

Roll No.: .....

# National Institute of Technology, Delhi

Name of the Examination: B. Tech 3<sup>rd</sup> year

Branch : ECE/EEE

Semester: V<sup>th</sup>

Title of the Course : IC Applications

Course Code: ECB-304

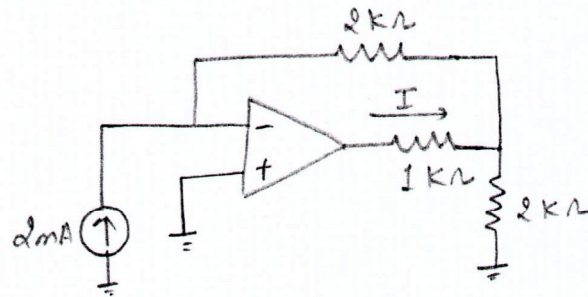
Time: 2 Hours

Maximum Marks: 25

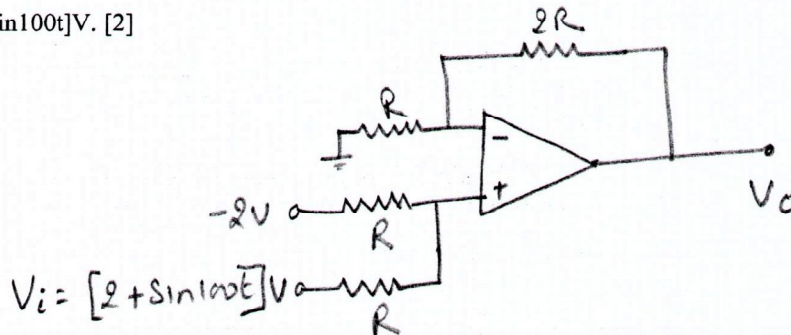
Note : Attempt all questions

Q1. The differential amplifier has two input terminals one is inverting and other is non-inverting. Take an example and show how the input terminals are classified as inverting and non-inverting. Also draw the transfer characteristics of the op-amp. [5]

Q2. Assume the op-amp as shown in figure is ideal. Find the current  $I$  flowing through resistor  $1k\Omega$ . [2]

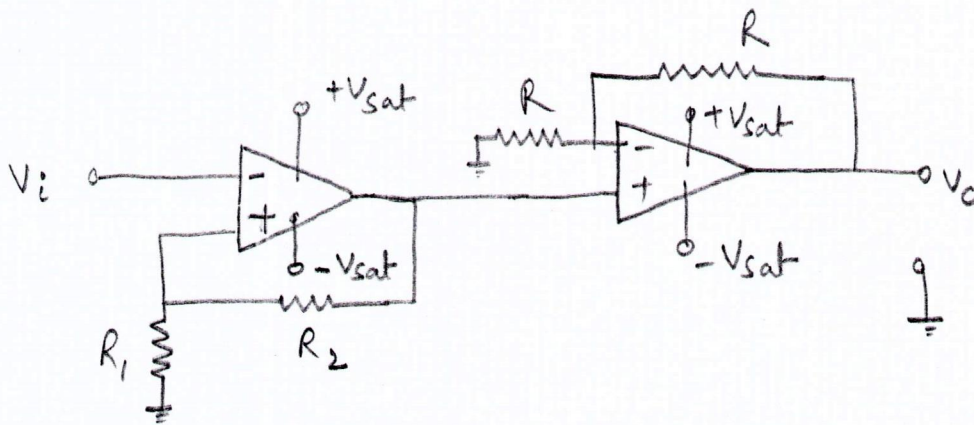


Q3. A non-inverting op-amp is shown in figure. Assuming op-amp is ideal, find the output voltage for an input  $V_i = [2 + \sin 100t]V$ . [2]



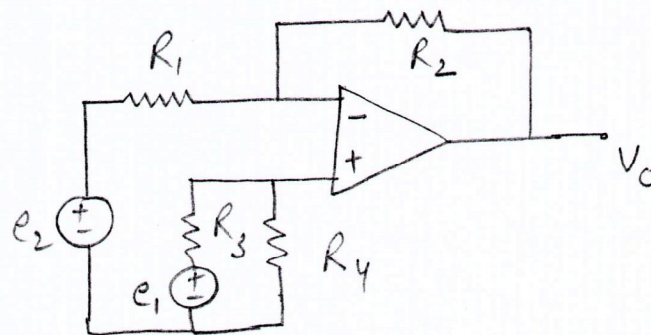
Q4. An operational amplifier circuit is shown in figure. Find the output voltage ( $V_o$ ) for a given input  $V_i$ . [2]

P.T.O.

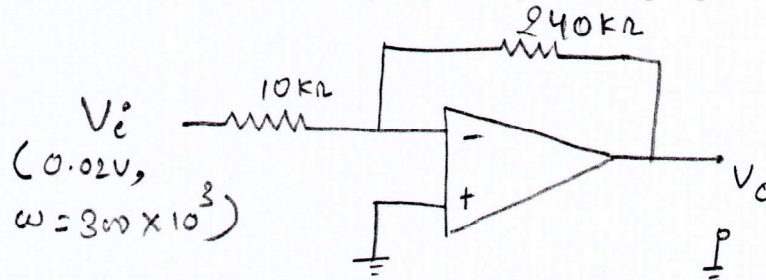


Q5. Consider an inverting amplifier circuit having gain of -100 is designed using an op-amp and two-resistors  $R_1=10\text{k}\Omega$  and  $R_2=1\text{M}\Omega$ . If the op-amp is specified to have input bias current of  $100\text{nA}$  and input offset current of  $10\text{nA}$  then find the output dc offset voltage. Assume bias current at inverting terminal is greater than bias current at non-inverting terminal. [3]

Q6. Find the condition for complete attenuation of common mode voltage at the output of the differential amplifier given in figure. [3]



Q7. Derive the maximum frequency at which op-amp can be operated without any distortion. For the given signal and circuit in figure, determine the maximum frequency that may be used. Op-amp slew rate is  $\text{SR}=0.5\text{ V}/\mu\text{sec}$ . [3]



Q8. Draw the transfer characteristic of the op-amp circuit shown in figure. [5]

