PHYSICS
024

14/03/2024 8:30 AM -11:30 AM

REPUBLIC OF RWANDA

KARONGI DISTRICT

KARONGI DISTRICT COMPREHENSIVE ASSESSMENT, 2023-2024

ORDINARY LEVEL 2nd TERM EXAMNATION,

SUBJECT: PHYICS

PAPER I: THEORY

CLASS: S2

DURATION: 3 HOURS

INSTRUCTIONS:

1) This paper has **TWO** sections: **A** and **B**
   SECTION A: Attempt **ALL** questions **(70 marks)**
   SECTION B: Attempt **ONLY THREE** questions **(30marks)**
2) You may use mathematical instruments and non-programmable calculator **where necessary**.
3) Do not open this question paper until you are told to do so
4) Use only a **blue** or **black** pen and a pencil for drawing

1.a. Answer each question with **yes** or **no**. Must two quantities have the same dimensions:

(i) if you are adding them? **/1mark**

(ii) If you are multiplying them? **/1mark**

(iii) If you are subtracting them? **/1mark**

(iv) If you are dividing them? **/1mark**

(v) If you are equating them **/1mark**

b. Arrange the following measurements in order of precision beginning with the most precise:
17.04 cm; 843 cm; 0.006 cm; 342.0 cm **/2marks**

2.a.Copy and Complete the following table: **/3marks**

Numbers	Number of Significant figures
5001.000	
0.0050830	
0.004004500	

b.What are the physical quantities whose the dimensions are given below?**/2marks**

i. $M^1 L^1 T^{-2}$ ii. $M^0 L^1 T^{-1}$

3. Read each of the following statements and write **True** if it is correct and

False if it is wrong:

i. Distance and displacement are always the same. **/1mark**

ii. As a ball falls freely, the distance it falls each second is the same. **/1mark**

iii. For an object thrown upward, the time it takes to reach its peak heightis the same as the time it takes to fall from the peak height . **/1mark**

iv. Uniform rectilinear motion is a rectilinear motion with constant acceleration. **/1mark**

4.a.what is frictional force? /**2marks**

b.state any two ways of minimizing the friction between surfaces in contact /**2marks**

5.Imagine a system that works in presence of high friction and that cannot work well when the friction is law **/5marks**

6.a.Define the terms that follow **/2marks**

i.density of a substance ii.pressure

b. What factors pressure in liquids depends on? /**2marks**

c. What factors that pressure in solids depends on? **/2marks**

7. a.Explain the following observations

i.An egg sinks in fresh water, but floats in a strong salt solution. **/2marks**
ii.We cannot walk comfortably on sand but camel can run in a desert easily. **/2marks**

b. The density of mercury is 13600 kgm^{-3} ,what is the gauge pressure under ten metres of mercury ?(Take g= 9.8ms^{-2}) **/3marks**

8.a.Define the following terms **/3marks**

i.an open system ii.a closed system iii.isolated system

b.State the law of conservation of mechanical energy in isolated system **/2marks**

9.a.what are the uses of the following instruments?

i. Sphygmomanometer **/1mark**

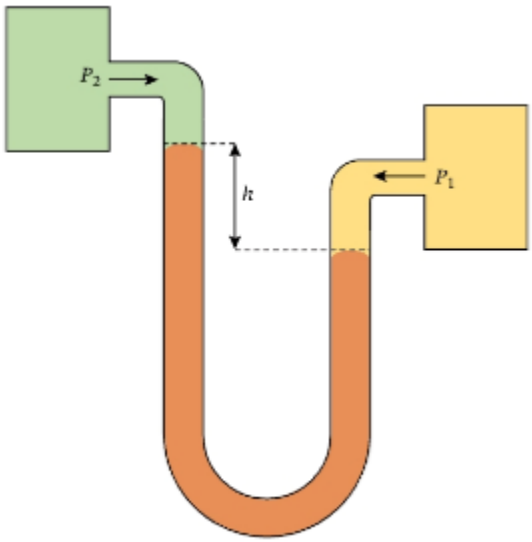
ii. An aneroid barometer **/1mark**

iii. Manometer **/1mark**

10.a.How is Hare's apparatus useful? **/2marks**

b.The diagram below shows a liquid column manometer connected at opposite ends to two gas reservoirs. The pressures of the gas reservoirs are P_1 =123.3kPa and P_2=110.1kPa.The U-shaped tube contains an oil with density of 1080 kgm^{-3}. Determine the vertical distance h between the tops of the oil columns? Give your answer to two decimal places. (Take g=9.81ms^{-2})

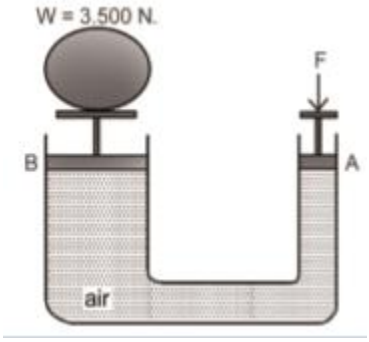
/5marks



11.a. State Pascal's principle **/2marks**

b. List any two applications of Pascal's principle **/2marks**

12. Area of A is 60 cm^2 and area of B is 4,200 cm^2, determine the external input force of F.



/3marks

13.a. State the Archimedes' principle **/2marks**

b.Define the following terms **/2marks**

i.Upthrust ii.Apparent weight of an object

14.Define the following terms and state their SI units **/3marks**

a.work b.energy c.power

15. Use g = 10 ms^{-2}

a.Metal block of density 7800 kgm^{-3} weighs 117N in air and 105 N in liquid when wholly immersed. Calculate the density of the liquid. **/2marks**

b. A body weighs 450 g in air and 310 g when completely immersed in water. Find

(i) the loss in weight of the body **/2marks**

(ii) the upthrust on the body **/2marks**

(iii) the volume of the body **/2marks**

c.Submarine works on Archimedes'principle.Invent your own system that works on the same principle **/5marks**

16.a.Match each of the following physical quantity with its meaning **/5marks**

e.g: 7-p;8-h;9-q

Physical quantity	Meaning
1.Power	a) The capacity for doing work
2.Energy	b) Any interaction that can change the motion of an object
3.Work	c) The rate at which work is done
4.Potential energy	d) Energy transfer that occurs when an object is moved over a distance by a force applied in the direction of the displacement
5.Force	e) Energy possessed by an object because of its position

b.i. A ball of mass 2kg is kept on the hill of height 3km. Calculate the potential energy possessed by the ball.($g = 9.8ms^{-2}$) **/2marks**

ii. A motor has to move a fully load at a steady speed of 3 m/s. The load has a mass of 1850kg (ignore friction). What is the minimum power of the motor to raise the load at a steady speed?

(Take $g = 10ms^{-2}$) **/3marks**

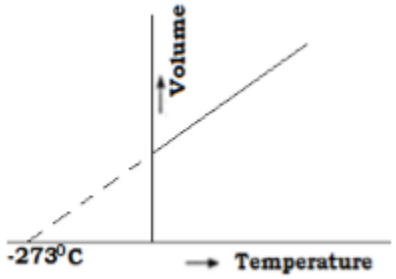
17.a. State

i. Dalton's law of partial pressure **/2marks**

ii. Avogadro's hypothesis **/1mark**

b. A fixed mass of gas at constant pressure has a volume of 100 cm^3 at 27^0C. Find its volume at temperature of 54^0C. **/3marks**

c. The graph V- T below, is an isobaric graph , analyse it and then answer the questions that follow:



i.How do we call the temperature represented on the graph above? **/2marks**

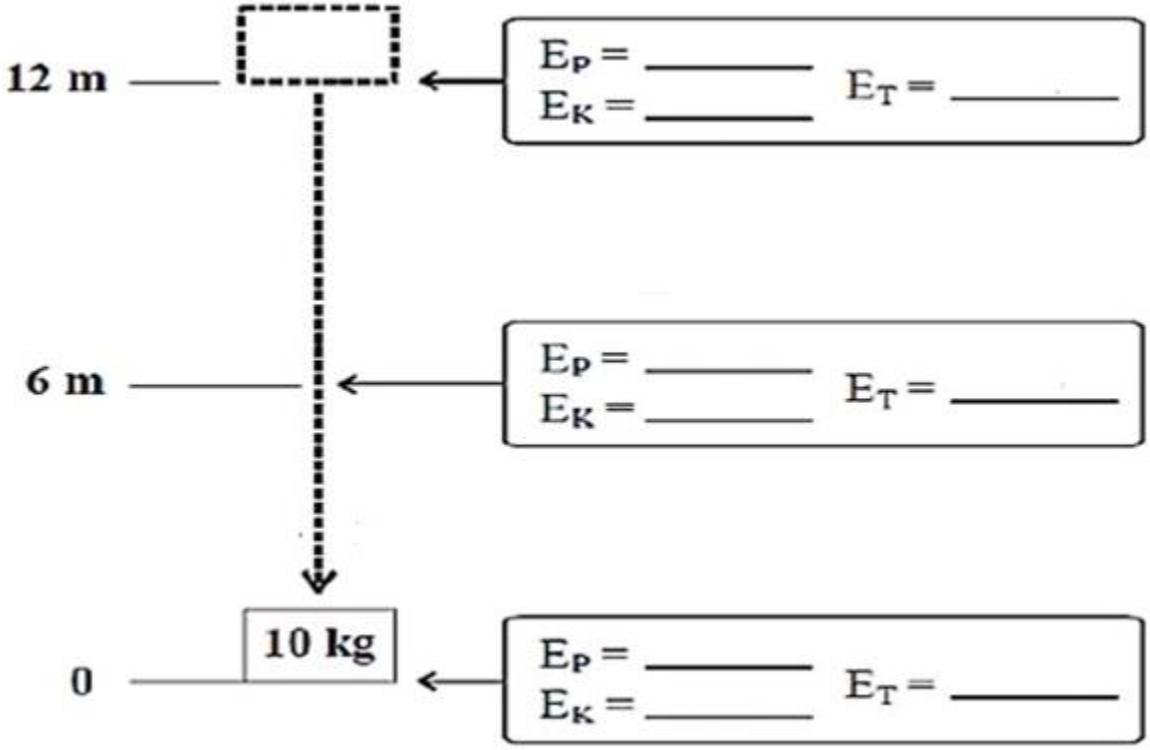
ii.Explain the answer that you have mentioned in(20.b.i) **/2marks**

18.a.define

i. elastic potential energy **/1mark**

ii.gravitational potential energy **/1mark**

b.A 10kg object falls from a height of 12m. Redraw and fill in the potential, kinetic and total energy of the object (or mechanical energy) at the given points .($g=10ms^{-2}$ **)** **/4.5marks**



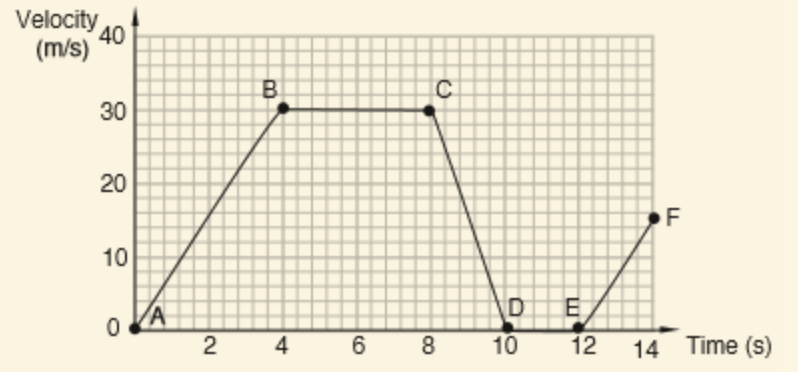
c. Justify the following statement: **/3.5 marks**

‘’Energy can be transformed from one form of energy to another form of energy’’

19.a.Define the following terms **/2marks**

i.Acceleration ii. Displacement

b.The figure below shows the motion of a motorcyclist on a straight road. Use the information on the graph to answer the following questions



i In which section of the graph was the cyclist accelerating most rapidly? **/2marks**

i. Calculate the acceleration of the motorcyclist from the graph. **/2marks**

iii. Calculate the retardation of the motorcyclist from the graph. **/2marks**

iv. Which part of the graph shows that the motorcyclist was stationary and for how long? **/2marks**

20.a.State

i. Boyle's law **/2marks**

ii. Charles' law **/2marks**

b.Explain the following processes:

i. isochoric process **/2marks**

ii. isobaric process. **/2marks**

iii. isothermal process. **/2marks**