



# TECHNICAL UNIVERSITY OF MOMBASA

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FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF MECHANICAL & AUTOMOTIVE ENGINEERING

## UNIVERSITY EXAMINATION FOR:

DIPLOMA IN MARINE ENGINEERING)(DMAE MODULE 11)

EMR 2217 : MARINE ELECTRONICS II

## END OF SEMESTER EXAMINATION

**SERIES:** MAY 2016

**TIME:** 2 HOURS

**DATE:** MAY 2016

### Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of FIVE questions. Attempt **ANY THREE Questions**

**Do not write on the question paper.**

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### Question ONE

- (a) (i) Explain how “RACE AROUND condition occurs in flip flops.  
(ii) State how the condition in a(i) above is overcome  
(iii) Draw a synchronous 3-stage parallel up counter and explain its operation

(11marks)

- (b) (i)With the aid of diagrams explain the following in digital logic circuits:-

- I. Decoder
- II. Multiplexer

- (ii) Explain the applications of the devices in b(i) above

(9marks)

### Question TWO

- a)(i) Explain any TWO applications of flip flops

- (ii)With the aid of sketches differentiate between Asynchronous and synchronous circuits in digital logic

(7marks)

(i) A clocked SR flip-flops logic circuit has a timing diagram as shown in figure 1 below.

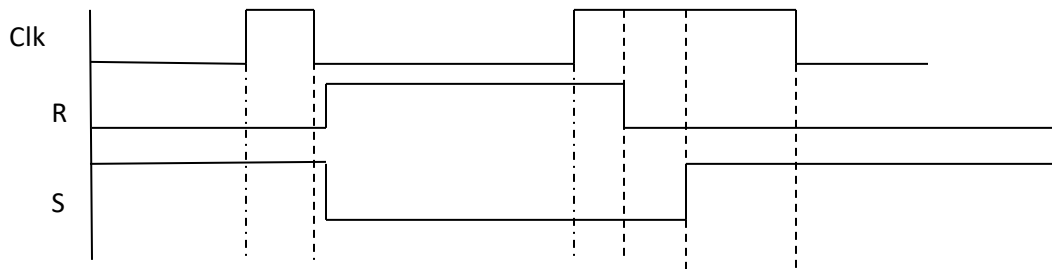


Fig 1

Draw the expected output waveform and explain how it is derived.

(13marks)

### Question THREE

- (a) (i) Explain the difference between RAM and ROM in semiconductor memory elements  
(ii) State any TWO advantages and ONE disadvantage of MOS over Bipolar memory Technology.  
(iii) Explain the following semiconductor memory elements:

(I) EEPROM

(II) PROM

(11marks)

(b)(i) Describe the operation of the thyristor using the two transistor analogue

(ii) Sketch the thyristor anode characteristics and explain the shape

(9marks).

### Question FOUR

(a) Explain the THREE types of triggering signals used in flip flops (3marks)

(b) With the aid of block diagrams, describe the FOUR modes of operation of shift registers

(8marks)

(c) Explain the following terms as applied to flip flops

(i) Propagation time

(ii) Hold time

(2marks)

(d) With the aid of a diagram and timing waveforms explain the operation of a J-K master slave.

(7marks)

### Question FIVE

(a)(i) Explain why modulation is necessary in communication systems

(ii) State any THREE differences between FM and AM receivers

(5marks)

(b)(i) With the aid of a block diagram explain the basic superhetrodyne principle in radio communication

(ii) A frequency modulated voltage signal is given by the following equation:

$$e = 12\cos(6 \times 10^8 t + 5\sin 1250t) \quad \text{Find:-}$$

- I. carrier frequency
- II. signal frequency
- III. modulation index
- IV. maximum frequency deviation
- V. power dissipated by the FM wave in  $10\Omega$  resistor.

(11marks)

c) Explain FOUR drawbacks of Amplitude modulation

(4marks)