**Name**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**Adm. No**. \_\_\_\_\_\_\_\_\_\_\_\_\_ **Class**: \_\_\_\_\_\_\_\_

**MOI HIGH SCHOOL – KABARAK**

**COMMON I EXAMINATIONS**

**TERM TWO, 2018**

**PHYSICS**

**FORM THREE**

**Time: 2 hours**

**INSTRUCTIONS TO STUDENTS**

* *Write your name, admission number and class in the spaces provided at the top of this page.*
* *Answer* ***ALL*** *the questions in the spaces provided.*
* *All working* ***MUST*** *be clearly shown.*
* *Mathematical table and electronic calculators may be used.*
* *Answers should be in decimal points and NOT fractions.*

**For Examiner’s use only**

|  |  |  |
| --- | --- | --- |
| **QUESTION** | **MAXIMUM SCORE** | **STUDENT’S SCORE** |
| 1 – 22 | 100 |  |

**SECTION A (50 MARKS)**

1. A micro meter screw gauge was used to determine the diameter of a cylindrical rod and the following was the reading.

(a) (i) State the reading. (1 mark)

(ii) If the instrument had a error of -0.03mm, what is the actual reading? (1 mark)

(b) If the length of the rod is 12.0cm, what is the volume of the rod? (3 marks)

2. (a) Explain the importance of the following features of a liquid in glass thermometer.

(i) thin walled bulb (1 mark)

(ii) Thick walled stem with a bulge in glass down one side. (1 mark)

(b) The distance between the upper and lower fixed points on a mercury thermometer is 30cm. What is the temperature in 0C when the mercury level is 15cm above the lower fixed point? (3 marks)

3. (a) (i) Show on the diagram and name the acting on a spherical ball (marble) falling through glycerine. (3 marks)

(ii) State what happens to each of the forces as the ball moves downwards.

(b) Explain the motion of the marble in the following.

C

Velocity (m/s)

D

B

Time(s)

A

(i) AC (1 mark)

(ii) CD (1 mark)

4. 60 cm3 of milk is mixed with 20cm3of water. If the densities of milk and water are 1.04g cm-3 and 1.0g cm-3 respectively. Calculate the density of the mixture. (3 marks)

5. (a) Determine the centre of gravity by construction of the lamina shown below. (2 marks)

(b) State the ***two*** ways in which stability of a bus under construction can be increased. (2 marks)

6. Explain in terms of particles and the kinetic theory;

(a) The observation that if a perfume is sprayed at one end of a room, it can be detected by the sense of smell throughout the room. (2 marks)

(b) The process of diffusion is speeded up by high temperatures. (2 marks)

7. Explain why iron fillings are not suitable for plotting lines of force of a weak magnetic field. (1 mark)

8. (a) Give ***two*** difference between primary and secondary cells. (2 marks)

(b) In making a simple cell, two electrodes used are not of the same metal. Explain.

9. In an experiment to determine the focal length of a concave mirror, the values of image distance (u) and object distance, v are recorded in a table as shown below.

|  |  |  |  |
| --- | --- | --- | --- |
| Object  distance, u(cm) | Image  distance, v(cm) | uv(cm2) | u + v(cm) |
| 15.0 | 30.0 |  |  |
| 20.0 | 20.0 |  |  |
| 25.0 | 16.7 |  |  |
| 30.0 | 15.0 |  |  |
| 35.0 | 14.0 |  |  |

(a) Complete the table for values of uv and u + v. (2 marks)

(b) Plot a graph of uv(y axis) against u + v. (5 marks)



(c) Calculate the slope of your graph. (2 marks)

(d) What is the significant of the slope? (1 mark)

10. A man uses of rope to pull a box of mass 30kg up a 5m plane inclined at an angle of 300 to the horizontal at a constant speed. Calculate;

(a) the work done on the box. (2 marks)

(b) the work done by the effort if the value of the effort is 250N. (2 marks)

(c) the work done against friction. (1 mark)

(d) the efficiency of the system. (2 marks)

11. Explain why when two inflated balloons are suspended close to each other and air blown in the pace between them the balloons move towards each other. (2 marks)

12. The total cross-sectional area of all blood capillaries in a person’s circulatory system is 0.25m2. If the blood flows at 100cm3/s, what is the average velocity of blood in the capillaries? (2 marks)

13. (a) State and explain two factors that affects the spring constant of a spiral spring. (2 marks)

(b) Fig shows a graph that was drawn from the results obtained in an experiment to study the extension of a spring.

Force F(n)

K

1.0

0.5

4

Extension e(x10-2m)

8

From the graph, determine;

(i) the spring constant K. (2 marks)

(ii) The work done in stretching the spring from 4 x 10-2m to 8 x 10-2m. (c) Three identical springs of spring constant 100Nm-1 are arranged as shown to support 50N load.

50

Determine the total extension in this arrangement. (3 marks)

14. A ship sends out an ultra sound whose echo is received after 4 seconds. The wavelength of the sound in water is 0.25m and the frequency of the transmitter is 6kH. Calculate,

(a) the velocity of the waves in water. (2 marks)

(b) the depth of the sea. (2 marks)

15. The fig. shows two bar magnets placed near each other. A conductor carrying current is placed between them as shown.

N

S

(a) Draw on the diag. the combined magnetic field between the bar magnets. (2 marks)

(b) Hence, or otherwise indicate the direction of the force on the conductor. (1 mark)

(b) State ***two*** adjustments that can be made on the arrangement to increase the magnitude of the force on the conductor. (2 marks)

16. Distinguish between distance and displacement. (1 mark)

17. A man threw a stone from the top of a building 125m high at an horizontal velocity of 30ms-1. Calculate given g = 10ms-2.

(a) The time the stone took to hit the ground below. (3 marks)

(b) The distance from the foot of the building to where the stone hit the ground below. (2 marks)

(c) The vertical velocity just before the stone hits the ground. (2 marks)

(d) On the axes provided below, sketch a displacement – time graph for a body moving at uniform velocity. (1 mark)

18. The diagram below shows two iron rods of same length but different cross sectional area. Fixed into two identical containers containing equal amounts of water at room temperature. The two rods are then heated at the end shown using same source heat.

Thermometer B

Thermometer A

Thick rod

Heat

State and explain the observation made on the thermometers A and B after some time of heating. (2 marks)

19. The diagram below shows a steering wheel of diameter 40cm.

The driver applied two anti-parallel forces F1 and F2 each 20N. Determine the moment of the antiparallel forces applied. (2 marks)

20. Figure (a), (B) and (c) shows a lift pump at sea level being operated mechanically.

(a) Explain what happens.

(i) in figure (a) (2 marks)

(ii) in figure (b) (2 marks)

(b) What is the purpose of the valve? (1 mark)

(c) Determine the value of height h given that the atmospheric pressure is 760 mm/Hg density of mercury is 13600 kg/m3 density of water = 1000 kg m-3. (2 marks)

21. A person of mass 80kg stands on a weighing machine in a lift as shown in the diagram. (Take g = 10m/s2)

Determine the reading of the balance when the lift is;

(i) Stationary. (1 mark)

(ii) Accelerating upwards at 1.5 m/s2. (2 marks)

(iii) Ascending at constant velocity. (2 marks)

(iv) Falling freely. (2 marks)