



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology
Department of Mechanical & Automotive Engineering
UNIVERSITY EXAMINATION FOR:
Diploma Marine Engineering
EMR 2207 : THERMOFLUIDS I
END OF SEMESTER EXAMINATION
SERIES: DECEMBER 2016
TIME: 2 HOURS
DATE: Pick Date Dec 2016

Instruction to Candidates:

You should have the following for this examination

- *Answer booklet*
- *Non-Programmable scientific calculator*

This paper consists of **FIVE** questions. Attempt **ANY THREE** questions.
Maximum marks for each part of a question are as shown.

Do not write on the question paper.

Question ONE

a) With a neat diagram (P-V diagram) explain the Isothermal Process. 10 marks

b) Show that;

$$C_p = \gamma C_v = \gamma R / (\gamma - 1) \quad \text{10 marks}$$

Question TWO

a) Differentiate between;

- Adiabatic Process and Isothermal Process
- Polytropic Process and Isentropic Process
- Constant Pressure Process and Constant Volume Process 12 marks

- b) Calculate; i) the specific enthalpy
ii) Specific internal energy
iii) Specific volume, of wet steam at 18 bar and dryness fraction 0.924 8 marks

Question THREE

a) Calculate the mass of air which has left a receiver, if the air receiver has a volume 8m^3 and contains air at 17bar and 42°C . A valve is opened and some air is allowed to blowout to atmosphere. The pressure of the air in the receiver drops rapidly to 13 bar when the valve is then closed. 10 marks

b) With the aid of diagrams, explain Nozzle and Throttling as open systems with steady flow. 10 marks

Question FOUR

a) Define the following Thermodynamic terms;

- i) Extensive properties
- ii) Cycle
- iii) Closed System
- iv) Property 10 marks

b) Define the following Thermodynamic terms;

- i) System
- ii) Surroundings
- iii) Thermal reservoir
- v) Volume
- vi) Energy 10 marks

Question FIVE

a) State the Joule's law 4 marks

b) Show that for any polytropic process;

$$W_{\text{input}} = (P_2V_2 - P_1V_1)/(n - 1) \quad \text{10 marks}$$

c) State 3 advantages of superheated steam and 2 disadvantages of superheated steam.

6 marks