



MACHAKOS UNIVERSITY

University Examinations for 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATION FOR DIPLOMA IN
ELECTRICAL AND ELECTRONICS ENGINEERING

EED 215: DIGITAL ELECTRONICS II

DATE: 30/5/2017

TIME: 2:00 – 4:00 PM

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.

QUESTION ONE COMPULSORY (30 Marks)

1. a) (i) State the difference between a combinational logic circuit and a sequential logic circuit. (2 marks)
(ii) With the aid of truth tables explain the common characteristic in a SR flip flop and a JK flip flop. (4 marks)
(iii) Define the following terms;
 - Counter
 - Register(4 marks)

- b) With the aid of waveforms, design a Mod. 11 UP- ripple counter. (10 marks)
- c) (i) Draw the symbol of a D flip flop. (2 marks)
- (ii) With the aid of a logic diagram and truth table, describe the operation of a clocked T flip flop. (8 marks)

QUESTION TWO (20 MARKS)

2. a) With the aid of a diagram and a truth table describe the operation of a Pseudo random sequence generator. (10 marks)
- b) With the aid of waveforms, design a Modulo 16 parallel counter. (10 marks)

QUESTION THREE (20 Marks)

3. a) With the aid of a MOS RAM cell (SRAM) circuit diagram, 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)

QUESTION FOUR (20 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)

QUESTION FIVE (20 MARKS)

5. a) Define the following memory terminologies;

- Volatile Memory
- Non volatile Memory
- Word size
- Memory address
- Erasable programmable ROM.

(10 marks)

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

- Two 2K ROM
- Two 4K RAM

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

(10 marks)