



MACHAKOS UNIVERSITY

University Examinations for 2020/2021

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

FIRST YEAR SECOND SEMESTER EXAMINATION FOR

CERTIFICATE IN AUTOMOTIVE ENGINEERING

APPLIED SCIENCE

DATE :

TIME :

INSTRUCTIONS

ANSWER ALL QUESTION

1.
 - a) How is sound produced (3 marks)
 - b) The speed of sound in air is 340m/s. A loud speaker placed between two walls A and B, but nearer to wall A than wall B, is sending out constant sound pulses. How far is the speaker from wall B if it is 200m from wall A and the time between the two echoes received is 0.176 seconds (7 marks)
 - c) How is sound propagated (6 marks)
 - d) What evidence is there to show that sound is a wave motion (4 marks)
2.
 - a) Define the following and state the units
 - (i) Heat capacity (2 marks)
 - (ii) Specific heat capacity (2 marks)
 - (iii) Specific latent heat of fusion (2 marks)
 - (iv) Latent Heat of evaporation (2 marks)
 - b) A block of iron of mass 1.25kg at 120°C was transferred to aluminium calorimeter of mass 0.3kg containing a liquid of mass of 0.6kg at 25°C. The block and the calorimeter with its contents eventually reached a common temperature of 50°C. Given the specific heat capacity of iron as 459J/kg and that of aluminium 900J/kg, calculate the specific heat capacity of liquid (12 marks)
3.
 - a) List five natural sources of energy (6 marks)
 - b) Name the device that facilitates energy transformation (2 marks)
 - c) Describe the energy transformation that takes place in each of the following
 - i) A car battery is used to light a bulb
 - ii) Coal is used to generate electricity
 - iii) A pendulum bob swing to and fro
 - iv) Water at the top of a waterfall and its temperature rises on reaching the bottom
4.
 - a) Define the following
 - i) Potential (1 mark)
 - ii) Kinetic energy (1 mark)

- b) The velocity of a body mass 16kg is increased from 5m/s to 20m/s in 12sec. Calculate the power required to produce the change in kinetic energy of the body. **(4 marks)**
- c) Hand operated lifting machine in a shop raises an engine of mass 260kg by means of an effort of 210N at the handle. If the effort through a distance of 13.5m in raising the engine 450 mm, calculate
- i) The force ratio **(3 marks)**
 - ii) The movements ratio **(3 marks)**
 - iii) The efficiency of the machine **(3 marks)**
- d) Draw a simple graph of effort against load for a simple machine. **(5 marks)**
- 5.**
- a) State five differentiate between solid and liquid **(5 marks)**
- b) With aid of simple sketches explain that pressure act in
- i) Equally and in all direction **(5 marks)**
 - ii) Pressure increases with depth **(5 marks)**
 - iii) Pressure in liquid takes its own level **(5 marks)**