TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology
Department of Mechanical & Automotive Engineering
UNIVERSITY EXAMINATION FOR:
Diploma in Marine Engineering (Y3S1)
EMR 2304 : Motor & Steam Engineering Knowledge I (Paper 2)
SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: SEPTEMBER 2018
TIME: 2 HOURS
DATE: Sep 2018

Instruction to Candidates:
You should have the following for this examination
- *Examination Pass & Student ID Card*
- *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) State: **(4 marks)**
    i.   Boyle's law
    ii.   Charles' law
b) Show that PV=mRT **(6 marks)**
c) Air at 17 °C and 125 kPa absolute pressure occupies 2.46 m^3. If the air is compressed
   to a volume of 1 m^3 and a pressure of 700 kPa absolute, calculate its final temperature
   and mass.   **(10 marks)**

Question TWO
a) Define the following: **(8 marks)**
    i.   Isothermal expansion
    ii.   Adiabatic expansion
b) Show the operation of a 4-stroke piston engine on a PV diagram.   **(12 marks)**

Question THREE

a) With the aid of sketches define the following engine components: **(10 marks)**
  i. Cylinder head
  ii. Combustion chamber
  iii. Intake valve
  iv. Piston
  v. Connecting rod
  vi. Crank shaft
  vii. Flywheel
  viii. Cam shaft
  ix. Exhaust valve
  x. Gudgeon pin

b) What do you understand by the following terms? **(10 marks)**
  i. Indicated power
  ii. Brake power
  iii. Volumetric efficiency
  iv. Stroke
  v. Cylinder Bore
  vi. Top Dead Centre (TDC)
  vii. Bottom Dead Centre (BDC)
  viii. Compression ratio
  ix. Spark ignition
  x. Compression ignition

Question FOUR

a) Define the following: **(10 marks)**
  i. Work
  ii. Energy
  iii. Power
  iv. Torque
  v. Force

b) An electric motor-driven hoist consumes 4 kW when lifting a mass of 500 kg through 2 m at constant velocity in 4 seconds. Calculate the overall efficiency of the hoist.

(10 marks)

Question FIVE

a) What do you understand by the term 'heat engine'? **(6 marks)**

b) Discuss the difference between an external combustion engine and an internal combustion engine. **(14 marks)**