



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF MECHANICAL & AUTOMOTIVE
ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA MARINE ENGINEERING

EMR2109: MARINE ENGINEERING KNOWLEDGE I.

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2016

TIME: 2 HOURS

DATE: DECEMBER 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.

PAPER ONE

QUESTION ONE

- (a) State THREE essentials of a heat engine. [3Marks]
- (b) Describe the working principle of a four stroke petrol engine. [6Marks]
- (c) Explain the timing diagram for the petrol engine and state its importance. [5Marks]
- (d) Explain the methods of lubrication in an internal combustion engine. [6Marks]

QUESTION TWO

- (a) (i) Define the term "Lubrication".

- (ii) State THREE classifications of lubrication. [5Marks]
- (b) Explain the following properties of lubricants [6Marks]
- (i) Viscosity
 - (ii) Lubricity
 - (iii) Volatility
 - (iv) Pour point
- (c) Explain the principle of Thin Layer boundary lubrication. [6Marks]
- (d) State TWO tests carried out on lubrication oil. [3Marks]

QUESTION THREE

- (a) Explain the following properties of fuel. [6Marks]
- (i) Flash point
 - (ii) Pour point
 - (iii) Ignition point
 - (iv) Calorific value
- (b) A coal consists of 80% carbon, 4.6% hydrogen, 3% oxygen and the remainder ash. If 1Kg of the coal is burnt with 20% excess air. Determine [10Marks]
- (i) The mass of the product of combustion
 - (ii) the percentage analysis by mass of the products of combustion.
- (c) State TWO advantages and TWO disadvantages of liquid fuels over solid fuels. [4Marks]

QUESTION FOUR

- (a) Describe the principle of construction of a shell and tube heat exchanger [5Marks]
- (b) Explain the difference between the parallel and counter flow heat exchangers. [5Marks]
- (c) (i) State any TWO methods of temperature control in a heat exchanger. [6Marks]
- (ii) Explain the test diagnosis for leaking tubes.
- (d) Describe the process of flash evaporation and multi effect evaporative. [4Marks]

QUESTION FIVE

- (a) Describe the following of fluids flow (dynamic) [4Marks]
- (i) Laminar flow
 - (ii) Turbulent.
- (b) Explain the principle of rotodynamic pump. [6Marks]
- (c) (i) Explain the term cavitation with respect to rotodynamic pumps. [6Marks]
- (ii) State FOUR effects of cavitation on a centrifugal pump.

(d) Explain how marine pollution by oil from ship may be prevented in accordance with MARPOL 73/78

[4Marks]