



# 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 II)

EMR2217 : MARINE ELECTRONICS 11

## 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) Distinguish between sequential logic circuit and a combinational circuit. (2marks)
- (b)(i) Explain the steps followed in designing a sequential logic circuit.
- (ii) With the aid of a block diagram describe the operation of a master slave J-K flip-flop. (13marks)
- (c) Using appropriate sketches to explain both the logic “1” bit and logic “0” bit storage concept. (5marks)

### Question TWO

- a) List the FOUR main types of flip-flops used in digital circuits. (4marks)
- b)With the aid of a diagram show the working principle, truth table and circuit symbol of an RS(Reset-Set) flip-flop constructed using NAND gates (10marks)
- c)With the aid of diagrams show how a D-flip flop can be realized from an S-R flip flop (6marks)

### Question THREE

- a)(i) State the meaning of the term “photo electric effect”  
(ii) Describe the THREE types of photo electric cells. (5marks)
- b) With the aid of a diagram, explain the principle of operation of SCR (6marks)
- c) Outline the stage by stage process of manufacturing monolithic Integrated circuits  
(9marks)

### Question FOUR

- a)With the aid of diagrams explain the working principle of A 3-bit Counter  
(6marks)
- b)(i) Explain the following semiconductor memory elements:  
(I) EEPROM  
(II) PROM
- ( ii)Using a block diagram, explain the function of each block of the basic computer architecture.  
(14marks)

### Question FIVE

- a) State SIX characteristics of Operational Amplifiers (6marks)
- b) Derive the expression for the output voltage and gain of an Inverting OPAMP (7marks)
- c)Define the following terms:  
i. Frequency modulation  
ii. Amplitude modulation  
(2marks)
- d) State the FIVE ways of radio wave propagation (5marks)