REPUBLIC OF RWANDA

GATSIBO DISTRICT

END OF THE SECOND TERM EXAMINATION MARCH 2024

SUBJECT:PHYSICS

DATE: ..../03/2024

CLASS: SENIOR FOUR (S4)

DURATION: 3 hours

MAX: 100 MARKS

COMBINATIONS

- **MATHEMATIC-PHYSICS-GEOGRAPHY. (MPG)**
- **MATHEMATICS-PHYSICS-COMPUTER SCIENCE. (MPC)**
- **PHYSICS-CHEMISTRY-BIOLOGY. (PCB)**
- **PHYSICS-CHEMISTRY-MATHEMATICS. (PCM)**
- **PHYSICS-ECONOMICS-MATHEMATICS. (PEM)**

INSTRUCTIONS:

1. This paper consists of **two** sections: **A** and **B**.

   Section A: attempt all questions **(70 marks)**

   Section B: attempt only **three** questions. **(30 marks)**

2. Non- programmable scientific calculators and mathematical sets may be used.

Section A: **attempt all questions** **(70 marks)**

1. Complete the following sentence: **(5 marks)**

(a) An object is placed at a distance of more than 40 cm from a convex lens of focal length 20 cm.
The image formed is real, inverted and… ……

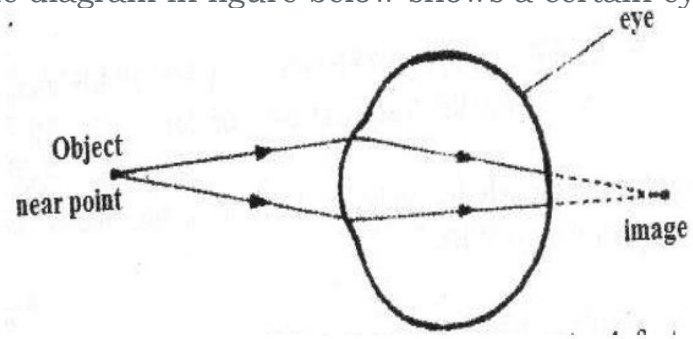
(b) An object is placed at a distance 2f from a convex lens of focal length f. The image formed is…… ……that of the object.

(c) An object is placed at a distance 5 cm from a convex lens of focal length 10 cm. The image formed is virtual, upright and… ……

(d) A ray of light that passes through the optical centre of a lens emerges……

(e) When white light passes through a prism, it undergoes ……..

2. The diagram in figure below shows a certain eye defect.



a) Name the defect. **(2marks)**

(b) Draw on the same diagram an arrangement to correct the defect. **(3marks)**

3. An object is placed 20cm from a converging lens of focal length 15 cm. Find position, magnification and the nature (properties) of the image. **(6 marks)**

4. a) What is ***normal adjustment*** of an astronomical telescope? **(3 marks)**

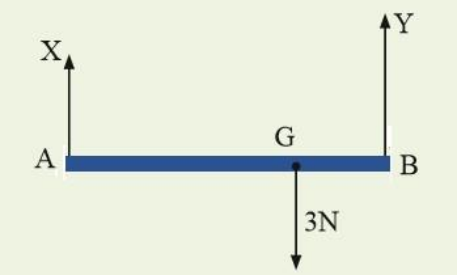
b) An astronomical telescope has an objective lens of focal length 120 cm and an eye piece of focal length 5 cm. If the telescope is in normal adjustment, what is;

i) The angular magnification (magnifying power)? **(3marks)**

ii) The separation of the two lenses? **(3marks)**

5. A horizontal rod AB is suspended at its ends by two strings. (See the figure below). The rod is 0.6m long and its weight of 3N acts at G where AG is 0.4m and BG is 0.2m. Find the

tensions X and Y. **(4 marks)**



6. a) match with the letter in the physical quantities column, with its corresponding number in the meaning column. **(7 marks)**

A. Work	1. Linear momentum is conserved , the total kinetic energy is conserved and the bodies separate after collision
B. Power	2. Energy possessed by moving object
C. Potential energy	3. Energy possessed by a stretched or compressed body
D. Kinetic energy	4. Work done in raising the body through a height
E. kilowatt-hour	5. The rate of doing work
F. Elastic collision	6. Product of force and distance moved in direction of the force
G. Elastic potential energy	7. Unity of energy

b) state the law of conservation of linear momentum. **(2 marks)**

7. a) State **two** quantities that are conserved in an elastic collision **(2 marks)**
b) A machine gun fires bullets of mass 0.014 kg at a speed of 640 m s^{-1}
Calculate the momentum of each bullet as it leaves the gun. **(3 marks)**

8. Enumerate any two factors on which the resistance of a conductor depends **(2 marks)**

9. All fossil fuels are nonrenewable but not all non-renewable energy sources are fossil fuels.

a. Differentiate between fossil fuel and renewable energy sources. **(2 marks)**

b. From the list of non-renewable energy sources, select one example which is not a fossil fuel. **(1 mark)**

c. Give any two example of a renewable energy. **(1mark)**

d) Provide anyone example of fossil fuel. **(1 mark)**

10. The burning of fossil fuels, which release green house gases into the atmosphere is one of the Causes of global warming. Propose any one solution of global warming. **(3 marks)**

11. What do you understand by the term degradation of energy? **(2 marks)**
Explain it by taking one example of your daily life. **(1mark)**

12. A fuel burning power station uses 2000 joules of fuel energy to generate 600 joules of electrical energy. The rest of the fuel energy is wasted as heat.

a) How much fuel energy is wasted as heat? **(2marks)**

b) Calculate the efficiency of the power station. **(2 marks)**

13. Explain energy transformation in hydropower plant **(4 marks)**

14. A car moves around a circular path of a constant radius at a constant speed. Which of the following statements is true?

A. The car's velocity is constant
B. The car's acceleration is constant
C. The car's acceleration is zero
D. The car's velocity is directed toward the center
E. The car's acceleration is directed toward the cente **(2 marks)**

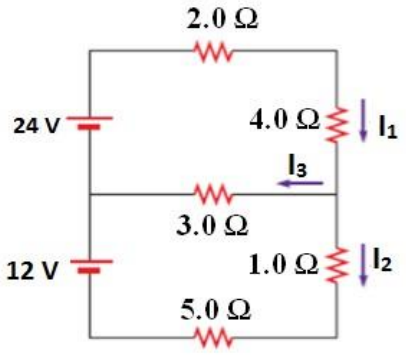
15. **a)** what is a projectile motion. **(2 marks)**

b) give atleast two real life examples where projectile motion is applicable. **(2 marks)**

Section B: attempt only **three** questions. **(30 marks)**

16. **a)** State Kirchhoff's law of electric current. **(2 marks)**

b) Find the currents I_1, I_2, and I_3 in the circuit shown in Figure below. **(8 marks)**



17. Processes related to both energy generation and energy consumption are associated with some negative and harmful environmental effects. In four points, discuss this topic. **(10 marks)**

18. A body is projected at an angle of 30^0 to the horizontal with velocity of 25m/s. Find:

a) The horizontal and vertical components of velocity **(2marks)**
b)The maximum height reached **(2 marks)**
c) The time of flight **(2 marks)**
d) The time to reach the maximum height **(2marksS)**
e) The horizontal range **(2 marks)**

19. **a)**Differentiate refracting telescope and reflecting telescope. **(2 marks)**

b) what are the differences of compound microscope over an astronomical telescope? **(3 marks)**
c) A telescope has two lenses which are 124m from each other. The angular magnification of the telescope is 30. What are the focal lengths of the objective and eyepiece of lenses? **(5 marks)**

20. **a) i**)State the types of static equilibrium **(3 marks)**
(ii) State the conditions under which a rigid body is in equilibrium under the action of coplanar forces. **(2 marks)**

b) A uniform ladder of length ℓ and weight mg =50 N rests against a smooth, vertical wall . If the coefficient of static friction between the ladder and the ground is f_s =0.40, find the minimum angle θ_{min} at which the ladder does not slip. (***5marks)***

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