EASTERN UNIVERSITY, SRI LANKA

THIRD EXAMINATION IN SCIENCE - 2003/2004

FIRST SEMESTER

(NOV/DEC 2004)

REPEAT

PH301 - ELECTRONICS II
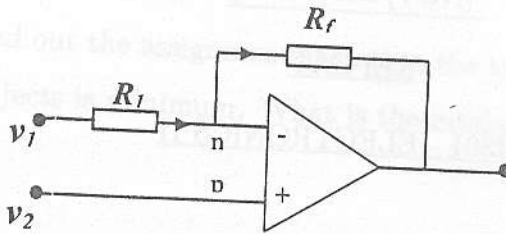
Time: 01 hour.

Answer __ALL__ questions

1.

(i) Describe the major properties of an ideal operational amplifier.

Draw circuits and derive the relation between the input and output signals of the followi
operational amplifier.

    (a) Inverting amplifier
    (b) Non-Inverting amplifier
    (c) Adder

(ii)

In the above circuit if $R_i = 1$ KΩ, $R_f = 10$ KΩ, $v_1 = 4$ V and $v_2 = 4.5$ V then
determine the output voltage and CMRR of the differential amplifier.

(iii) Solve the following simultaneous equations for x and y using operational amplifier.

$$a_1 x + b_1 y = c_1$$
$$a_2 x + b_2 y = c_2$$

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

Simplify the following expressions.

    (i) $Z = \left(\overline{A} + B\right)\left(A + B\right)$
    (ii) $Z = \left(\overline{A} + B\right)\left(A + B + D\right)\overline{D}$
    (iii) $Z = \overline{A}BCD + A\overline{B}\,\overline{C}\overline{D} + A\overline{B}\,\overline{C}D + A\overline{B}C\overline{D} + A\overline{B}CD + AB\overline{C}\overline{D} + AB\overline{C}D + ABC\overline{D} +$
    (iv) $Z = \overline{A}C\left(\overline{ABD}\right) + \overline{A}B\overline{C}\overline{D} + A\overline{B}C$
    (v) $Z = \left(A + B\right)\left(\overline{A} + C\right)\left(\overline{B} + C\right)$

A lamp in a room is to be operated from two switches, ones at the back door and one at th
The lamp is to be ON if the front switch is ON and the back switch is OFF, or if the fr
OFF and the back switch is ON. The lamp is to be OFF if both switch are OFF or if bo
ON. Let a HIGH (1) output represent the ON condition and a LOW (0) output repres
condition. Construct a logic circuit for this system.