# EASTERN UNIVERSITY, SRI LANKA

## THIRD EXAMINATION IN SCIENCE – 2013/2014

## FIRST SEMESTER (May & June 2016)

## PH 301 ELECTRONICS II



Time: 01 hour

Answer ALL Questions

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Q1.

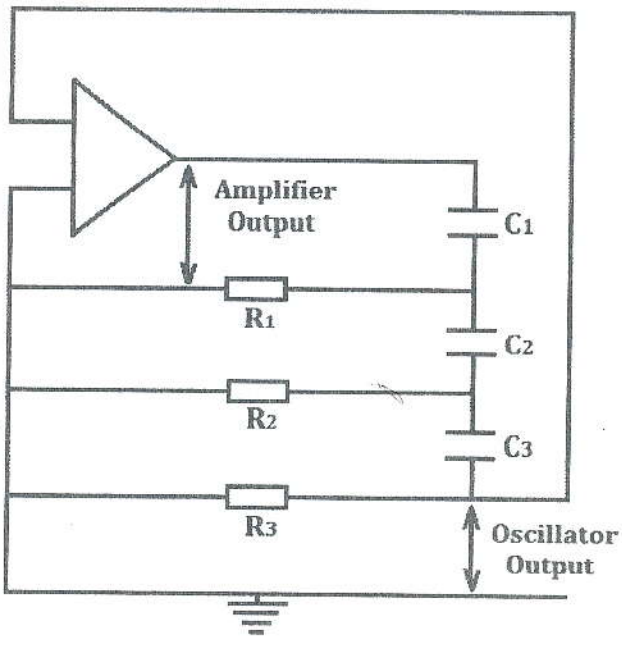
In an amplifier feedback circuit, show that closed-loop voltage gain is given by $A_f = \frac{A_0}{1-\beta A_0}$, where $A_0$ is the open-loop voltage gain of the amplifier and $\beta$ is the voltage feedback factor. Hence, describe "negative" and "positive" feedback. Hence explain how positive feedback can be used to produce oscillations.

As shown in figure below, RC-phase-shift circuit network is used to sustain oscillations with values $R_1 = R_2 = R_3 = 47k\Omega$ and $C_1 = C_2 = C_3 = 0.01\mu F$.

a) What should be the gain of the amplifier to sustain oscillations?

b) At what frequency oscillations are produced?

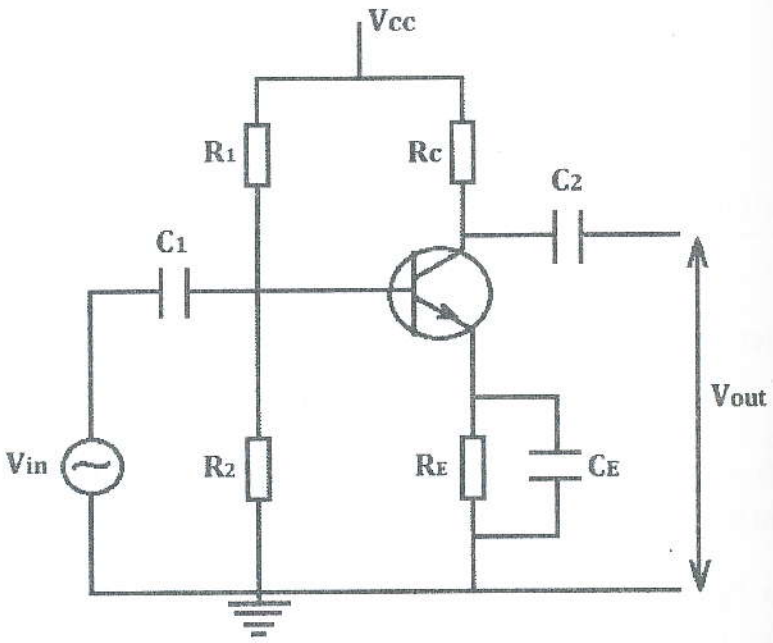
Prove any formula you may use.



Q2.

Define small signal hybrid parameters of a transistor.

Draw the hybrid equivalent circuit for the amplifier circuit shown below:




Using hybrid-parameter equivalent circuits derive expressions for pow
input impedance and output impedance of the transistor, and hence calc
respective values for the above quantities for a transistor with t
$h$-parameters:

$h_{ie} = 1500\ \Omega$ $\qquad$ $h_{fe} = 50$

$h_{re} = 4 \times 10^{-4}$ $\qquad$ $h_{oe} = 5 \times 10^{-5}\ \Omega^{-1}$

Hence, find the input and output impedance for the above amplifie
which have the following component values:

$R_1 = 47\ k\Omega,\ R_2 = 25\ k\Omega,\ R_C = 10\ k\Omega$, and $R_E = 7.5\ k\Omega$.

Assume the source resistance and the load resistance to be $r_s = 1$
$R_L = 30\ k\Omega$ respectively, and the reactance of the capacitors are negligi