



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

(A Centre of Excellence)

**Faculty of Engineering &
Technology
(Ukunda Campus)**

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

CERTIFICATE IN TECHNOLOGY

EEP 1203: DIGITAL ELECTRONICS II

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2012

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions in **TWO** sections **I & II**

Answer question **ONE (COMPULSORY)** and any other **TWO** questions

Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages
SECTION I (COMPULSORY)

Question One (30 marks)

- a) Define the following terms as used in digital electronics:
- i) Logic family (1 mark)
 - ii) Multiplexer (1 mark)
 - iii) Decoder (1 mark)
 - iv) Multivibrator (1 mark)
 - v) Flip-flop (1 mark)
 - vi) Noise margin (1 mark)
- b) Differentiate between the following terms:
- i) Current sinking and current sourcing (2 marks)
 - ii) Fan-in and fan-out (2 marks)
 - iii) Monostable and Bistable multivibrators (2 marks)
 - iv) Hold time and set-up time in flip-flop (2 marks)
- c) List **TWO** examples of logic families that use bipolar devices (2 marks)
- d) List **THREE** industrial applications of encoders. (3 marks)
- e) With the aid of a schematic diagram, show how a NOR gate can be implemented using a Resistor Transistor Logic (RTL) (3 marks)
- f) With the aid of a logic circuit and truth table illustrate the concept of priority encoding using octal-to-binary encoder. (8 marks)

Question Two (20 marks)

- a) State the **TWO** major classifications of logic families (2 marks)
- b) With the aid of a diagram, show how the following logic gates can be implemented,
- i) AND gate using DL (3 marks)
 - ii) A two input NAND gate using DTL (3 marks)
- c) Figure 1 below shows a standard TTL NAND gate. Describe the circuit operation when:
- i) Both inputs are in the logic HIGH state (6 marks)
 - ii) Both inputs are in the logic Low state. (6 marks)

Question Three (20 marks)

- a) Differentiate between a bistable and astable multivibrator. **(2 marks)**
- b) State **TWO** applications of Schmitt trigger circuits. **(2 marks)**
- c) With the aid of a circuit diagram, explain the operation of the following multivibrators.
 - i) Astable multivibrator **(8 marks)**
 - ii) Monostable multivibrators **(8 marks)**

Question Four (20 marks)

- a) Differentiate between level triggered and an edge triggered flip-flop. **(2 marks)**
- b) With the aid of a diagram describe the operation of an edge triggered flip-flop. **(8 marks)**
- c) Briefly describe **FOUR** flip-flop timing parameters. **(8 marks)**
- d) State **TWO** flip-flop applications in electronics. **(2 marks)**

Question Five (20 marks)

- a) Differentiate between the following terms:
 - i) Decoder and Encoder **(2 marks)**
 - ii) Multiplexer and Demultiplexer **(2 marks)**
- b) State **TWO** similarities and **TWO** differences between a demultiplexer and a decoder **(4 marks)**
- c) Design a four-line to two-line priority encoder with active HIGH inputs and outputs, with priority assigned to the higher order input line. **(10 marks)**
- d) Outline **TWO** applications of multiplexers in digital electronics. **(2 marks)**