



MACHAKOS UNIVERSITY

University Examinations for 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SECOND YEAR SECOND SEMESTER EXAMINATION FOR
DIPLOMA IN ELECTRICAL AND ELECTRONIC ENGINEERING

EED 215: DIGITAL ELECTRONICS II

DATE:

TIME:

INSTRUCTIONS

1. You should have an examination booklet for this examination
2. Question **ONE** is compulsory
3. Answer **ANY** other **TWO** questions.
4. Maximum marks for each part of a question are as shown.

1 a) (i) Name TWO examples of sequential logic circuits. (2 marks)

(ii) Define the following terms;

- Flip Flop
 - Counter
 - Register
- (6 marks)

(iii) State the difference between a sequential circuit and a combinational circuit (2 marks)

b) With the aid of waveforms, design a Mod. 12 UP- ripple counter. (10 marks)

c) (i) Draw the symbol of a J-K flip flop. (2 marks)

(ii) Define the following memory terminologies;

- Memory capacity
- Firmware
- Cycle time
- Memory address

(8 marks)

2 a) With the aid of a logic diagram and truth table, describe the operation of;

- Clocked S-R flip flop
- T flip flop

(18 marks)

b) Draw the symbols for each of the above flip flops in question 2(a).

(2 marks)

3 a) With the aid of a MOS RAM cell (SRAM) circuit, explain its operation.

(10 marks)

b) (i) Differentiate between volatile and non-volatile memory.

(4 marks)

(ii) A memory used in an electronic equipment has a capacity of $16K \times 8$, calculate;

- The number words in this memory
- Number of bits in each word (word length)
- Total number of memory cell in the memory.

(6 marks)

4 a) State the operational differences between synchronous and asynchronous counters. (2 marks)

b) A 4-bit counter has a propagation delay time (t_{pd}) of 50nS for each flip flop and a propagation delay time (t_{pd}) of 20nS for each AND gate used.

(i) Determine the maximum frequency (f_{max}) when the counter is connected as;

- Synchronous counter
- Ripple counter.

(6 marks)

(ii) Compare the results in (b) (i) above.

(2 marks)

c) (i) Draw the logic circuit diagram of a 5-bit twisted ring counter

(ii) Determine the auxiliary states of (c) (i) above.

(10 marks)

5 a) State the difference between FEPROM and EAPROM memories. (4 marks)

b) With the aid of symbols and truth tables, explain the difference between an ordinary buffer and a tristate buffer. (6 marks)

b) A microcomputer uses the following memories starting from address location 0000H;

- Two 1K ROM
- Two 2K RAM

Sketch the memory map for this microcomputer. Let the ROM start at location 0000H and the RAM start location 4000H.

(10 marks)