TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

UNIVERSITY EXAMINATIONS 2016/2017

FOR THE DEGREE OF BACHELOR OF SCIENCE IN ELECTRICAL AND ELECTRONIC ENGINEERING

EEE 2210:ANALOGUE ELECTRONICS II

END OF SEMESTER EXAMINATIONS

SERIES: MAY, 2016

TIME: 2 HOURS

INSTRUCTIONS:

1. You should have the following for this examination:
   - Answer booklet
   - Non-Programmable Scientific calculator
2. This paper consists of **FIVE** questions
3. Answer **QUESTION ONE** and other TWO Questions.
4. Do not write on the question paper.
5. ***This paper consists of FOUR printed pages.***

Question ONE

(a) Consider Fig.Q1, CE circuit. Draw:

(i) DC load line

(ii) AC load line

(iii) Determine the maximum peak-to-peak signal that can be obtained

(14.5 marks)

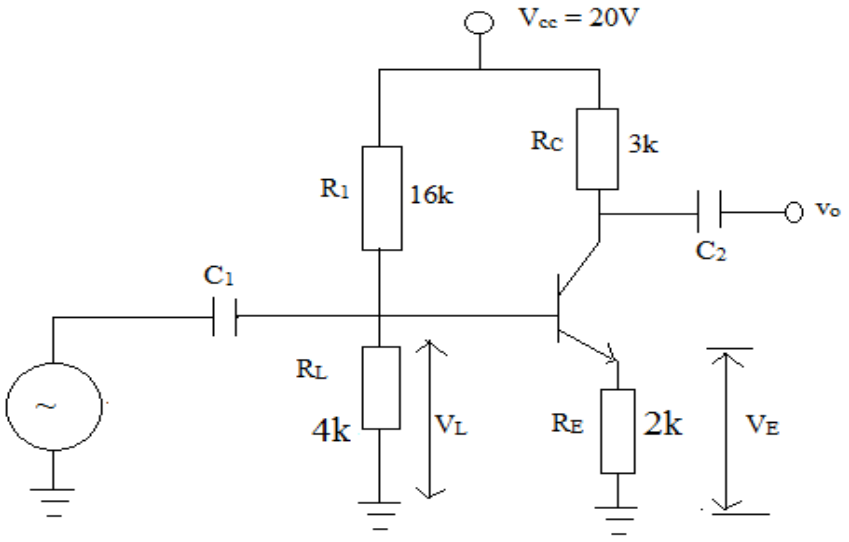

Fig. Q1

(b) (i) State at least **THREE** reasons for the popular use of h-parameters.

(ii) A transistor used in CE arrangement had the following set of h-parameters when the d.c operating point is:

V_{CE} = 15V and I_C = 1mA.

H_{ie} = 2500Ω, $h_{oe} = 10^{-4}$mho, $h_{ie} = 10^{-3}$, h_{fe} = 40

The as load line seen by the transistor is r_L= 500Ω. Determine the Approximate values using reasonable approximation of the following:

(I) Input impedance

(II) Current gain

(III) Voltage gain and comment on its sign.

(c) (i) Discuss negative feedback in amplifiers.

(ii) Consider an amplifier of 60dB gain, output impedance $f_o = 10k\Omega$. It is required to modify its output impedance to 500Ω by applying negative feedback. Calculate:

(I) The value of the feedback.

(II) The percentage change in the overall gain for 10% change in the gain of the interval amplifier.

Question TWO

(a) For the transistor amplifier show in Fig. Q2, h_{ie} = 1.5kΩ, h_{fe}= 100, h_{re} = 3 x 10^{-4}, h_{oe} = 25μmhos = $\frac{1}{40k}$. Calculate:

(i) A_i
(ii) R_i
(iii) A_v
(iv) x/o

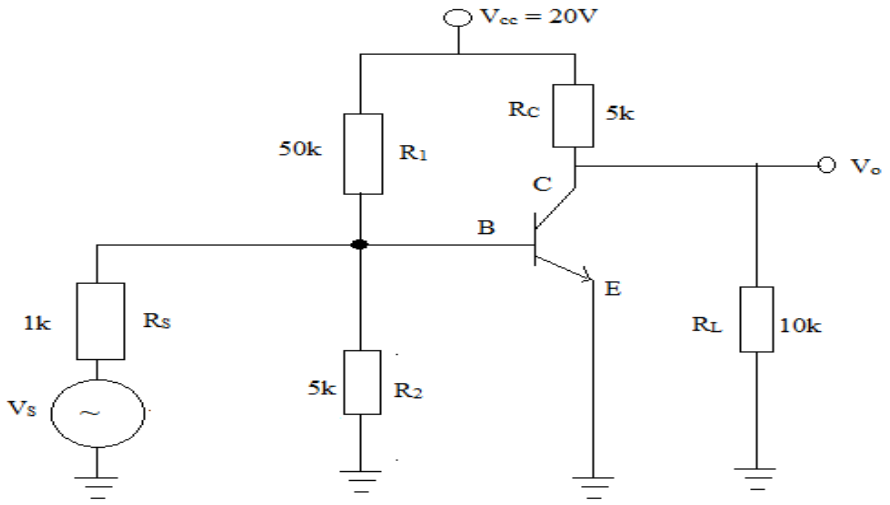

Fig. Q2

(c) Consider a Silicon Controlled Rectifier (SCR).

(i) Draw the circuit symbol

(ii) Briefly describe the principle of operation.

(3.5 marks)

Question THREE

(a) Name the **FOUR** basic arrangements for using negative feedback and the block diagrams to differentiate them.

(8 marks)

(b) With the aid of a block diagram show how negative feedback can increase the input impedance of an amplifier.

(4 marks)

(c) Consider the amplifier of 60dB. A negative feedback of $\beta = 0.005$ is applied. Determine the change in overall gain of the feedback amplifier if the interval amplifier is subjected to a gain reduction of 10%.

(8 marks)

Question FOUR

(a) (i) Draw the circuit of a generalized FET amplifier with a source resistance R_s and a draw resistance R_d.

(ii) Draw the small-signal equivalent circuit of (a)(i).

(iii) Determine the Thevenin's equivalent circuit looking into the drain at low frequency.

(11.5 marks)

(b) Define:

(i) Transconductance, gm
(ii) Dain resistance, rd
(iii) Pinch off voltage
(iv) Amplification factor, μ

(4 marks)

(c) In an FET amplifier, the load resistance $R_L = 10k\Omega$, $RG = 1m\Omega$, $R_s = 1k\Omega$, $C_s = 25\mu F$, $\mu = 25$, $r_d = 80k\Omega$. If the input signal voltage is 0.1V at a frequency of 1μHz, find the output signal voltage of the amplifier.

(4.5 marks)

Question FIVE

(a) Consider a triac:

(i) Draw the basic structure diagram
(ii) Draw the circuit symbol.
(iii) I-V characteristics

(iv) Briefly describe the principle of operation

(v) State at least two applications

(14.5 marks)

(b) A given silicon UJT has an inter-base resistance of 8kΩ, R_{BI} = 5kΩ, with I_E = 0, find:

(i) UJT current if V_{BB} = 30V VE is less V_P

(ii) Z and standoff voltage

(iii) Peak point voltage, V_p

(5.5 marks)