REPUBLIC OF RWANDA
SOUTHERN PROVINCE
HUYE DISTRICT



THE END OF TERM TWO COMPREHENSIVE ASSESSMENT

ADVANCED LEVEL

SUBJECT: PHYSICS
CLASS: S4

- MPG (Mathematics-Physics-Geography);
- PCB (Physics-Chemistry-Biology);
- PCM (Physics-Chemistry-Mathematics).
- MPC (Mathematics-Physics-Computer science)

Date:

Duration: From 8h30-11h30

This paper consists of TWO sections: A and B.

- **Section A: This section is compulsory (70 marks).**
- **Section B: Attempt any three questions (30 marks)**

Section A: This section is compulsory (70 marks).

1. Optical fibers are mainly used for which of the following: **(1mark)**

i. Music instrument
ii. Food industry
iii. Weaving
iv. Communication

2. A body of mass **m** is projected at an angle **θ** from the ground with an initial velocity v. Acceleration due to gravity is g. What is the maximum horizontal range covered? **(1mark)**

(i) $R = v^2 (\sin 2\theta)/g$
(ii) $R = v^2 (\sin \theta)/2g$
(iii) $R = v^2 (\sin 2\theta)/2g$
(iv) $R = v^2 (\sin \theta)/g$

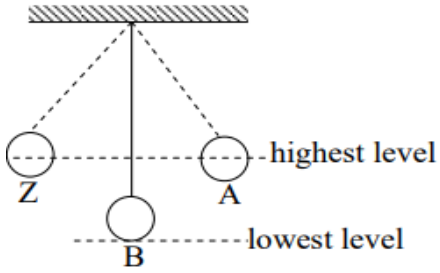
3. The path followed by a projectile in the air is : **(1mark)**

(i) circular (ii) parabola (iii) Elliptical
(iv)Straight line

4. A crane raises a mass of 500 kg vertically upwards at a speed of 10 ms^{-1}. Find the power developed **(1mark)**

A. 5.0×10^0 B. 5.0×10^1 C. 5.0×10^2 D. 5.0×10^4

5. The figure below shows an oscillating pendulum bob. Which of the following statements is true about its motion? **(1mark)**



A. the K.E at B is equal to the K.E at A
B. the K.E at B is less than the P.E at A
C. the K.E at B is equal to the P.E at A.
D. the K.E at B is greater than the P.E at Z.

6.a)What is : i) energy **(1mark)**
ii) work **(1mark)**
iii) power **(1mark)**

b) A man lifts a box of mass 10 kg through a vertical height of 2 m in 4 seconds. Calculate the power He developed **(2marks)**

7. a)Differentiate renewable and non –renewable sources of energy and provide examples for each. **(2marks)**

b)

A truck of mass 1500kg moves with uniform velocity of 5.0ms^{-1} up a straight track inclined at an angle of 30° to the horizontal. The total frictional resistance to the motion of the truck is 580N. Calculate:

(a) the power developed by the engine.

(b) if the engine of the track in (a) above can not develop a power greater than 75kW. Calculate the maximum speed greater attainable by the track.

(3marks)

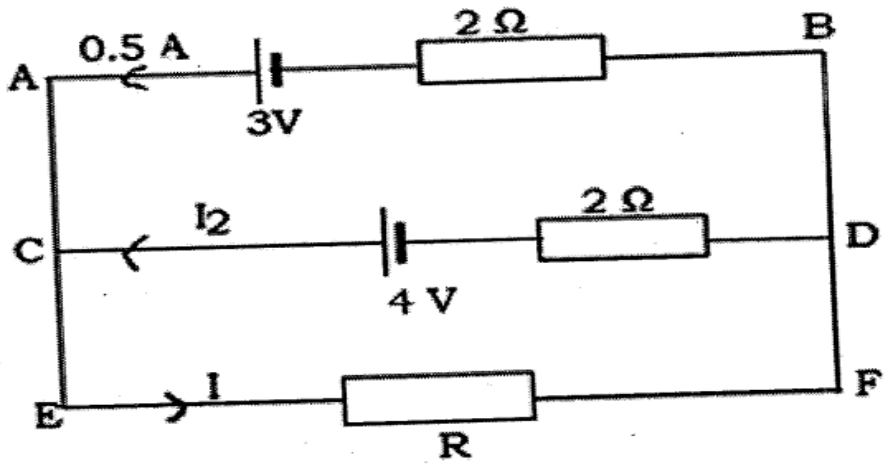
c) what are the advantages of using renewable energy sources over non-renewable sources of energy **(6marks)**

8. Match the elements of **column A** With **Column B** **(4marks)**

Column A	**Column B**
1. retina	**a**. angle between two rays of light from extremities of object and penetrating into the eye of the observer
2. visual angle	**b**.it controls the amount of light entering the eye
3. iris	**c**. It controls the bending of light rays by changing its shape
4. lens	**d**. sensitive part of the Eye and where the image is formed

9. a) state kirchhoff's laws for complex electrical circuit **(2marks)**

b) Analyze the following electric circuit , then answer the questions below



Determine :

I. Electric current I_2 in the arm CD (**2marks)**

II. The p.d V_R across unknown resistance **(2marks)**

III. The Electric current I (**1mark**)

10.a) Explain the following terms as they are used in projectile motion

i. Projectile **(6marks)**

ii. Projectile motion

iii. Angle of projection

iv. Maximum height

v. Range

vi. Time of flight

b) A short is fired from the top of a Cliff 200m high with a velocity of 500 ms^{-1} at an elevation of 30^o . Find;

(i) the time taken and **(2marks)**

(ii) the distance from the point where the shot strikes the ground to the bottom of the Cliff. **(2marks)**

iii) The distance from the ground to the highest point reached. **(3marks)**

11. Using a table Compare human eye and lens camera by types of lens, method of focusing image and light control. **(6marks)**

12.a)What is ? : i) momentum of a moving particle **(1mark)**

ii) collision **(1mark)**

iii) impulse **(1mark)**

b) state any one application of momentum in daily life **(1mark)**

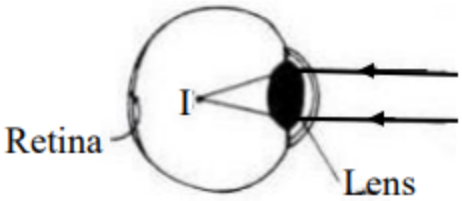
c) Differentiate elastic collision from inelastic collision **(2marks)**

d) Two bodies of mass 3kg and 5kg travelling in opposite directions on a horizontal surface collide. The velocities of the 3kg and 5kg bodies before collision are $6ms^{-1}$ and $5ms^{-1}$ respectively. They separate after collision and move in the same direction in which the 5kg body was moving before collision. Given that the velocity of the 5kg body after collision is $1ms^{-1}$, find the speed of the 3kg body after impact and the percentage loss in energy (if at all it is There). **(5marks)**

13. Enumerate any two ways that can be used to reduce Great forces that are produced during collision. **(2marks)**

14. **(4marks)**

The diagram in figure shows one of the eye defects in human.



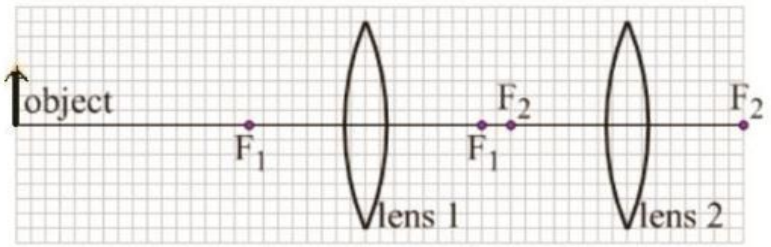
(a) (i) State the type of eye defect shown in the diagram.
(ii) Explain with a help of diagram how the defects can be corrected.
(b) What is meant by accommodation?

15. state any two defects of lens and explain how it can be corrected. **(2marks)**

Section B: Attempt any three questions (30 marks)

16.

A toy train with a height of 4.0 cm is placed at 24 cm from a converging lens that has a focal length of 8.0 cm. A second converging lens, identical to the first, is placed at 18 cm from the first lens and on the opposite side of the lens from the train as shown in figure 7.



a) Calculate the position of the image created by the first lens. **(2 marks)**

b) Repeat part (a), but for the second lens, to find the position of the final image. **(2 marks)**

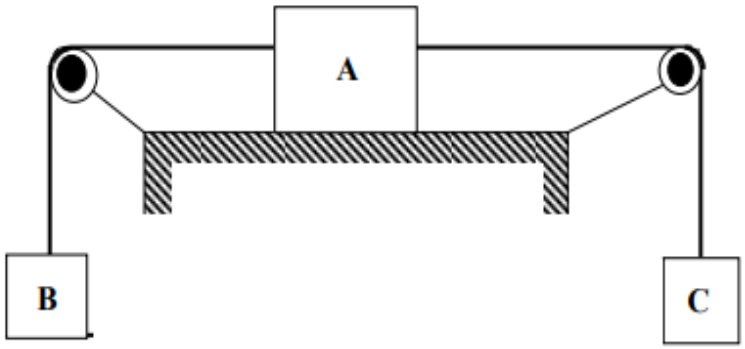
c) Use a graph paper to draw a ray diagram to support your calculations. Use appropriate scale. **(2 marks)**

d) Determine the overall magnification of this two-lens system. **(2 marks)**

e) Deduce, from your results, the characteristics of the final image. **(2 marks)**

17. **(a)** state the conditions of rigid body to be in equibrium. **(2marks)**

(b) Three blocks A, B and C of masses 5kg, 3kg and 2kg respectively are arranged as shown below, and the system is released from rest. If the coefficient of sliding friction between block A and the table is $\frac{1}{7}$, calculate : i)the acceleration of the system ii) the tension strings **(8marks)**



18. The sun is the source of energy for all our energy resources except geothermal, nuclear and tidal. Discuss about this statement. **(10marks)**

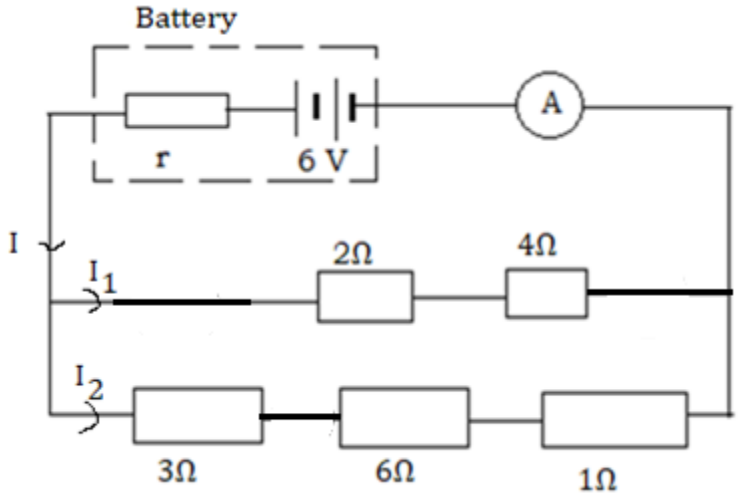
19. Dicuss about the challenges that are faced by energy sector in Rwanda **(10marks)**

20. a) Explain the terms below in words as used in electricity

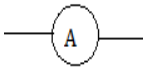
(i) Electromotive force of a battery **(0.5mark)**

(ii) Resistance of a conductor **(0.5mark)**

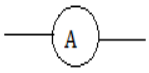
b) Analyze the following electric circuit and then answer the following Sub- questions. The battery has emf of 6 V and internal resistance r The electric current I is 1.5 A.



(i)Determine the equivalent resistance of all external resistors **(5 marks)**
(ii)Find the internal resistance of the battery **(0.5 mark)**
(iii)Calculate the terminal voltage of the battery **(0.5 mark)**
(iv)What does the symbol below represent? **(0.5 mark)**



(v)Observe the given electric circuit then determine the reading of the measuring instrument below



(0.5mark)

(vi)Determine

1)The current I_1 **(1mark)**
2)The current I_2 **(1 mark)**

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