

TECHNICAL UNIVERSITY OF MOMBASA
Faculty of Engineering and Technology
DEPARTMENT OF MECHANICAL AND AUTOMOTIVE ENGINEERING
DIPLOMA IN TECHNOLOGY IN MARINE ENGINEERING (DMAE 1)

EMR 2103
MARINE ELECTRICAL I

END OF SEMESTER EXAMINATIONS

SERIES: sept. , 2017

TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

- 1. You should have the following for this examination:**
 - **Answer Booklet**
 - **A Non-programmable Scientific Calculator**
- 2. This paper consists of FIVE Questions**
- 3. Answer ANY THREE Questions**
- 4. All questions carry equal marks.**
- 5. This paper consists of THREE printed pages.**

Question ONE

- a) Using a chart plot a brief description of accident types in the workshop:
Stating the main causes of these accidents
(5marks)
- b) A length of copper wire ($\alpha = 0.004041$ at 20°C) has a resistance of 5 ohms at 20 degrees Celsius. Calculate its resistance if the temperature were to increase to 50 degrees Celsius
(4 marks)
- c)
- i. What is meant by linear and nonlinear elements?
 - ii. What is meant by active and passive elements?
(4 marks)
- d) Make a brief description of Mouth-to-mouth resuscitation procedure and differentiate it from the Silvester method
(7 marks)

Question TWO

- a) What are RCDs(residual current devices) and differentiate among its main types:
(7 marks)
- b) Using graphical representation and diagrams show both the real and imaginary components of impedance in AC circuits and state the impedance equation
(10 marks)
- c) Express two main functions of per-unit system of measurement :
(3 marks)

Question THREE

a)

- i. What is Quality (Q) factor
- ii. What are the three main regimes which can be considered when referring to the damping and Q factor in electric circuits

(8 marks)

b) Describe the main fire types:

(10 marks)

c) Calculate the resistance of each of these specimens, given their resistance at the reference temperature ($R_r @ T_r$), and their present temperatures (T):

- Specimen 1: Copper ; $R_r = 200 \Omega @ T_r = 20^\circ\text{C}$; $T = 45^\circ\text{C}$; $R_T =$

(2 marks)

Question FOUR

a) Derive the Wheatstone bridge equation:

(8marks)

b) State:

Ohm's law for magnetic circuit.

What is meant by electromagnetic torque in motors?

(4 marks)

c) Consider a steel with the mean length of 20 m, the cross section of 2 m^2 . What is the Magnetic reluctance

(6 marks)

d) Based on properties and area of applications, state the main electrical material types

(2 marks)

Question FIVE

(a) Derive the Wheatstone bridge equation:

(8 marks)

(b) Based on properties and area of applications, state the main electrical material types

(2 marks)

(c) Consider a load that consumes 1kW of power at a power factor of 0.8 lagging and operates at 115 V (r m s). The load is connected to a voltage source by a wire with a resistance of 0.1Ω .

• What is the power supplied by the source?

(6 marks)

(d) Compare series and parallel circuits

(4 marks)