TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MEDICAL ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN MEDICAL ENGINEERING

EHL 2104 : **MEDICAL ELECTRONICS I**

END OF SEMESTER EXAMINATION

SERIES: APRIL 2016

TIME: 2HOURS

DATE:10May2016

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 question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question ONE

a) i. Explain any **THREE** typical resistor parameters which are normally specified in a data book **(6 marks)**

ii. State any **TWO** advantages and disadvantages of carbon resistors **(4marks)**

b) i. Explain briefly the following terms as used in semiconductor theory:

I. Doping

II. Extrinsic semiconduction **(4 marks)**

ii With the aid of diagrams explain how the following is achieved:

I. Forward biased P-N junction

II. Reverse biased P-N junction **(8 marks)**

c) i. With the aid of a circuit diagram explain the operation of a half- wave rectifier circuit.

(6marks)

ii. State any **TWO** advantages of a full wave rectifier over half wave rectifier **(2 marks)**

Question TWO

a) i. State three configurations of bi-polar junction transistor amplifier

ii. With the aid of a diagram explain the connection and operation of forward biased NPN transistor. **(10 marks)**

b) i. The figure **Q2** below uses germanium transistor. Given that h_{FE} is 49 and I_c =2mA. Calculate:

I. Base current I_B

II. The value of R_B

III. The value of I_E **(6 marks)**

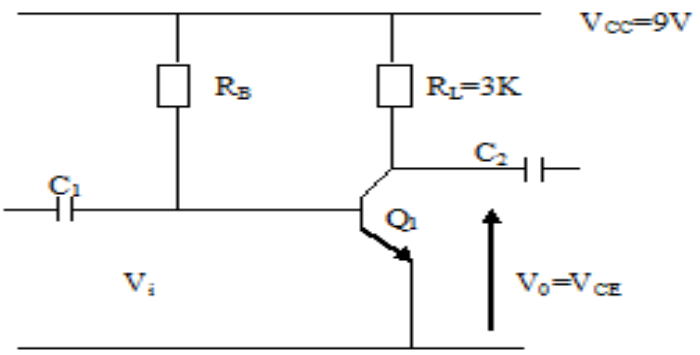

Fig. Q2

ii. State any **FOUR** merits of using emitter feedback circuit **(4 marks)**

Question THREE

i) A 6.8 voltage zener diode can be considered as a linear resistance of 10 Ω in the breakdown region. It is used in a simple voltage stabilizing circuit to stabilize a load voltage of 7V from 12V supply. If the load 2.5KΩ.

I) Draw a suitable circuit diagram

II) Calculate the value of the series resistor Rs **(6 marks)**

ii. Give any **TWO** practical applications of each of the following

I. Ordinary P-N diode

II. Zener diode **(4 marks)**

a) With the aid of a suitable diagram explain the operation of a π filter **(10 marks)**

Question FOUR

a) i) With the aid of a circuit diagrams explain how a capacitor can be used as a coupling and decoupling device

ii). State **FOUR** applications of capacitors **(10 marks)**

b) i) Define the following passive components:-

I. Thermistor

II. Inductor **(2 marks)**

ii). With the aid of Resistance/Temperature characteristics curves describe the two basic types of thermistors **(8 marks)**

Question FIVE

a) i. Explain the following terms as used in diode characteristics

I. Peak inverse voltage

II. Avalanche breakdown voltage **(4 marks)**

ii.With the aid of a circuit diagram explain the operation of a full wave centre tap transformer rectifier

(6 marks)

iii. Derive an expression of the V_{mean} of the full-wave rectifier circuit **(6 marks)**

b) Explain briefly any **TWO** types of electron emission **(4marks)**