INTI
INTERNATIONAL COLLEGE PENANG (507232-U)
LAUREATE INTERNATIONAL UNIVERSITIES

FINAL
Examination Paper

(COVER PAGE)

Session : AUGUST 2016

Programme : DIPLOMA IN ELECTRICAL AND ELECTRONIC ENGINEERING

Course : EEE 1105: CIRCUIT THEORY & ELECTRONIC DEVICES

Date of Examination : 6 December 2016 (Tuesday)

Time : 11:00am – 1:00pm Reading Time : Nil

Duration : 2 Hours

Special Instructions :

This paper consists of **SIX (6)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Materials permitted :

Non-Programmable Scientific Calculator

Materials provided :

Nil

Examiner(s) : **Shalyn Lim Sheue Hui**

Moderator : **Kevin Tan**

*This paper consists of 10 printed pages, including the cover page.*

INTI INTERNATIONAL COLLEGE PENANG

DIPLOMA IN ELECTRICAL AND ELECTRONIC ENGINEERING PROGRAMME (DEEI)

EEE 1105: CIRCUIT THEORY & ELECTRONIC DEVICES
FINAL EXAMINATION: AUGUST 2016 SESSION

Instructions: This paper consists of SIX (6) questions. Answer any FOUR (4) questions in the answer booklet provided. All questions carry equal marks.

Question 1

(a) With reference to Figure Q1(a) , calculate the

(i) total resistance between node A and node E, $R_{AE}$.

(3 marks)

(ii) total resistance between node B and node E, $R_{BE}$.

(3 marks)

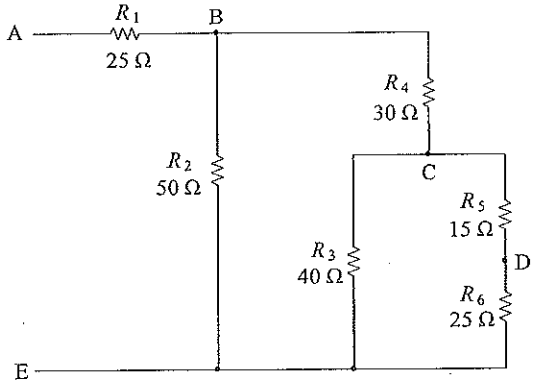



Figure Q1(a)

(b) Refer to Figure Q1(b), calculate $V_{ab}$ using nodal analysis.

(5 marks)

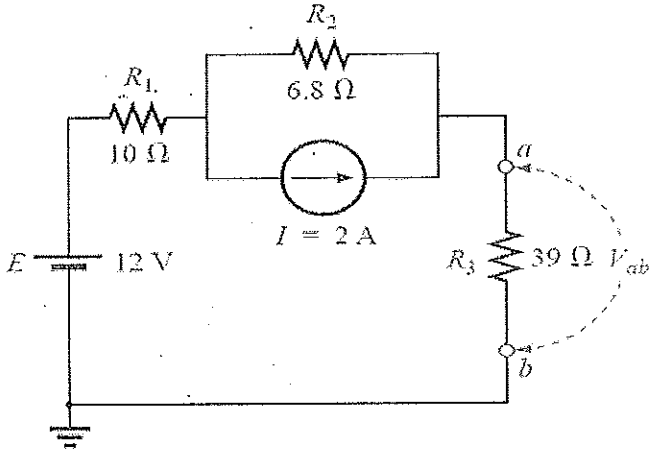



Figure Q1(b)

(c) Refer to Figure Q1(c), calculate the current flow through $R_3$ using superposition approach.

(7 marks)

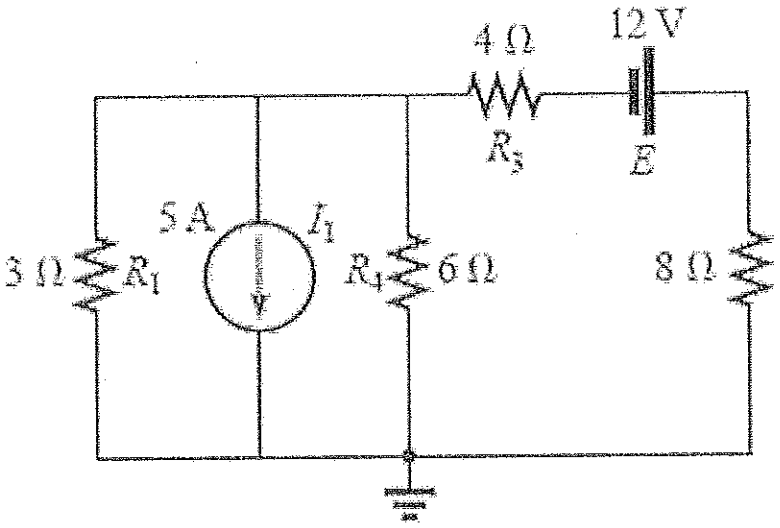



Figure Q1(c)

(d) Find the Thevenin's resistance for the network of Figure Q1(d) and determine maximum power transferred to a load $R_L$.

(7 marks)

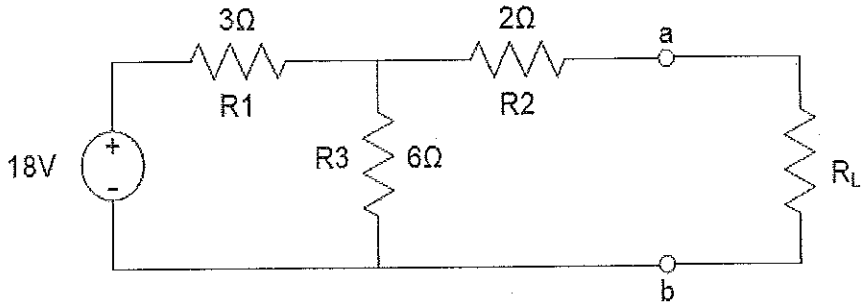



Figure Q1(d)

Question 2

(a) For the oscilloscope display in Figure Q2(a),determine the

(i) frequency of waveform *i*.

(2 marks)

(ii) Vrms value for waveform e.

(2 marks)

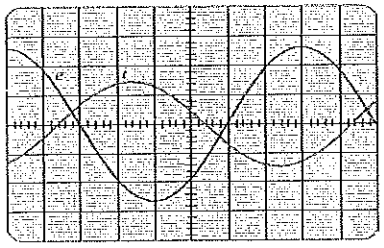



Figure Q2(a)

(b) Consider the situation shown in Figure Q2(b). Here, a voltage source delivers power to two loads connected in parallel.

(i) Find the active power, reactive power, and power factor for the source.

(7 marks)

(ii) Find the phasor current I.

(3 marks)

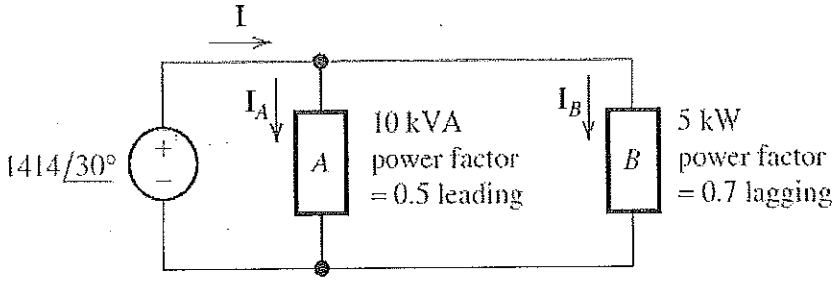



Figure Q2(b).

(c) For the network of Figure Q2(c),given the rms of the supply voltage is $100\ \angle 0^{o}\ V$ determine
[Note: answer in polar form]

(i) the total admittance $Y_T$.

(4 marks)

(ii) the voltage $V_1$ and $V_2$ .

(4 marks)

(iii) the current $I_3$.

(3 marks)

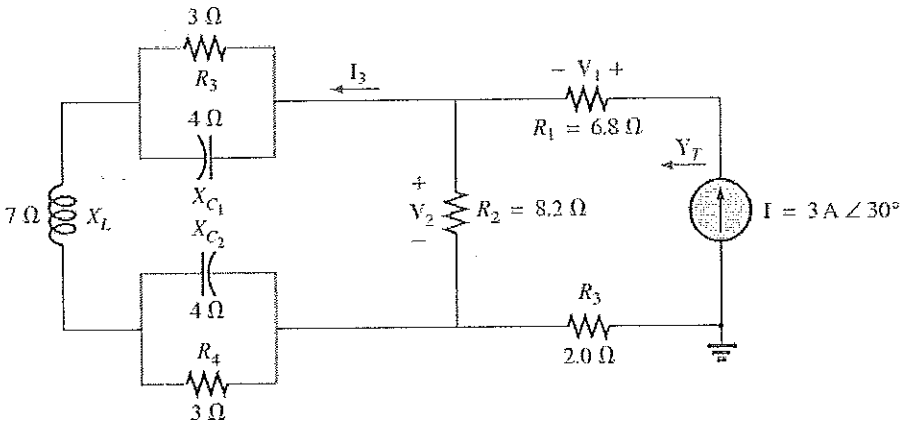



Figure Q2(c)

Question 3

(a) Give one example of the P-Type impurity atoms and sketch the impurity atoms in a silicon crystal structure.

(4 marks)

(b) For Figure Q3(b), calculate $V_{OUT}$ and the current flowing through the diode D1. Assume practical models for all the diodes.

(4 marks)

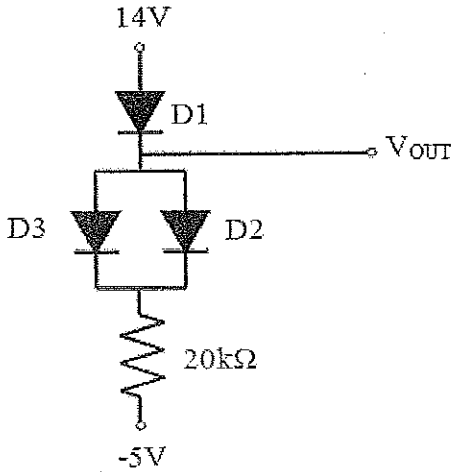



Figure Q3(b)

(c) Figure Q3 (c) shows the full wave rectifier circuit with the input sine wave.

(i) Calculate the average output voltage after the rectifier, $V_{AVG}$.

(4 marks)

(ii) Determine the value of PIV.

(2 marks)

(iii) Sketch the output voltage at RL with proper labeling.

(2 marks)

(iv) Calculate the average diode current.

(4 marks)

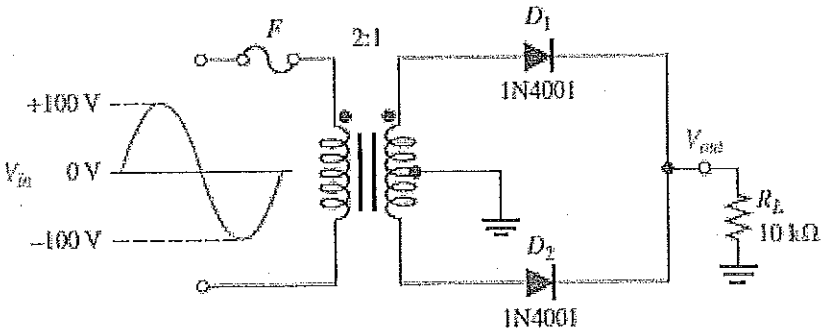



Figure Q3(c)

(d) Design a clipper circuit to perform the function indicated in Figure Q3(d). Use practical silicon diodes for your design.

(5 marks)

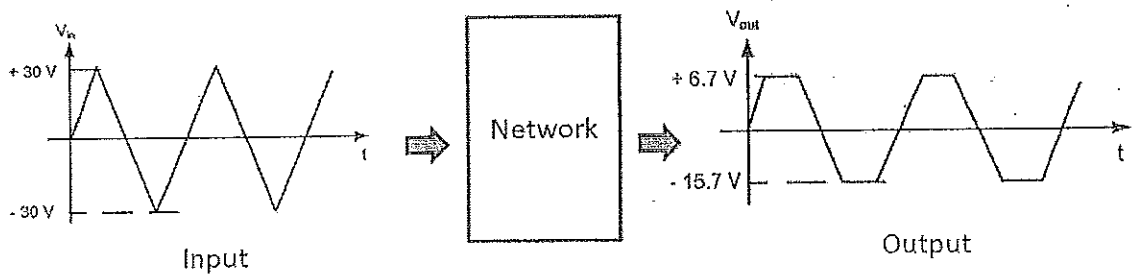



Figure Q3(d)

Question 4

(a) What is a Q-point in BJT network? Determine the Q-point with β=200 for the circuit in Figure 4(a) and draw the dc load line along with the labeling of saturation and cut off point. Give one of the applications using the BJT amplifier.

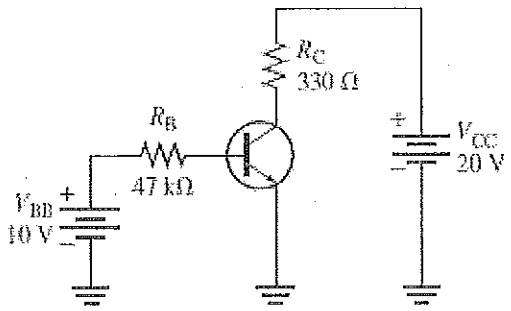



Figure 4 (a)

(8 marks)

(b) Determine $I_B$,$I_C$ and $V_{CE}$ for the network shown in Figure 4(b) with β=100

(7 marks)

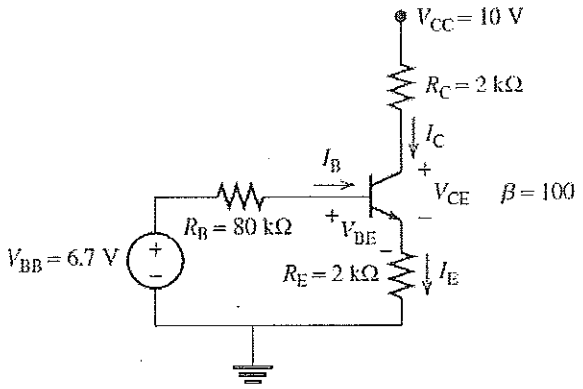



Figure 4(b)

(c) Given the characteristic shown for the transistor of Figure Q4(c), if $R_C$ is twice the value of $R_E$, determine the following:

(i) $V_{CC}$

(1 marks)

(ii) $R_C$ and $R_E$

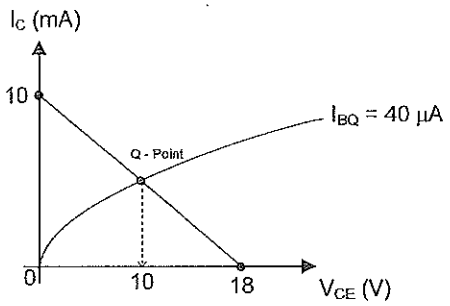
(4 marks)

(iii) $\beta$

(3 marks)

(iv) $R_B$.

(2 marks)



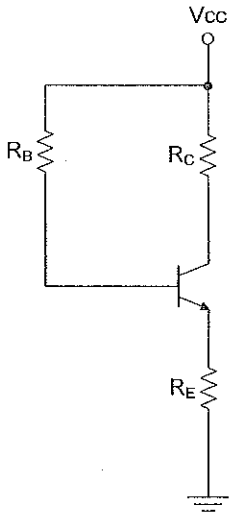




Figure Q4(c)

Question 5

(a) Differentiate pinch off voltage and cut off voltage for a JFET.

(4 marks)

(b) Determine $I_{DQ}$, $V_{GSQ}$, and $V_{DS}$ for the network shown in Figure Q5(b) using mathematic approach.

(14 marks)

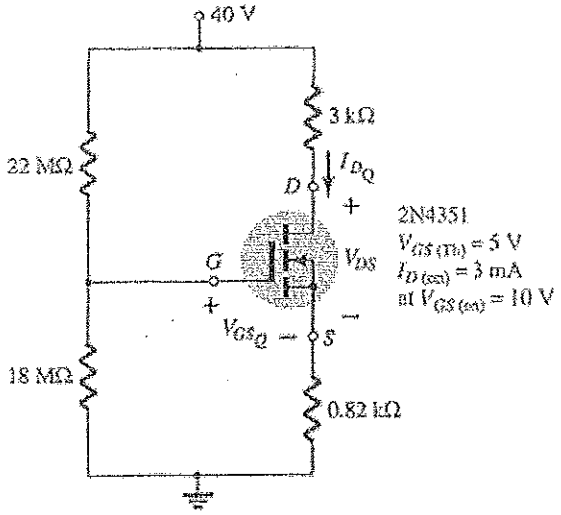



Figure Q5(b)

(c) Determine $I_D$ and $V_{GS}$ for the JFET with voltage-divider bias in Figure Q5(c), given that for this particular JFET the parameter values are such that $V_D$ =7V.

(7 marks)

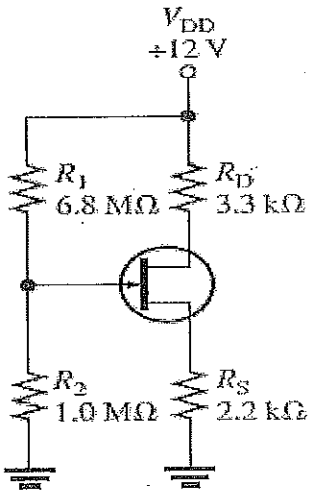



Figure Q5(c)

Question 6

(a) Refer to circuit in Figure Q6(a) calculate

(i) the currents $I_1$, $I_2$, and $I_3$.

(7 marks)

(ii) the voltages $V_1$ and $V_2$.

(4 marks)

(iii) the power dissipation across 12kΩ resistor and the overall network power.

(4 marks)

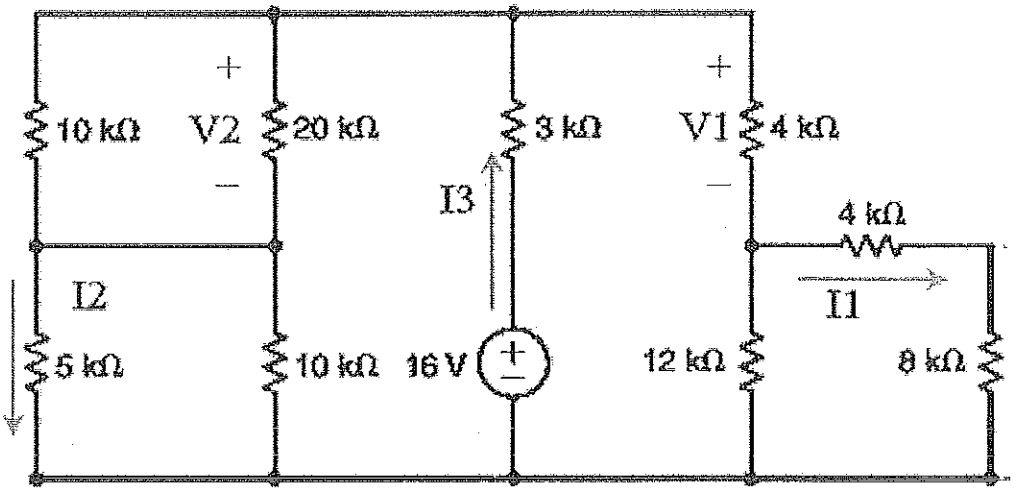



Figure Q6(a)

(b) The circuit as shown in Figure Q6(b) contains two silicon diodes D1 and D2. Calculate the values of their respective diode currents, $I_{D1}$ and $I_{D2}$.

(5 marks)

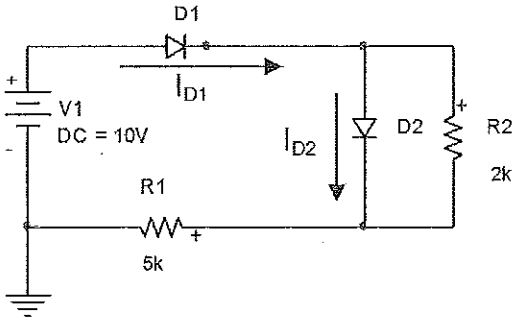



Figure Q6(b)

(c) The specifications of the n-channel E-MOSFET are given as: $V_{GS(Th)} = 4$ V and $I_{D(on)} = 4$ mA at $V_{GS(on)} = 6$ V, determine k and write the general expression for the drain current, $I_D$. Sketch the transfer characteristics for this device.

(5 marks)

--THE END--

*<EEE1105/(F)/AUGUST16/ Shalyn Lim 21/09/16*