TECHNICAL UNIVERISTY OF MOMBASA

KWALE CAMPUS

Faculty of Engineering & Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLGY (DICT II)

EEE 2135: ELECTRONICS

END OF SEMESTER EXAMINATION
SERIES: OCTOBER 2014
TIME: 2 HOURS

Instructions to Candidates:
You should have the following for this examination
- *Answer Booklet*

This paper consists of **FIVE** questions.

Attempt question **ONE (Compulsory)** and any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **FOUR** printed pages

Question One (Compulsory)

a) (i) With the aid of a diagram, explain the operation of an electronic capacitor.
(ii) For two capacitors connected in parallel show that total capacitance, CT is given by:

$$C_T = C_1 + C_2$$

(10 marks)

b) For the circuit shown in figure 1, calculate:
(i) V_{AB}
(ii) V_{BA}
(iii) V_{AC}
(iv) V_{CD} **(10 marks)**

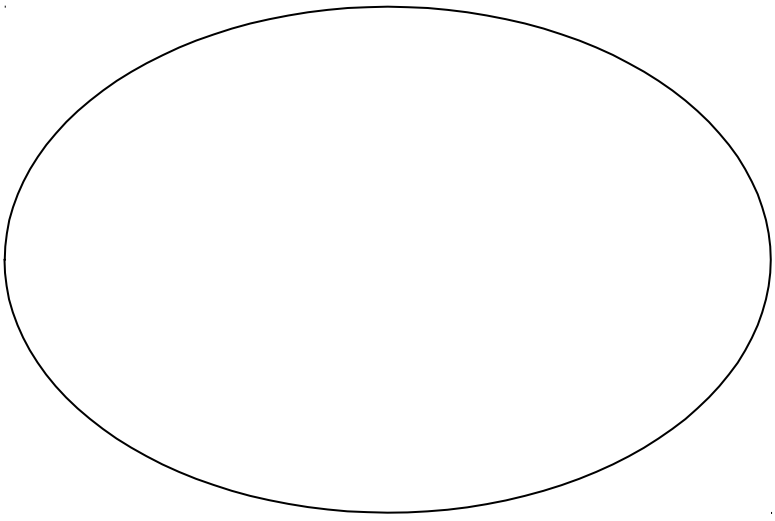
Question Two

a) (i) Explain any TWO factors that affect the Q point of a transistor amplifier.
(ii) State how the factors in a(i) can be minimized. **(4 marks)**

b) Explain the term 'thermovunaway as applied to semiconductor diode. **(5 marks)**

c) (i) For the circuit shown in figure 1, determine the following:
(i) Collector curleur **(7 marks)**
(ii) V_{R1}
(iii) V_{CE}
(iv) I_B (Assume V_{BE} = 0.6V and B = 100)

(ii) Calculate the new value of c(i) if the resistor of 1KΩ is connected between emitter and ground.



d) Explain how DC stabilization is a achieved in an amitter feedback biasing circuit. **(4 marks)**

Question Three

a) (i) State any THREE methods of biasing a transistor.
(ii) State TWO purposes for each of the following:
(i) DC loadline
(ii) AC loadline **(7 marks)**

b) The characteristics of a BJT are given table 1. The transistor has a collector load of 1500 Ω, a supply voltage of 6v and a bias of 40 μA
(i) Plot the output characteristics
(ii) Draw the DC loadline
(iii) Calculate the power dissipated by the transistor
(iv) Calculate the total voltage swing at the collector for an AC input signal current of 40 μA at the base:

VCE	Collector Current I_C (mA)		
	1b = 0	1B = 40 μA	1b = 80 μA
1	0.2	1.900	3.7
4	0.3	2.05	4.0
7	0.4	2.20	4.3

Table 1

Question Four

a) Define the following terms as applied to power supplies:
(i) Ripple
(ii) PIV

b) (i) Draw the circuit diagram of a full wave bridge rectifier and explain its operation with the aid of a wave forms.
(ii) State any TWO advantages of the full wave bridge rectifier over the centre-tapped
(iii) With the aid of a circuit diagram, explain the operation of a zener diode regulator when:
(i) the load varies
(ii) The input voltage varies **(12 marks0**

Draw a data flow diagram for the following description.

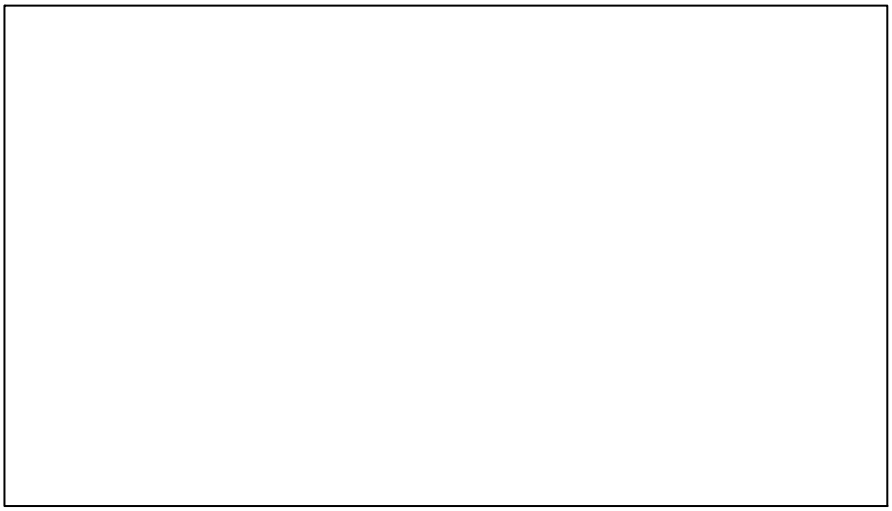
c) A 5.6v, 1W Zener diode having a minimum current of 5mA is used in a shunt regulator to supply a constant load current of 20mA from a supply which varies between 15V to 24V. Calculate:
(i) Suitable value of the series resistor, Rs
(ii) Power rating of Rs in C(i)
(iii) Power dissipated by the Zener diode when the supply is at its maximum 6 marks.

Question Five

a) State any TWO differences between NPN and PNP transistor.

b) In figure 4, calculate:

(i) VB
(ii) VE
(iii) IB
(iv) IE
(v) IC
(vi) VC **(12 marks)**



c) For BJT, show that:

$$\beta = \frac{\alpha}{1-\alpha}$$

(6 marks)