



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

1. a) Define the following Thermodynamic terms;
 - i) Steam
 - ii) Wetness fraction
 - iii) Dryness fraction
 - iv) Quality of Steam
 - v) Priming 10 marks

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

Question TWO

- a) State the first law of Thermodynamics 3 marks
- b) State Joules Law 2 marks
- c) Calculate the final volume, final temperature and workdone on the mass of air in a cylinder, given that air is at 3 bar, 27°C initially occupying a cylinder volume of 0.028m³, is compressed reversibly and adiabatically by a piston to a pressure of 9 bar. Assume $\gamma = 1.4$ and $C_v = 0.718$
- 15 marks

Question THREE

- a) Explain the zeroth law of Thermodynamics 4 marks
- b) Show that the steady flow energy equation is;

$$m(h_1 + c_1^2/2 + z_1g) + Q + W = m(h_2 + c_2^2/2 + z_2g) \quad 16 \text{ marks}$$

Question FOUR

- a) A mass of 0.05kg of a fluid is heated at a constant pressure of 2 bar until the volume occupied is 0.0658m³. Calculate the heat supplied and the work done, when the fluid is steam, initially dry saturated. 14 marks
- b) State 3 advantages of superheated steam and 2 disadvantages of superheated steam. 6 marks

Question FIVE

- a) Define the following Thermodynamic terms;
- i) Surroundings
 - ii) Energy
 - iii) System

iv) Volume

v) Thermal reservoir

10 marks

b) Define the following Thermodynamic terms;

i) Extensive properties

ii) Cycle

iii) Closed System

iv) Property

10 marks