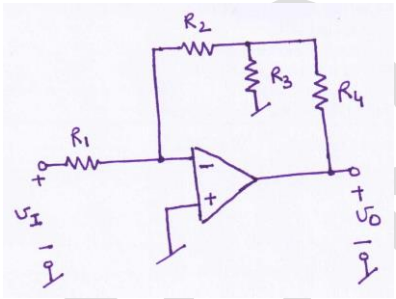
| Paper Code: EC-401 | Roll No. | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|

# B.Tech.
## (SEM IV) EVEN SEMESTER EXAMINATION, 2015-16
## ELECTRONIC CIRCUITS

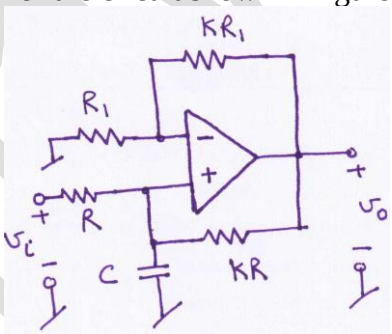
**[Time: 3 hrs.]** **[Max. Marks: 100]**

**Note-** Attempt All Questions. All Questions carry equal marks.

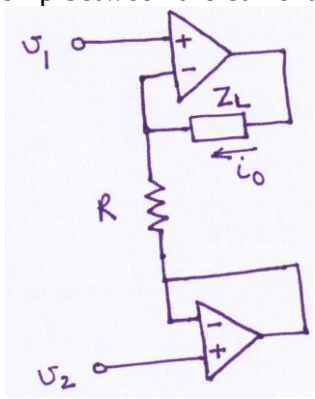
1. Attempt any **four** parts of the following: **[5x4=20]**
   (a) Using op-amp draw the practical circuits of VCVS and CCVS. Justify your answer.
   (b) Describe how the performance of an op-amp is affected by the finite open loop gain of amplifier.
   (c) Assume the op-amp to be ideal, derive an expression for the close-loop gain $v_O/v_I$ of the circuit shown in figure.




   (d) What is the transfer function for the circuit shown in figure?




   (e) The circuit in figure represents a current source that forces a current through the floating load impedance $Z_L$. Find the relationship between the current $i_O$ and the input voltage $v_1$ and $v_2$.




   (f) Draw the circuit diagram three op-amp instrumentation amplifier and drive the expression for the output voltage.

2. Attempt any **two** parts of the following: **[10x2=20]**

(a) MOSFET as an amplifier. Justify your answer using mathematical model.

(b) Explain channel length modulation and derive an expression for drain current influence of channel length modulation.

(c) Consider a common-source amplifier with source resistance and find the expression for the amplifier input resistance, overall voltage gain, output resistance, short circuit current gain.

3. Attempt any **two** parts of the following: **[10x2=20]**

(a) Discuss briefly the charge transport model in a BJT and show that in saturation condition the $\beta_{forced} < \beta_F$.

(b) Consider a common-base amplifier and find the expression for the amplifier input resistance, output voltage, voltage gain, open circuit voltage gain, overall voltage gain, output resistance, short circuit current gain.

(c) Discuss the various internal capacitances in detail for BJT. Draw the high frequency hybrid-π model of bipolar junction transistor. Drive the expression for the unit gain bandwidth is given as:

$$f_T = \frac{g_m}{2\pi(C_\pi + C_\mu)}$$

4. Attempt any **two** parts of the following: **[10x2=20]**

(a) Write the features of differential amplifier. Draw the circuit of MOS differential pair configuration and describe its common mode operation for the determination of over drive voltage.

(b) Drive the expression for differential gain of the MOS differential amplifier with differential input.

(c) Explain the small-signal operation of the BJT differential amplifier and show that the differential input resistance $R_{id}$ is given as:

$$R_{id} = (\beta + 1)(2r_e + 2R_E)$$

5. Attempt any **two** parts of the following: **[10x2=20]**

(a) Explain the working of a Wien Bridge oscillator. Derive an expression for the frequency of oscillations. What are the merits and demerits of such oscillator?

(b) Merits and demerits of negative feedback. Explain four basic feedback topologies.

(c) Write a short notes on any **two** of the following:

i. Slew rate and full power bandwidth.
ii. Early effect and Early voltage
iii. LC oscillators