EASTERN UNIVERSITY, SRI LANKA

THIRD EXAMINATION IN SCIENCE - 2008/2009

FIRST SEMESTER (PROPER)

(FEBRUARY 2010)

PH 301 ELECTRONICS II

Time: 01 hour.

Answer ALL Questions

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1. Briefly explain the characteristics of an ideal Operational Amplifier.

   Why an open loop configuration of an op-amp is not suitable for linear applications?

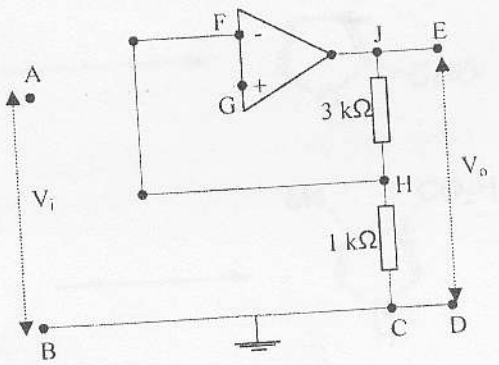
   Find the relationship between input and output voltages of the following Operational Amplifiers:

   (a) Integrator

   (b) Adder

   (c) Differentiator

   The figure shows an operational amplifier circuit using feedback.



   (a) Explain the advantages of using negative feedback in the circuit.

   (b) Using the letters on the circuit diagram, write the path of the negative feedback.

   (c) Write down the feedback factor β.

   (d) Op-amp in the diagram has a gain of 80,000, what will be the output voltage V_o when input voltage V_i is 0.2 V?

2. Draw the symbols and truth table for the following.
   (a) AND
   (b) OR
   (c) NAND
   (d) NOR

Prove the following Boolean identity.

(a) $A.B+\overline{A.C}+\left(A.\overline{B}.C\right).(A.B+C)=1$

(b) $\left(\overline{A}+B\right).(A+B+D).\overline{D}=B.\overline{D}$

(c) $(A+B).\left(\overline{A}+C\right).\left(\overline{B}+C\right)=C.(A+B)$

A student designed a logic circuit using only NAND gates in order to monitor the opening and closing of two doors. Logic 1 represents a closed door and logic 0 represents an open door. Logic 1 output is required when only one or the other of the doors is open. Write down the truth table for the circuit and draw the logic circuit using only NAND gates.