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KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY

UNIVERSITY EXAMINATION, 2022/2023 ACADEMIC YEAR
FIRST YEAR, FIRST SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE
(COMPUTER SCIENCE)

Date: 14th April, 2022
Time: 8.30am –10.30am

KPH 101 - PHYSICS 1

INSTRUCTIONS TO CANDIDATES

ANSWER **QUESTION ONE (COMPULSORY)** AND **ANY OTHER TWO** QUESTIONS

QUESTION ONE (30 MARKS)

a) Differentiate the following terms as used in kinematics?

i) Distance and Displacement

ii) Speed and Velocity

iii) Acceleration and Velocity. (6 marks)

b) A train is accelerating steadily from 10 ms^{-1} to 15 ms^{-1} in 10 second, calculate the uniform acceleration of the train.
(4 marks)

c) State the three equations for constant acceleration
(3 marks)

d) A car accelerates uniformly from rest. If it travels a distance D in time t then how far will it travel in a time 2t?
(4 marks)

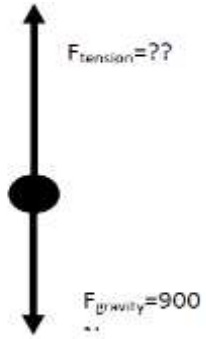
e) If the car in b above has speed v at time t then what is the speed at time 2t?
(3 marks)

f) Differentiate scalar quantity from vector quantity, give two examples of each quantity
(4 marks)

g) Express the following quantities using fundamental dimensions: force, voltage and work.
(6 marks)

QUESTION TWO (20 MARKS)

a) Tarzan (m=65 kg) swings from a vine that is 3.0 meters long. His speed at the bottom of the swing is 5.0 m/s. Calculate



i) Centripetal acceleration? (4 marks)

ii) NET force acting on him? (3 marks)

iii) The tension in the vine? (3 marks)

b) State Hooke's law (2 marks)

c) Discuss the difference between strain and stress? (2 marks)

d) With the aid of a diagram, differentiate between tensile and compressive stress. (3 marks)

e) A 10 m steel wire stretches 3.08 mm due to the 200 N load. What is the longitudinal strain? (3 marks)

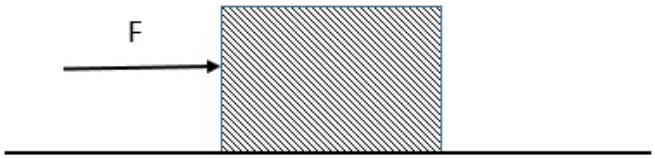
QUESTION THREE (20 MARKS)

a) State the three laws of solid friction (3 marks)

b) Give the differences between kinetic and static friction? (4 marks)

c) Briefly describe the coefficient (μ) of static friction (4 marks)

d) A block of mass M = 15 kg rests on a table. A force of F = 7 N is applied in the horizontal direction, as shown. The block continues to remain at rest due to friction.



i) Calculate the magnitude of the force opposing the motion in the object? (5 marks)

ii) Now the applied force is increased to F = 29.4 N and this is the maximum force that can be applied before the block begins to move. Find coefficient of the static friction (μ_s). (4 marks)

QUESTION FOUR (20 MARKS)

a) An acrobat of mass 55 kg is going to hang by her teeth from a steel wire and she does not want the wire to stretch beyond its elastic limit. The elastic limit for the wire is $2.5*10^8$ Pa. What is the minimum diameter the wire should have to support her?

(6 marks)

b) Briefly describe the following terms;

i) Tensile stress

ii) Compressive stress

iii) Elastic limit (6 marks)

c) A steel wire 10m and 2mm in diameter is attached to the ceiling and a 200N weight is attached to the end. What is the applied stress?

(4 marks)

d) If the above steel wire stretches 3.08mm due to the 200N load. What is the longitudinal strain?

(4 marks)

QUESTION FIVE (20 MARKS)

a) Define calorimetry (2 marks)

b) A large paraffin candle has a mass of 96.83 gram. A metal cup with 100.0 mL of water at 16.2°C absorbs the heat from the burning candle and increases its temperature to 35.7°C. Once the burning is ceased, the temperature of the water was 35.7°C and the paraffin had a mass of 96.14 gram. Determine the heat of combustion of paraffin in kJ/gram. GIVEN: density of water = 1.0 g/mL

(6 marks)

c) State the two laws of reflection.

(4 marks)

d) With the help of a diagram, illustrate what we mean by total internal reflection.

(4 marks)

e) Describe the differences between concave and convex mirrors

(4 marks)