MACHAKOS UNIVERSITY

University Examinations for 2020/2021

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARMENT OF MECHANICAL ENGINEERING

FIRST YEAR SECOND SEMESTER EXAMINATION FOR

BUILDING AND CIVIL ENGINEERING

IN APPLIED SCIENCE

DATE : **TIME :**

INSTRUCTIONS :

ANSWER ALL THE QUESTIONS

1. (a) State the UNIT name and SI UNIT of the following measurement ? **(**4 marks)

Measurement	**Unit Name**	**SI.Unit Calculation**
Velocity		
Acceleration		
Density		
Pressure		

(b) State the fundamental units and their abbreviations? (4 marks)

(c) Describe the energy transformation that takes place in each of the following

(i) Acar battery is used to light a bulb

(ii) Coal is used to generate electricity

(iii) A pen drum bob swing to and for

(iv) Water at the top of a waterfall and its temperature rises on reaching the bottom (12 marks)

2. (a) Define the following (3 marks)

(i) solids

(ii) liquids

(iii) gases

(b) Differentiate between solids and liquids (4 marks)

(c) With aid of simple experiment explain how you can find the density of an irregularly stone assuming it does not suck**.** (13 marks)

3. (a) Define the following (3 marks)

(i) Distance

(ii) Displacement

(iii) Average velocity

(b) State and explain the five laws of linear motion (10marks)

(c) A box of mass m 1 = 10.0 kg rests on a smooth frictionless box of mass m 2 = 5.00 kg. If a force of

20.0 N is applied to box 1 to accelerate both boxes, determine the acceleration of the boxes and the magnitude of the contact force between the boxes. (7 marks)

4. (a) Define the following and state international standard of units. (6 marks)

(i) work

(ii) energy

(iii) power

(b) Find the amount of work done by a hydraulic hoist in lifting a vehicle of mass 1500 kg to height of 2m. (4 marks)

(c) An engine has amass of 150kg and is above ground level.

(i) Determine the potential energy of the due to its position above the ground level.

(ii) Due to a fault in the string the engine falls freely to the ground from that height; calculate the velocity and the kinetic energy of the engine at the point of impact with the ground.

(iii) Determine the kinetic energy and potential energy after falling 3m. Neglect a resistance. (10 marks)

5. (a) A student measures the thickness of a human hair by looking at it through a microscope of magnification 100. He makes 20 observations and finds that the average width of the hair in the field of view of the microscope is 3.5 mm.What is the estimate on the thickness of hair (6 marks)

(b) (i) List three pressure gauges. (3 marks)

(ii) A simple u-tube manometer containing mercury is connected to apipe in which a fluid with specific gravity 0.8 and having vaccume pressure is flowing.The other end at the manometer is open to atmosphere. Find the vacuum pressure in pipe,if the difference of the mercury level in the two limbs is 40cm and the height of the fluid in the left from the centre of the pipe is 15cm below (11 marks)