



TECHNICAL UNIVERISTRY OF MOMBASA

# Faculty of Engineering & Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY (DICT)

**EEE 2135: ELECTRONICS**

END OF SEMESTER EXAMINATION

**SERIES: DECEMBER 2014**

**TIME: 2 HOURS**

**Instructions to Candidates:**

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions. Answer any **THREE** questions

Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

### Question One

- a) Define the following terms:  
(i) Doping  
(ii) Intrinsic (4 marks)
- b) (i) With the aid of a diagram, explain how a depletion layer is formed in a P-N junction  
(ii) Draw the forward characteristics curve of a silicon diode and explain its shape. (10 marks)
- c) For the circuit of figure 1, calculate:  
(i) The output voltage  
(ii) The power dissipated by  $R_L$

Figure 1

(6 marks)

### Question Two

- a) (i) With the aid of a diagram, distinguish between the common base CB and the common emitter CE configuration for an NPN transistor
- (ii) Show that:
- $$h_{FE} = \frac{h_{FB}}{1 - h_{FB}}$$
- (8 marks)
- b) (I) State any TWO reasons why common emitter configuration is preferred than the common base or common collector
- (II) With the aid of circuit diagram explain:  
(i) Why fixed bias is limited in sue  
(ii) How stabilization is achieved in a collector-base bias method (12 marks)

### Question Three

- a) (i) Explain any TWO factors that affect the Q-point of an amplifier.  
(ii) State how the factors in a(i) may be minimized (6 marks)
- b) (I) Define the following terms as applied to Field Effect Transistors  
(i) Trans conductance  
(ii) Drain zonce resistance (2 marks)

(II) Draw the typical drain characteristics of n-channel JFET and explain its regions.

- c) With the aid of a construction diagram, explain the operation of n-channel depletion MOSFET **(12 marks)**

#### Question Four

- a) (i) State any TWO factors that distinguish a Zener diode from a power diode. **(2 marks)**  
(ii) Using a schematic diagram and wave forms explain the operation of a full wave bridge rectifier **(8 marks)**
- b) (i) Draw the I/V characteristics of zener diode and explain the shape. **(4 marks)**  
(ii) For the circuit of figure 2, calculate:  
(i) The value of resistor R  
(ii) The diode current when the load is  $2K\Omega$

Figure 2

#### Question Five

- a) With the aid of construction diagram explain the NPN transistor action. **(7 marks)**
- b) (I) Define the following in semiconductor devices:  
(i) Compound  
(ii) Element  
(iii) Molecule
- (II) Explain any TWO advantages of full wave rectifier over half-wave. **(7 marks)**
- c) (I) Explain “diffusion current” in semiconductor. **(2 marks)**
- (II) List any FOUR types of semi-conductor diodes giving ONE application of each. **(4 marks)**