



# TECHNICAL UNIVERSITY OF MOMBASA

## *Faculty of Engineering and Technology*

### DEPARTMENT OF MECHANICAL AND AUTOMOTIVE ENGINEERING

DIPLOMA IN MARINE ENGINEERING (DMAE 4)

#### EMR 2213 GENERAL ENGINEERING KNOWLEDGE

END OF SEMESTER EXAMINATIONS

YEAR 2 SEMESTER 2

**SERIES:** DECEMBER, 2013

**TIME:** 2 HOURS

#### **INSTRUCTIONS TO CANDIDATES:**

1. You should have the following for this examination:
  - Answer Booklet
  - Drawing Instruments
2. This paper consists of **FIVE** Questions.
3. Answer **ANY THREE** Questions.
4. **This paper consists of THREE printed pages.**

Question ONE

- (a) Explain any **FOUR** similarities between air-conditioning and refrigeration systems. **(8 marks)**
- (b) Using sketches, explain the marking principles of a basic compression refrigeration cycle. **(12 marks)**

### Question TWO

- (a) Define the following terminologies:
- (i) Dryness fraction
  - (ii) Refrigerant
  - (iii) Air-conditioning load
  - (iv) Heat sink
- (8 marks)**
- (b) Using sketches, explain how a 70% air-conditioning unit with refrigeration operates. **(12 marks)**

### Question THREE

- (a) Explain any **FIVE** parameters that are to be considered when performing shaft alignment. **(10 marks)**
- (b) Using a block diagram, explain how a typical gear marine steering system operates. **(10 marks)**

## SECTION B

Answer **ONE** Question from this Section

### Question FOUR

- (a) Using sketches, explain the working principles of a:
- (i) A reciprocating single screw compressor
  - (ii) A centrifugal volute vane compressor
- (10 marks)**
- (b) State and explain the functions of any **FIVE** safety devices fitted on an air compressor system. **(10 marks)**

### Question FIVE

(a) Using sketches, explain the working principles of:

- (i) A single piston reciprocating pump
- (ii) A centrifugal lobe pump
- (iii) A diaphragm reciprocating pump

**(15 marks)**

(b) State any **FIVE** safety precautions and measures to be considered when working on pumping systems. **(5 marks)**