

INTERSECONDARY SCHOOLS EXAMINATION SERIES
ISESE
FORM FOUR PRE NECTA No. 01
PHYSICS 1

031/1

TIME 3 HOURS

Friday 19th July 2024

1. This paper consists of section A, B and C with a total of Eleven (11) questions
2. Answer ALL question in section A and B and Two (2) from section C
3. Section A carries sixteen (16) marks, Section B fifty-four (54) marks and section C
4. Thirty (30) marks
5. Non-programmable calculators may be used
6. Cellular phones and any unauthorized materials are **NOT** allowed in the
7. examination room
8. Write your Examination name on every page of your answer sheet provided
9. Where necessary, the following constant may be used:
 - a) Acceleration due to gravity, $g = 10\text{m/s}^2$ or 10N/kg
 - b) Atmospheric pressure $P_a = 102,000\text{N/m}^2$
 - c) Density of water, $\rho_w = 1\text{g/cm}^3$ or $1,000\text{kg/m}^3$
 - d) Density of mercury, $\rho_{Hg} = 13.6\text{g/cm}^3$ or $13,600\text{kg/m}^3$
 - e) Specific heat capacity of water, $C_w = 4,200\text{j/kg K}$
 - f) Speed of sound in air, $v = 340\text{m/s}$
 - g) Pie, $\pi = 3.14$

SECTION A (16 Marks)

Answer **all** questions from this section

1. For each items (i) – (x) choose the correct answer among the given alternatives and write its Letter beside the item number in the answer booklet provided.

i) While engaged in a physics experiment, Msaki accidentally spills a chemical on his leg, resulting in skin irritation. What immediate course of action should be taking to address this situation?

- a) Schedule a visit to the school nurse after the class
- b) Plan to see a doctor after school hours
- c) Notify the lab instructor immediately
- d) Administer first aid independently
- e) Any time chemicals, heat or glassware are used

ii) A student is conducting a physics experiment in the lab and needs to measure the length of a metal rod accurately. They use a meter rule and record the measurement. What is the measurement shown on the meter rule

- a) 0.7m
- b) 0.76m
- c) 0.761m
- d) 0.7614m
- e) 7.614m

iii) Why is it more challenging to walk on a wet and slippery floor compared to a dry one?

- a) Wet floors have less friction
- b) Wet floors have more friction
- c) It's equally easy on both wet and dry floors
- d) Wet floors increase air resistance
- e) To increase friction and prevent skidding

iv) In her birthday party, Ms. Kim is handed two helium balloons. They share the same mass, but one is notably larger than the other. Which of the balloons will rise more rapidly into the sky, and what's the expectation for this phenomenon?

- a) The larger one, because it has a greater buoyant force
- b) The smaller one, because it has a greater buoyant force
- c) The smaller one, because it has a higher density
- d) The larger one, because it has a higher density

e) The larger one, because it has a smaller buoyant force.

v) While Robert is playing with her glitter in a jar of water, he observes the glitter particles moving randomly. he recalls learning about Brownian motion in his physics class. What does Brownian motion provide evidence of the existence of?

- a) Friction
- b) Kinetic energy
- c) Atoms
- d) Gravity
- e) Vector

vi) Angela is lifting a book on a shelf, if there is no energy loss during the process, what happens to the gravitational potential energy (G.P.E) Of the book?

- a) Decrease in Kinetic energy
- b) Grain in kinetic energy
- c) Constant kinetic energy
- d) Zero kinetic energy
- e) G.P.E charges to K.E

vii) What phenomenon is minimized in an astronomical telescope with a larger objective lens or mirror, leading to better image quality?

- a) Chromatic Aberration
- b) Astigmatism
- c) Coma
- d) Diffraction
- e) Refraction

viii) A mechanic was using a hand-cranked generator to provide power for her tools she had a large iron nail in her toolbox, and she noticed that after using the generator for a while, the nail had become magnetized. What process led to the magnetization of the nail?

- a) Industrial magnetization
- b) Electrical resistance
- c) Thermal expansion
- d) Demagnetization
- e) Magnetic shielding

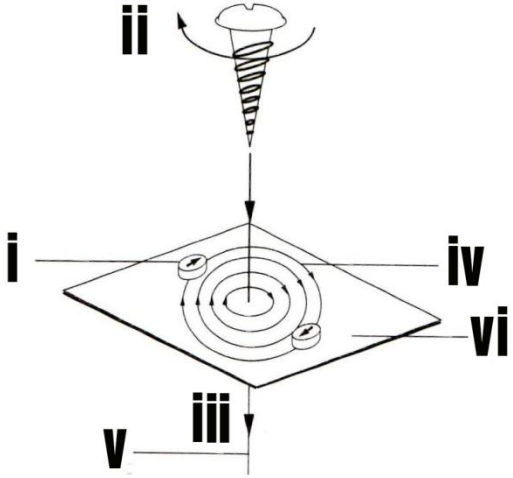
ix) A gardener uses a wrench to turn a stubborn bolt on a lawnmower blade. The gardener exerts of force at the end of the wrench creating a turning effect. What physical quantity is associated with this turning effect?

- a) Velocity
- b) Acceleration
- c) Moment of force
- d) Inertia
- e) Torque

x) In a bakery, a baker uses a rolling pin to flatten the dough for making delicious pastries. The rolling pin is an example of a

- a) Lever
- b) Pulley
- c) Inclined plane
- d) Wheel and axle
- e) Wedge

2. Match the phrases in **List A** with the responses in **List B** by writing the letter of the correct Responses beside the items number in the answer booklet(s) provided

LIST A	LIST B
	<ul style="list-style-type: none"> A. Rotation of the screw B. Plotting compass C. Field lines shown by iron filings D. Card E. Current direction F. Straight wire G. Maxwell's H. Vertical screw I. Lines of force J. Wire loop

SECTION B: (70 Marks)

Answer **all** questions in this section

3.(a) In the context of road design for hill and mountainous terrain, the alignment of roads often incorporates very gentle slopes with such gentle slopes and how this design choice addresses the unique challenges presented by mountainous landscapes?

b) You are watching a car race, and you observe one car overtaking another. The car in front initially accelerates, and then the car behind catches up, maintaining a constant distance between them. Explain the motion of the overtaking car in terms of uniformly accelerated motion and the car in front maintaining its speed.

4.(a) You are a scientist conducting experiments in a lab that require precise temperature measurements. Your colleagues are using a different type of thermometer with a larger fundamental interval, your colleagues thermometer affect the accuracy of your experimental results?

(b) According to estimates by the Indian government, the country's tidal energy potential is approximately 8000MW. Could you provide a comprehensive overview of both benefits and drawback associated with the utilization of tidal energy as a source of power in India?

5. (a) In designing a new car safety feature you need to analyze the impact forces during a collision. If a car experiences a horizontal force of 50000N during a crash, and the vertical force is 10000N, calculate the resultant force and its direction. How would this information influence the design of safety system?

(b) If the air temperature is 20°C and the dew point is 18°C , will there be dew forming on surfaces?

6. (a) You are in the kitchen preparing a meal, and you accidentally spill some cooking oil on the countertop. You notice that the spilled oil spreads out quickly, forming a thin layer. Explain the behavior of spilled cooking oil on a hot countertop in terms of its density.

(b) You have a car tire with a volume of 4.35 litres and it's currently at a pressure of 1.16atm. if you inflate the tire to a volume of 9.3 litres while keeping the temperature constant, what will be the new pressure in atm.

7. (a) You are working in a manufacturing facility where precise temperature control is essential for a chemical process. The challenge is to minimize heat loss by convection in a large industrial space while maintaining the desired temperature. What strategies can you implement to achieve this goal effectively?

(b) Imagine physical experiment where a hand lid of copper shot is heated to 800°C and introduced into 800g of water at 200°C in an insulated container. The system reaches thermal equilibrium at 400°C . With the specific heat capacities of water as $4200\text{J/kg}^{\circ}\text{C}$ and copper as $390\text{J/Kg}^{\circ}\text{C}$, discuss how the conservation of energy principle applies in this scenario and calculate the heat gained or lost by each component (copper and water)

8. (a) Architects designing concert halls often use acoustic principles to enhance the equality of sound during musical performances. Reflective surfaces are strategically placed to optimize the distribution of sound waves. How does the application of wave reflection principles in the design of concert halls contribute to creating an acoustically pleasing environment for both performances and the audience?

(b) In a busy hospital radiology department, a radiologic technologist routinely operates x-ray machines. One day, they notice colleagues constantly failing to wear their radiation monitoring badge. What potential hazard could the colleagues be exposing themselves to, and why is it essential to wear the radiation monitoring badge?

SECTION C: (30 Marks)

Answer **only two** questions from this section

9. (a) Imagine you are setting up a home audio system for a friend's party. The goal is to ensure clear and powerful single-stage amplifiers in the speaker system contribute to achieving this objective?

(b) The use of bipolar junction transistors (BJTs) is prevalent in electronic devices. Assume you are an electrical engineer working on designing a new electronic gadget. In your project, you decide to incorporate a BJT for signal amplification. Explain with relevant details, why an ordinary junction transistor is referred to as "bipolar"

10. (a) Imagine you are designing a new amusement park ride that involves a rotating platform. How can the knowledge of magnetic fields due to a current-carrying conductor be applied to ensure the safety and efficiency of his ride?

(b) Imagine you are designing an electric generator for a renewable energy project. Provide a detailed explanation of how Faraday's law of electromagnetic induction and Lenz's law come into play in the electric generator design for a renewable energy project.

11. Astronomers often rely on their knowledge of constellations to navigate the night sky and locate celestial objects. In the context of space exploration, consider a scenario where a spacecraft is on a mission to explore a distant galaxy. The craft's navigation system utilizes information about constellations for orientation and position determination. Using your knowledge of constellations, list five different constellations that the spacecraft's navigation system might encounter during its journey through the vastness of space.



INTERSECONDARY SCHOOLS EXAMINATION SERIES
ISESE TIME TABLE
FORM TWO PRE – NATIONAL No.04
20th – 30th September 2024

DAY & DATE	MORNING SESSION (A.M)			AFTERNOON SESSION (P.M)		
	CODE NO.	SUBJECT	TIME	CODE NO.	SUBJECT	TIME
Friday 20/09/2024	013	Geography	8:00 – 10:30	011	Civics	2 : 00 - 4 :30
Monday 23/09/2024	033	Biology	8:00 – 10:30	021	Kiswahili	2 : 00 - 4 :30
Tuesday 24/09/2024	041	Basic mathematics	8:00 – 10:30	012	History	2 : 00 - 4 :30
Wednesday 25/09/2024	022	English language	8:00 – 10:30	032	Chemistry	2 : 00 - 4 :30
Thursday 26/09/2024	031	Physics	8:00 – 10:30			2 : 00 - 4 :30
Friday 27/09,2024	062	Book-keeping	8:00 – 10:30			2:00 – 4:30
Monday 30/09/2024c	061	Commerce	8:00 – 10:30			2:00 – 4:30

KUSHIRIKI PRE-NECTA HIZI WASILIANA NA COORDINATOR 0624 254 757 (UNAWEZA KUSHIRIKI SOMO MOJA AMA ZAIDI)



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Friday 20/09/2024	011	Civics	8:00 – 11:00	022	English	2 : 00 - 5 :00
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