TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MEDICAL ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN MEDICAL ENGINEERING

EHL2202: MEDICAL ELECTRONICS II

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: SEPTEMBER 2018

TIME: 2HOURS

DATE: Pick Date Sep 2018

Instructions to Candidates
You should have the following for this examination
-*Answer Booklet, examination pass and student ID*
This paper consists of **FIVE** questions. Attempt any THREE questions.
Do not write on the question paper.

QUESTION ONE

a) Draw a CE class A RC coupled power rectangle and indicate the following regions;

   i)   Total power (covered) supplied to the circuit from the V_{CC} battery

   ii) Power lost as heat in the load resistor

   iii) Power delivered to transistor

   iv) a.c power cross Re (a.c. power output)

   v)   Power dissipated by collector region of transistor.

   (14 marks)

b) State TWO merits and ONE demerit of a RC coupled over transformer coupled CE class A amplifier.

   (3 marks)

c) A class A amplifier operates from a 20.3V power source, draws a no signal current of 4.5 A and feeds a 45 Ω load through a transformer of $N_2/N_1=3.16$. Find

   i)   Whether the amplifier is properly matched for maximum power transfer

   ii) maximum ac signal power output

iii) Maximum dc power input

iv) Conversion efficiency at maximum signal input.

(13 marks)

QUESTION TWO

a) Explain the following terms as used in amplifier

   i) Distortion

   ii) Noise

   iii) Bandwidth

   iv) Cut-off frequency

(8 marks)

b) The signal input to a small-signal amplifier consists of 60 μW of signal power and 0.8 μW of noise power. The amplifier generator on internal noise power of 40 μW and has a gain of 25 dB.

Calculate.

   i) Input S/N

   ii) Out S/N

   iii) Noise factor

   iv) Noise figure

(12 marks)

QUESTION THREE

a) With the aid of a diagram, explain the principle of operation of a push pull class B amplifier

(10 marks)

b) A microphone delivers 20 mV to the 300 Ω input of an amplifier. The a.c. power delivered to a 16 Ω speaker is 18 W. Calculate the amplifier's power gain.

(6 marks)

c) Explain **TWO** main causes of amplifier gain variation with frequency.

(4 marks)

QUESTION FOUR

a) With the aid of a diagram, explain the principle of operation of a complementary symmetry push-pull class-B amplifier.

(10 marks)

b) For the RC-coupled circuit of fig 1, calculate the lower cut-off frequency

   i) at C_1
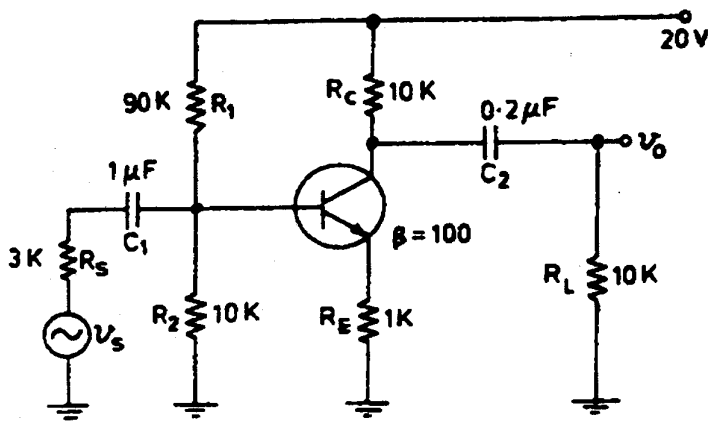
   ii) at C_2

iii) for the amplifier.

(10 marks)

Fig 1

QUESTION FIVE

a)

i) Sketch the gain versus frequency response curve of an amplifier

ii) Explain the **THREE** regions of the curve in (i)

(10 marks)

b) Calculate the upper cut-off frequency of the CE amplifier in fig 2 given the input wiring capacitances $C_{wir} = 40pF$, $C_{be} = 8_pF$, $C_{bc} = 10pF$ and $\beta = 100$

(10 marks)