TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology
Department of Mechanical & Automotive Engineering
UNIVERSITY EXAMINATION FOR:
Diploma Marine Engineering
EMR 2101 : MARINE ENGINEERING SCIENCE 1
END OF SEMESTER EXAMINATION
SERIES: DECEMBER 2016
TIME: 2 HOURS
DATE: Pick Date **Dec 2016**

<u>**Instruction to Candidates:**</u>
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) What do you understand by the term "thermal equilibrium"?   **2 marks**
b) Differentiate between maximum thermometer and max-minimum thermometer. **6 marks**
c) Explain the following Acid and Base theories:
   i)   Arrhenius
   ii)   Bronsted   **12 marks**

Question TWO
a) Define the term Salt.   **2 marks**
b) Explain the following types of salts;
     i) Double salts
     ii) Complex salts   **6 marks**
d) Explain THREE methods of Salt preparation for water soluble salts.   **12 marks**

Question THREE
a) Define the following terms; i) coefficient of thermal conductivity
                                ii) Stefan- Boltzmann law
                                iii) Blackbody radiation   **6 marks**

b) Explain the following Quantum Numbers:
    i)   Principal Quantum Number
    ii)   Azimuthal/ Subsidiary Quantum Number
    iii)   Magnetic Quantum Number
    iv)   Spin Quantum Number   **12 marks**
c) Define the term Gas.   **2 marks**

Question FOUR

a) State:
    i)   Hund's Rule
    ii)   Pauli Exclusion Principle   **4 marks**
b) Explain the formation of Multiple bonds and give TWO examples of Multiple bonds.
          8 marks

c) Explain the following types of Salts:
    i)   Normal Salts
    ii)   Acid Salts
    iii)   Basic Salts
    iv)   Double Salts   **8 marks**

Question FIVE

a) Define the term gas (2mks)

b) A 10 liter container contained 0.85 kg of Butane gas (C_4H_{10}). Assuming ideal gas behavior, calculate the pressure of the gas if the cylinder is stored at 25°C. **9 marks**

c) The following data was collected during an experiment. Calculate the Molecular mass (Mm) of the volatile liquid.
Mass of syringe + liquid= 10.6403g
Mass of syringe after injection of liquid= 10.4227g
When volatilized the liquid gave 67.3cm³ of gas
Temperature of oven= 81°C
Barometric pressure= 752mmHg
R=   8.314Jmol$^-$K$^-$
9 marks