Republic Rwanda

Ministry of education

Eastern province

Kirehe District

Exam: PHYSICS II
Maximum: 100 MARKS
Class: SENIOR FOUR
Date: 14/03/2024
Duration: 3hours

SECOND TERM PHYSICS EXAMINATION /2023-2024

INSTRUCTION TO CANDIDATES:

-The test is composed of two sections A and B

-Attempt ALL questions for section A and any THREE for section B

COMBINATIONS:

PHYSICS-CHEMISTRY-MATHEMATICS (PCM)

MATHEMATICS- PHYSICS- COMPUTER SCIENCE (MPC)

PHYSICS –CHEMISTRY- BIOLOGY (PCB)

MATHEMATICS –PHYSICS- GEOGRAPHY (MPG)

PHYSICS-ECONOMICS-MATHEMATICS (PEM)

SECTION A: ATTEMPT ALL QWESTIONS (55Marks)

1. Copy the following table and categorize each physical quantity as being either a vector or a scalar quantity. **(3marks)**

Physical quantity	Category
Energy	
Linear momentum	
Pressure	

2. Match each of the following physical quantity with its meaning (**5marks)**

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

3. Choose the letter that corresponds to the correct answer
   a) Optical instrument used to view things that are far away is (**1marks)**

   i) compound microscope ii) simple microscope

   iii) telescope iv) camera

   b) Short sightedness/myopia can be corrected using **(1marks)**

i) Convex lens ii) convex mirror

iii) concave mirror iv) concave lens

c) A10 kg box is accelerated from 2 m/s to 4 m/s. Use work energy theorem to find work needed to accelerate the box **(2 marks)**

i)50 J ii)20 J iii)60 J iv)100 J

4. A 2250kg pickup truck has a velocity of 25m/s to the east. What is the momentum of the truck? **(3marks)**

5. a) What is meant by the term energy degradation? **(1 mark)**
   b) Explain energy transformation in hydropower plant **(4 marks)**
6. a) What do you understand by the following terms?
   (i)Fossil fuel **(1mark)**
   (ii) Renewable energy **(1mark)**
   b) Identify the energy resources used in Rwanda related to
   (i) fossil fuels **(2 marks)**
   (ii) renewable energies **(2 marks)**

7. a) What is compound microscope used for? **(1mark)**
   b)(i)What is myopia/nearsightedness ? **(1mark)**
   (ii)How is myopia corrected? **(1mark)**

8. Complete the following statement with appropriate term:

   i) ……of an object is the product of mass and velocity of moving body. **(1mark)**

   ii) The quantity given by the product of force and the time is called……. **(1mark)**

   iii) If you want to open a heavy door an appropriate quantity is ……..rather than force. **(1mark)**

9. a) Two students of s4 were given two lenses A and B of focal length 2cm and 5cm respectively and they were asked to use them in making a compound microscope, their answers are as follow **(1mark)**
   i) A is eye piece lens, B is objective lens

ii) A is objective, B is eye piece.

Choose the correct answer and justify your answer.

b. When a microscope is used in normal adjustment the objective and eye piece are arranged in such way that the image formed by objective is placed: **(1mark)**

i) At focal point of eye piece

ii) inside focal point fe of eye piece

iii) inside the focal point fo of the objective.

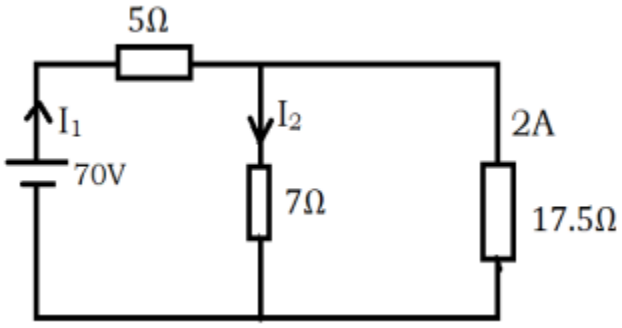
Select the right answer.

c) What are the differences between compound microscope and astronomical telescopes? **(2marks)**

10. a) Explain the following terms.
    i) Critical angle. **(1mark)**
    ii) Total internal reflection. **(1mark)**
    b) State the conditions for total internal reflection **(2marks)**
11. Calculate the increase of kinetic energy of a car of mass of 800kg when it accelerates from 20m/s to 30m/s. **(2marks)**

12. A converging lens with 50cm focal length forms a real image that is 2times larger than the object. How far is the object from the image? **(3marks)**
13. a) i) Name the phenomenon occur when the incident light falling on a surface is sent back into the same medium. **(2mark)**
    ii) Explain why the image formed by a plane mirror cannot be formed on screen. **(1 mark)**
14. A moving object has an acceleration of 2.4m/s2 . It reaches in 12s a momentum of 800kgm/s. Compute
    a) the mass of that object **(2marks)**
    b) the force acting on it. **(1marks)**

15. Analyze the given electrical and determine the currents I1 and I2 **(4 marks)**



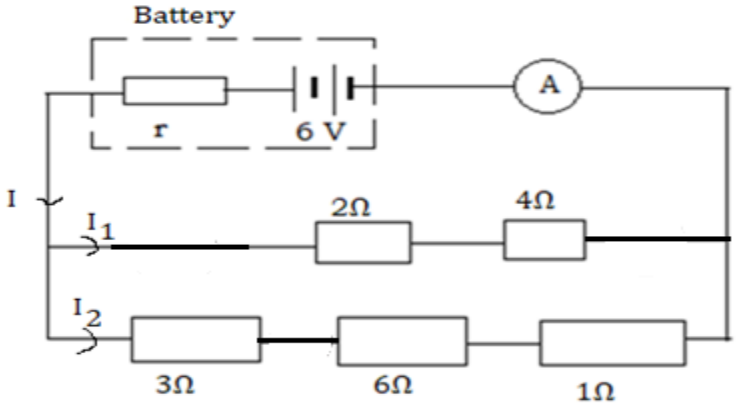
SECTION A: ATTEMPT ONLY THREE QWESTIONS (45Marks)

16) a) Explain the terms below in words as used in electricity

(i) Electromotive force of a battery **(1mark)**

(ii) Resistance of a conductor **(1mark)**

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.

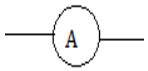


(i)Determine the equivalent resistance of all external resistors **(3 marks)**

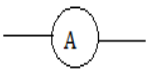
(ii)Find the internal resistance of the battery **(2 marks)**

(iii)Calculate the terminal voltage of the battery **(2 marks)**

(iv)What does the symbol below represent? **(1 mark)**



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



(1mark)

(vi)Determine

1)the current I_1 **(2 marks)**

2)the current I_2 **(2 marks)**

17. a) List any two defects of lenses **(2 marks)**

b) An object of height 7 cm is placed at a distance of 25 cm in front of a thin converging lens of focal length 35 cm. Find

(i)the location of the image **(2 marks)**

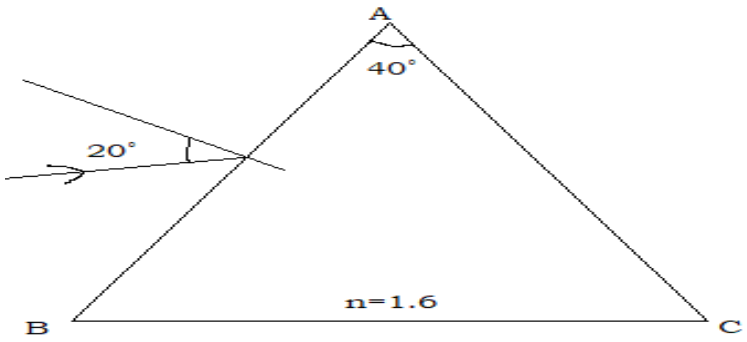
(ii) the size of the image **(2 marks)**

(iii) any two properties of the image **(2 marks)**

c)(i) What do you understand by the term **dispersion of light** by a prism? **(1mark)**

(ii) A triangular glass prism (n = 1.6) is immersed in air (n = 1) as shown in figure below drawn not to scale.

A ray of light is incident on face AB making an angle of 20˚ with the normal.



Find

1. The angle of refraction on the face AB **(2 marks)**

2. The angle of incidence on AC **(2 marks)**

3. The angle of emergence **(2 marks)**

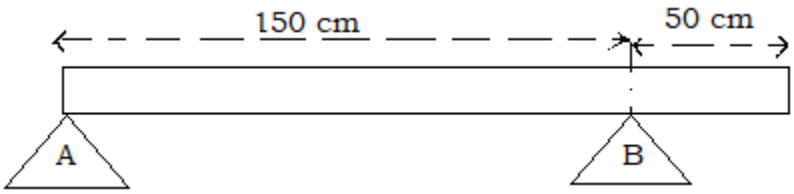
18 a) State

(i) the types of static equilibrium **(3 marks)**

(ii) the conditions of equilibrium of a rigid body. **(2 marks)**

b)A uniform board with a weight of 240 N and a length of 2 m rests horizontally on two supports as shown below.

The support A is under the left end of the board while support B is 50 cm from the right end.



(i)Name the point where the weight of the board is applied **(2marks)**

(ii)Determine the location of the point of application of the weight of the board with respect to the support A. **(1marks)**

(iii)Draw a free body diagram showing the direction of each of the forces exerted on the board. **(3 marks)**

(iv)Use the conditions of equilibrium of a rigid body to determine the support force F_A and F_B .Take the support point A as a reference point **(4 marks)**

19. a) A point object is moving along a circular path of radius 5 cm at the linear speed of 200 π cm/minute

What is the period of this point in seconds? **(3 marks)**

b) A car of mass 2000 kg is turning around a circular path of radius 50 m at the constant speed of 36 km/h

(i)Express the speed in m/s **(2mark)**

(ii)What is the centripetal force acting on this car? **(3 marks)**

c) An object is launched at a velocity of 20 m/s in the direction making an angle of 25° with the horizontal.

Acceleration due to gravity is 9.81 m/s^2

Find

(i) The time required to reach the maximum height **(3 marks)**

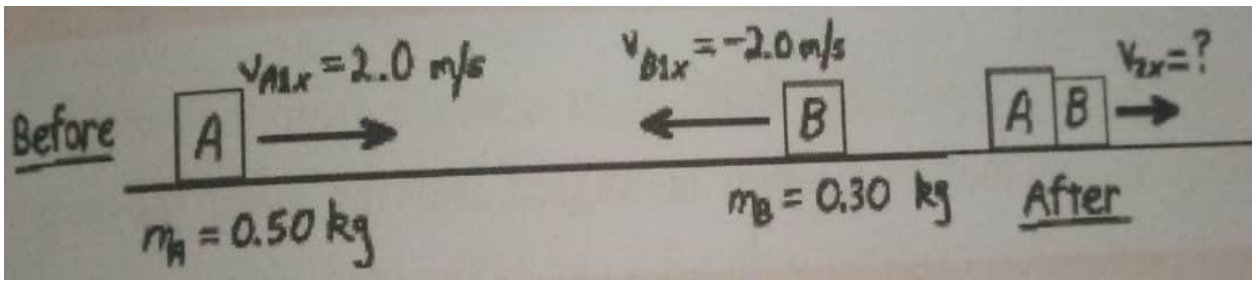
(ii) The maximum height reached by the object **(3 marks)**

(iii) The total flight time (between launch and touching the ground) of the object **(1 mark)**

20. a) Define the term collision. **(2marks**)

b) Differentiate elastic and inelastic collision. **(4marks**)

c) the figure below shows two particles moving in opposite direction.



i) What type of collision described below? **(1mark)**

ii) find

1. the common velocity after collision, **(3mark)**
2. the initial kinetic energies (**3mark)**
3. final kinetic energies of the system. **(2mark)**