UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF MARINE ENGINEERING TECHNOLOGY

FINAL EXAMINATION
JANUARY 2016 SEMESTER

COURSE CODE	:	LEB10603
COURSE NAME	:	ANALOGUE ELECTRONICS
PROGRAMME NAME (FOR MPU: PROGRAMME LEVEL)	:	BACHELOR OF ENGINEERING TECHNOLOGY IN MARINE ELECTRICAL AND ELECTRONICS
DATE	:	
TIME	:	
DURATION	:	3 HOURS

INSTRUCTIONS TO CANDIDATES

NOTE: Instructions below to be edited to suit the needs of the intended course/examination.

1. Please CAREFULLY read the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. This question paper consists of TWO (2) sections; Section A and Section B.
4. Answer ALL questions in Section A. For Section B, answer THREE (3) questions.
5. Please write your answers on the OMR answer script and answer booklet provided.
6. Answer all questions in English language ONLY.

THERE ARE 5 PAGES OF QUESTIONS, INCLUDING THIS PAGE.

SECTION B (Total: 40 marks)

INSTRUCTION: Answer ALL questions.
Please use the answer booklet provided.

Question 1

(a) Describe how DC current gain (β_{DC}) varies with temperature and collector current. *(Course Learning Outcome: 1)*

(7 marks)

(b) Discuss the operation of light-operated relay circuit as an example of phototransistor application. *(Course Learning Outcome: 1)*

(13 marks)

Question 2

Analyse the circuit shown Figure 2A and if the multistage is driven by 80Ω, $50\mu V$ source and the second stage is loaded with an $R_L = 20k\Omega$, determine:

i. voltage gain of each stage

(12 marks)

ii. overall voltage gain

(5 marks)

iii. express the gains found in Question (i) and Question (ii).

(3 marks)

(Course Learning Outcome 2)

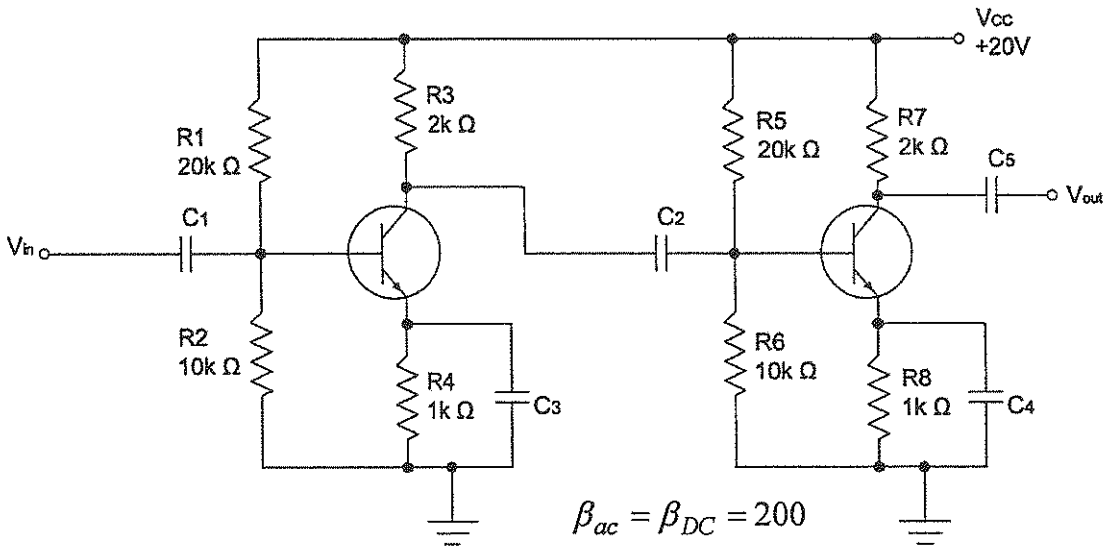
Vcc
+20V
R1
20k Ω
R3
2k Ω
R5
20k Ω
R7
2k Ω
C5
Vout
Vin
C1
C2
R2
10k Ω
R4
1k Ω
C3
R6
10k Ω
R8
1k Ω
C4
$\beta_{ac} = \beta_{DC} = 200$

Figure 2A

SECTION B (Total: 60 marks)

INSTRUCTION: Answer THREE (3) questions ONLY.
Please use the answer booklet provided.

Question 3

Develop an alarm system circuit for detecting forced entry into a building using transistor switches. The alarm system will accommodate four zones with any number of openings. It can be expanded to cover additional zones. For the purpose of this application, a zone is one room in a house or other building. The sensor used for each opening can be mechanical switch, a magnetically operated switch, or an optical sensor. Detection of intrusion can be used to initiate an audible alarm signal and/or to initiate transmission of a signal over the phone line to a monitoring service. You are required to explain in detail the process of circuit construction.
(Course Learning Outcome 1 & 2)

(20 marks)

Question 4

Class AB power amplifier application in the PA system are simplified using the block diagram as shown in Figure 4A. In this application, the power amplifier is constructed using a circuit in Figure 4B and assumed audio preamp output voltage is 10Vpp. Analysed the amplifier circuit given (Figure 4B) in order to identify the following information:

i. The DC parameters $V_{B(Q1)}, V_{B(Q2)}, V_E, I_{CQ}, V_{CEQ(Q1)}, V_{CEQ(Q2)}$.

(9 marks)

ii. Determine the power delivered to the 50Ω speaker.

(4 marks)

iii. Sketch the load line for the npn transistor and label the saturation current and show the Q-point.

(7 marks)

(Course Learning Outcome 2)

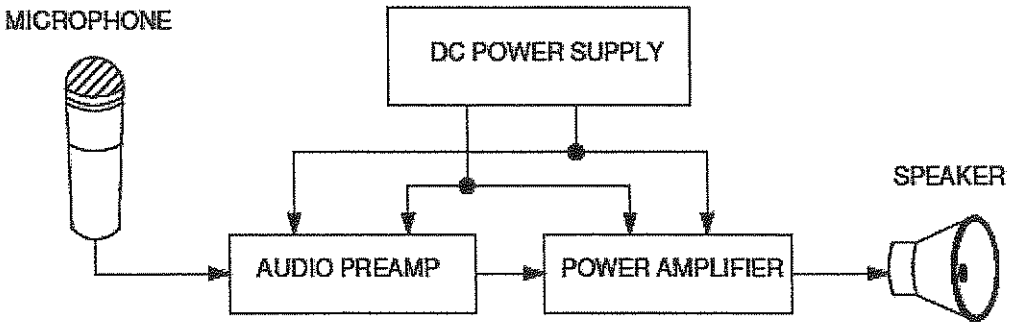

Figure 4A

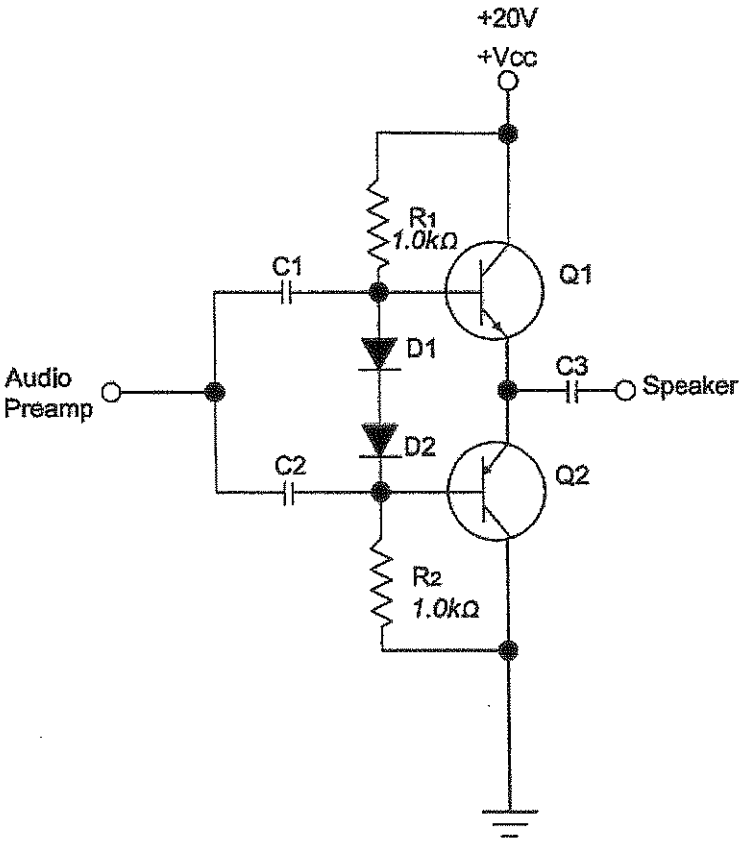

Figure 4B

Question 5

Design a circuit using an n-channel E-MOSFET with the following datasheet specifications: $I_{D(on)} = 500mA@V_{GS} = 10V$ and $V_{GS(th)} = 1V$. Use a +15V dc supply voltage with voltage divider bias. The voltage at the drain with respect to ground is to be +10V. The maximum current from the supply is to $25mA$.

(Course Learning Outcome 1 & 2)

(20 marks)

Question 6

(a) Compare a practical operational amplifier with ideal operational amplifier.

(6 marks)

(b) Compare the general effects operational amplifier with negative feedback and without negative feedback.

(7 marks)

(c) Determine the output voltage waveform as shown in Figure 6A.

(7 marks)

(Course Learning Outcome 1 & 2)

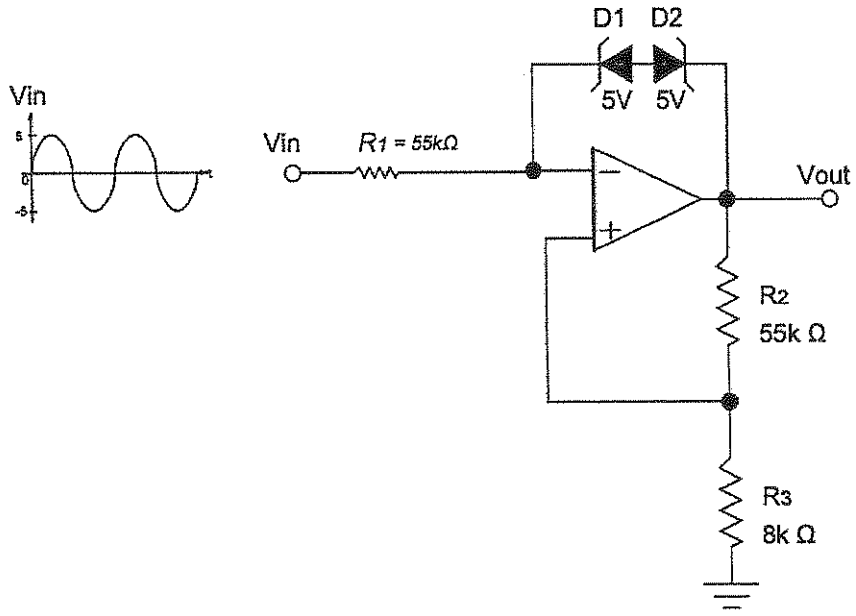

Figure 6A

END OF EXAMINATION PAPER