**END TERM 1-2020.**

**FORM 3**

**PHYSICS PAPER 1**

**TIME: 2 HOURS.**

**NAME ……………………………………………………**

**ADM NUMBER …………………………………………**

**DATE…………………………………………………….**

**-***Write your name, admission number and exam date on the spaces above.*

*-This paper consists of 8 printed pages. Check the question paper to ascertain that all the pages are printed as indicated and that no question is missing.*

**For examiner’s use only**

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| **QUESTION** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** |
| **SCORE** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

TOTAL SCORE

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 **SECTION A: (25 MARKS)**

***Answer all the questions in this section.***

1. A stopwatch started 0.36s after the start button was pressed. The time recorded using a stopwatch for an athlete running from point A to B was 12.86s. Determine the actual time taken by the athlete. (2mks)

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**2.** Fig 1.0 shows a spherical ball held between the anvil and the spindle of a micrometer screw gauge.



Determine the radius of the spherical ball. Give your answer in SI units. (2 marks)

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**3.** Figure 2.0 shows a loop of cotton thread tied onto a wire frame. The figure is dipped into a soap solution and withdrawn.



Illustrate and explain what happens to the shape of the loop of thread when part A is broken by touching it with a hot needle. (2 marks)

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**4.** Figure 3.0 shows a brick of mass 8.0kg standing upright on the ground as shown.



 What is the pressure it exerts on the ground ? (g = 10Nkg-1) (3 marks)

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**5.** The figure 4.0 shows a rod made of wood on one end and metal on the other end suspended freely with a piece of thread so that it is in equilibrium.



The side made of metal is heated with a bunsen burner flame. State with a reason, the side to which the rod is likely to tilt. (2mks)

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**6.** State the relationship between Physics and Mathematics. (1mark)

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**7.** The diagram in fig 5.0 shows a section of a pipe with different cross-sectional area.



If water flows with a velocity of 10m/s in section A, what would be the velocity of water in

section B ? (3 marks)

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**8.** Determine the spring constant of a spiral spring whose length changes from 10cm to 18cm when a load of 10.0N is suspended from its lower end. (3 marks)

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**9.** Figure 6.0 below shows a wooden sphere with a nail hammered into it as shown.



The sphere is rolled on a horizontal ground and comes the rest after sometime at point Y. Draw the sphere after it comes to rest at point Y. (1 mark)

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**10.** When the temperature of an enclosed gas at constant pressure is raised, the volume of the gas increases. Explain how the molecules of the gas causes the increase in volume. (2 marks)

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**11.** It is easier to stop a saloon car than a bus when both are moving with the same velocity. Explain. (2 mks)

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**12.** Figure 7.0 (a) shows a displacement-time graph. Sketch a velocity-time graph on fig. 7.0(b) (1mark)



**13.** State the law of conservation of energy.(1mark)

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**SECTION B(55 MARKS).**

***Answer ALL the questions in the spaces provided.***

**14.** a) State the principle of conservation of linear momentum. (1mk)

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b) Distinguish between elastic and inelastic collision. (1mk)

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c) A stricker kicks a ball of mass 200 g initially at rest with a force of 78N. Given that the foot was in contact with the ball for 0.30s, determine the take – off velocity of the ball. (3mks)

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d) A high jumper usually lands on a thick soft mattress. Explain how the mattress helps in reducing the force of impact. (2mks)

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e) A ball is throne horizontally from the top of a vertical tower of height 75m and strikes the ground at a point of 80m from the bottom of the tower. Determine the:

i) Time taken by the ball to hit the ground (acceleration due to gravity= 10m/s) (3mks).

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ii) Initial horizontal velocity of the ball. (2mks)

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**15.** (a). (i) Define the term velocity and state its SI unit. (2 marks )

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(ii) The figure below show a tape obtained from a ticker timer operated at a frequency of 100 Hz.



 Determine the time taken to move from one dot to the successive dot. (2 mks )

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 (b) A student from Favour high school threw a stone horizontally at a velocity of 25 m/s from a top of a tree 45 m high. Calculate;

(i) The time taken by the stone to hit the ground.( take g = 10 m/s2 ) (3 marks )

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(ii) The distance covered by the stone horizontally from the base of the tree. (3 marks)

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(c) A car started from rest and accelerated uniformly at 2 m/s2 for 5 seconds. It then travelled for 3 seconds with attained velocity before accelerating again at 2.5 m/s2 for 2 seconds. The car was brought to rest within 2 seconds.

(i) Sketch a velocity - time graph for the car’s motion. (3 marks)

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(ii) Calculate the total distance covered by the car from the graph in (i) above. (3 marks)

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**16.** a) i) State the Newton’s second law of motion. (2 mks )

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ii) Show that f = ma from the Newton’s second law of motion in part (i) above. (3 marks)

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b) A bullet of mass 20g is shot from a gun of mass 20 kg fired by a stationary soldier at a velocity of 200 m/s . Determine .

 i) The recoil velocity of the gun. (3 marks)

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ii) Explain your answer in b (i) above. (2 mks )

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c) A box of mass 20 kg is opposed by a frictional force whose co-efficient is 0.8 . Calculate,

i) Frictional force on the box. (3 marks)

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 ii) State two methods of minimizing frictional force. (2 mks)

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**17)** a) Use the table below to answer the questions that follow;



i)Complete the table by filling in the missing values. (2mks)

(ii) Plot a graph of force ( x-axis ) against extension. (5mks)**(The grid to be provided by the examiner)**

(iii) From the graph, determine the spring constant. (2mks)

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(iv) Why will the graph not be linear if a large mass is hung? (1mks)

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b) A spring with a spring constant of 25 N/cm extends by 5 cm when a certain force acts on it. Determine the work done by the force. (2mks)

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