

EASTERN UNIVERSITY, SRI LANKA

THIRD EXAMINATION IN SCIENCE - 2004/2005

First Semester (January/February 2006)

ELECTRONICS II - PH 301

Answer ALL questions.

Time: 1 hour

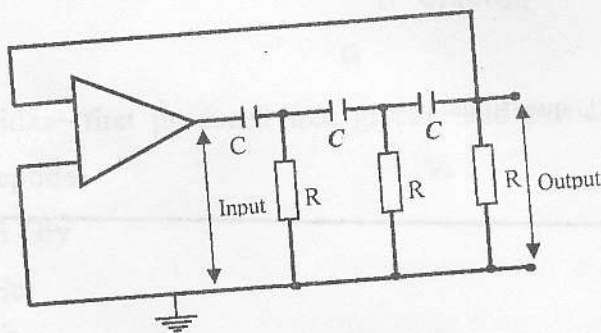
Q1. State what you understand by "positive and negative" feedback in electronics circuits and obtain an expression for the voltage gain of an amplifier with feedback. Write five advantages of negative feedback in electric circuits.

If V_i and V_o are the input and output voltage of the circuit given below

(i) show that the circuit will sustain oscillations if the voltage gain of the amplifier is

$$\left| \frac{V_i}{V_o} \right| = -\frac{1}{29}$$

(ii) show that its resonance frequency is $f_r = \frac{1}{2\pi RC\sqrt{6}}$



Q2. Draw the circuit symbol and truth table for

(i) an AND gate

(ii) a NOR gate

Using the Boolean algebra, show that

(i) $AB + \overline{AC} + \overline{ABC}(AB + C) = 1$

(ii) $\overline{AC} + \overline{AB} + \overline{ABC} + BC = \overline{AB} + C$

(iii) $\overline{ABC} + \overline{A}BC + A\overline{B}C + ABC = BC + AC + AB$

A simple audible warming system for a motorcar is activated (ie. $W=1$) when the engine is running (ie. $E=1$) and either the oil pressure is too low (ie. $P=0$) or the alternator is not charging (ie. $C=0$)

(i) By means of a truth table, or otherwise, show that the output of the warming system is given by $W = E\overline{P}C + E\overline{P}\overline{C} + E\overline{P}\overline{C}$

(ii) Show that the expression for W can be simplified to $W = E\overline{P} + E\overline{C}$

(iii) Suggest a logic circuit, using only NAND gates, to implement this warming system