MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF PHYSICAL SCIENCES

FIRST YEAR SECOND SEMESTER EXAMINATION FOR

CERTIFICATE IN BUILDING TECHNOLOGY

CERTICATE IN PLUMBING

1704/102/AS: APPLIED SCEINCE

DATE: 25/4/2019   **TIME:2.30-5.30 PM**

INSTRUCTIONS TO CANDIDATES

- Answer question one and any other two
- Illustrate your answers with suitable diagrams wherever possible

1 a) Define the following terms;   (4 marks)

   i.   Vector quantity

   ii.   Scalar quantity

   b) Differentiate between the physical and chemical changes.   (2 marks)

   c) State and explain two factors affecting chemical changes   (4 marks)

   d) Discuss two advantages and two disadvantages of friction   (8 marks)

   e) Describe the structure of an atom   (6 marks)

   f) Consider a 4200kg train car travelling at 10m/s towards another train car. After the two car collide, they couple together and move and move along at 6m/s. What is the mass of the second train car?   (6 marks)

2. a) Define the following terms ;   (4 marks)

   i.   Moment of a force

   ii.   principal of moment

   b) Give two examples of turning effect of a force   (2 marks)

c) A pupil applies a force of 20N to the handle of a door which is 1.2 from the hinges of the door. Calculate the moment of a force   (6 marks)

d) A uniform meter rule is pivoted at its center, two masses of weights of 2N and 1N are placed 30cm and 20cm respectively from the center of meter rule on one side, another mass of weight w balances the meter rule at 40cm from the point of pivot on the other side. Calculate the weight W   (8 marks)

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

    i.   Friction force

    ii.   Coefficient of friction

  b)   i   Discuss two advantages and two disadvantages of friction   (8 marks)

    ii   Explain two methods used to reduce friction on a surface   (4 marks)

    iii   A block weighing   200N is pushed a long a surface. If it takes 80N to get the block moving at a constant velocity. What are the coefficient of static friction μs and coefficient of kinetic friction μ   (6 marks)

4. a) Define pressure and state its SI unit   (2 marks)

  b) Calculate the pressure produced by a kilogram of lead on a horizontal surface if the area it rest on 0.02 sq. meter.   (3 marks)

  c) Derive the equation ($H_\varrho g$) of pressure at the bottom of a colum of liquid (5 marks)

  d) A swimming pool of width 9.0m and length 24.0m if filled with water to a depth of 3.0m. Calculate pressure on the bottom of the pool due to the water. ($_\varrho$ of fresh water =100kg/m)   (4 marks)

  e) Explain two application of pressure   (4 marks)

  f) Barometer is usually made up of mercury. Explain why it is not practical to have a water barometer   (2 marks)

5. a) Define the following terms;   (4 marks)

    i.   Element

    ii.   Mixture

  b) State the law of conservation of energy   (1 mark)

  c) Explain the application of pressure in real life situation   (9 marks)

  d) A rectangular block of steel has a mass of 0.5 tonnes   .if the dimensions of the block are 0.5m by 0.4 by0.7m, find the density of the steel.   (6 marks)