

**REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT  
HAI DISTRICT  
FORM THREE JOINT TERMINAL EXAMINATION**

031/1

**PHYSICS 1**

**Time: 3 Hours**

**MAY, 2025**

**INSTRUCTIONS**

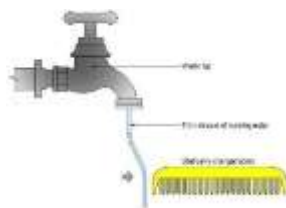
1. This paper consists of section A, B and C with total of eleven (11) questions.
2. Answer all questions in section A and B and any two (2) questions in section C.
3. Cell phones are not allowed in the examination room.
4. Non programmable calculator and mathematical table are allowed in the examination room.
5. Where necessary the following constants may be used:
  - Acceleration due to gravity  $g = 10\text{m/s}^2$
  - Gravitation force  $g = 10\text{N/kg}$
  - Density of water =  $1000\text{kg/m}^3$  or  $1\text{g/cm}^3$ .
  - Specific heat capacity of water =  $4200\text{Jkg}^{-1}\text{K}^{-1}$
  - Linear expansivity of copper is  $1.68 \times 10^{-5} \text{K}^{-1}$
  - Linear expansivity of iron is  $1.09 \times 10^{-5} \text{K}^{-1}$

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**SECTION A (16 Marks)**

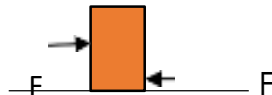
Answer **all** questions from this section

1. For each of the items (i) – (x), choose the correct answer among the given alternatives and write its letter beside the item number in your answer sheets.
  - (i) Suppose you are provided with a coca cola what is the name of the instrument you will use to measure diameter of the bottle's neck?  
A. Vernier caliper C. Meter rule B. Micrometer screw gauge D. Tape measure E. Ruler
  - (ii) Which of the following does not affect surface tension?  
A. Impurities B. Detergent C. Temperature D. Volume of liquids E. Cohesive force
  - (iii) Which of the following group of machines represents first class levers?  
A. Wheel barrow and bottle opener  
B. Fishing rod and sugar tongs  
C. Claw bar and claw hammer  
D. Nut crackers and pair of scissors  
E. Spade and sugar tongs
  - (iv) A Form Three student did an experiment to demonstrate electrostatic attraction between water and charged comb through rubbing it with hair. The charged comb was brought to a slow stream of water coming from the tap as seen in figure below. The result of the experiment found the water particles were attracted to the comb causing the stream of water to bend. This means that the charge on the comb?



- A. Is the same with that in water B. Is less with that in water C. Is Opposite to that in water

- D. Is larger than that in water E. Is equal to that in water
- (v) Whenever the surfaces in contact tend to move with respect to each other, friction comes into play if;  
 A. Both surfaces are solids B. One of the two objects is a liquid  
 C. One of the object is gaseous D. Both objects are liquids  
 E. Irrespective of whether the objects are solid, liquid or gases
- (vi) A boy does work of 4000J in 2 seconds. What is the power of the boy?  
 A. 8000W B 800 J/s C 2000W D 200 J/s E 5000W
- (vii) If after a small displacement, a body retains its initial position, what type of equilibrium is this?  
 A. Stable equilibrium B. Unstable equilibrium  
 C. Neutral equilibrium D. Natural equilibrium E. Bistable equilibrium
- (viii) An Ohmic conductor has a large voltage drop of 9V measured across it. The current flowing in the conductor is 3mA, what is the resistance?  
 A. 300A B.  $27\Omega$  C.  $3k\Omega$  D.  $500\Omega$  E.  $2700\Omega$
- (ix) In tropical countries shiny bright roofing materials are more preferred compared to dull brown tiles because?  
 A. shiny bright roofing materials are more attractive than dull brown tiles  
 B. shiny bright roofing materials are more durable than dull brown tiles  
 C. shiny bright roofing reflects the sun's radiant heat more than dull brown tiles  
 D. shiny bright roofing materials are lighter than dull brown tiles  
 E. Shiny bright roofing materials are good conductors of heat.
- (x) A block of mass 10kg is lying at the front desk of a classroom. The coefficient of static friction is 0.5. A force of 40N is applied to the book. The book will  
 A. Move  
 B. Not move  
 C. Move up and down  
 D. Slide  
 E. Fall aside



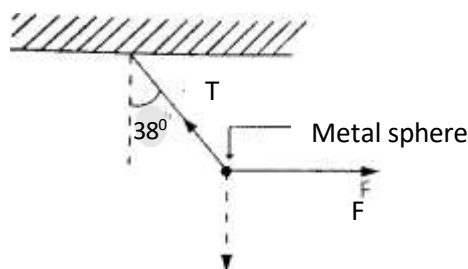
2. Match the items in **List A** with the responses in **List B** by writing the letter of the corresponding response beside the item number in the answer sheet provided.

LIST A	LIST B
(i) A concave mirror forms real, inverted and diminished image	A. Object between P and F B. Object between F and C C. Object at infinity D. Object at F E. Object at C F. Object beyond C G. Real image H. Virtual image
(ii) A converging mirror forms real, inverted and image is same size as object	
(iii) Concave mirror forms an image at focal point	
(iv) Concave mirror forms real, inverted and magnified image	
(v) Concave mirror forms image at infinity	
(vi) Concave mirror forms virtual, erect and magnified image	

## SECTION B (54 Marks)

Answer all questions from this section

3. (a) Why efficiency of a pulley system is always less than 100%? Give two reasons (3 marks)  
(b) A heavy uniform metal beam AB weighing 500N is supported at its ends. The beam carries a weight of 300N at a distance of 1.5m from end A. If the beam is 4m long, determine the thrust at the supports (6 marks)
4. (a) It is painful to walk with barefoot on a road covered by pebbles. Why? (03 Marks)  
(b) A cube of sides 2cm is completely submerged in liquid so that the bottom of the cube is at depth of 10cm. If the density of the liquid is  $1027 \text{ kg/m}^3$  (06 Marks)  
(i) What is the difference between the pressure at the bottom of the cube and the pressure at its top?  
(ii) What is the weight of the water displaced by the cube?
5. (a) State the parallelogram law of forces (03 Marks)  
(b) A metal sphere weighing 60N is suspended from a beam by a thin string. What horizontal force must be applied to the weight to keep the string at an angle of  $38^\circ$  to the vertical? What is the tension in the string?



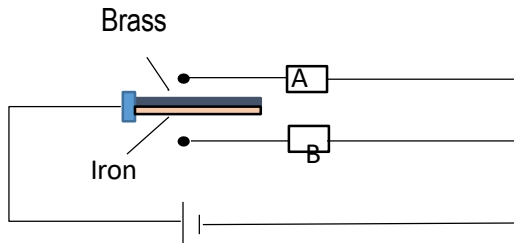
(6marks)

6. (a) You are provided with two types of mirrors, concave mirror and convex mirror. What type of the mirror among the two will you prefer on a driving car to see the traffic at your back? Explain two reasons for your choice. (4 Marks)  
(b) An iron rod is 600cm long at  $0^\circ\text{C}$ . It is mounted alongside a copper rod and both are always maintained at the same temperature. When they are heated to  $100^\circ\text{C}$  it is found that the difference in their lengths is the same as it was at  $0^\circ\text{C}$ . What is the length of the copper rod at  $0^\circ\text{C}$ ? (5 marks)
7. (a) In which ways is the human eye similar to the lens camera? Give three points (4.5 Marks)  
(b) A 1.8m tall student is standing 2.5m in front of a digital camera that uses a converging lens whose focal length is 0.05m  
(i) Find the image distance and state whether the image is real or virtual  
(ii) Determine the magnification and height of the image formed (4.5 Marks)
8. (a) A pulley is a simple machine composed of a rope and a hub or drum with a wheel mounted on an axle. Using a clear diagram draw a pulley system with a velocity ratio of four. (04 Marks)  
(b) A converging lens produces an upright image four times the object height. If the focal length is 25cm, find the object distance. (05 Marks)

## SECTION C (30 Marks)

Answer two (2) questions from this Section

9. (a) i) Explain how the efficiency of the vacuum flask would be affected if the double-walled glass bottle was replaced with a double-walled metal bottle. (4marks)  
ii) Why do you feel warmer during cloudy night than during clear sky night? (4marks)  
iii) The diagram below shows a bimetallic thermostat used to regulate a cooler and heat in a class room. Given Linear expansivity of brass is  $18.9 \times 10^{-4} \text{ K}^{-1}$  and Linear expansivity of iron is  $10.2 \times 10^{-4} \text{ K}^{-1}$ . To keep the temperature in the room constant, which of the two devices A or B should be the heater? Explain your answer (2marks)



- (b) A hollow metal sphere of mass 5kg is tied to the bottom of the sea –bed by a rope. The tension in the rope is 60N. Calculate the volume of the sphere assuming density of sea water to be  $1100\text{kg/m}^3$  **(5marks)**

10. (a) When a simple pendulum displaced at a small angle swings to and fro, in this motion. Potential energy and kinetic energy changes by alternating each other. With the aid of a diagram verify the alternation of these energies **(5 marks)**
- (b) A 50kg girl runs upstairs case of 50 steps each step is 15cm in height in 5 seconds. Find the workdone against gravity by the girl and the power she use to run **(05 Marks)**
- (c) The speed of car B relative to car A is 8m/s and 28m/s when the two cars are moving in the same and opposite direction respectively. Determine the speed of each car. **(5 Marks)**
11. (a) In which part of a fridge or a microwave oven do magnetic strips installed? Why? **(2 marks)**
- (b) White and light coloured clothes are more suitable in hot seasons. Explain **(3 marks)**
- (c) A plastic tray weighing 48g and containing 200g of water at  $20^\circ\text{C}$  is put in a refrigerator which abstract heat at a uniform rate of  $2100\text{J/min}$ . Calculate the;
- (i) The time taken for the tray and water to reach at  $0^\circ\text{C}$  **(6marks)**
- (ii) Total time taken to freeze all the water to ice at  $0^\circ\text{C}$ . **(4marks)**
- Given specific heat capacity of plastic =  $1050\text{J/kgK}$ ;  
Specific latent heat of fusion of water =  $335000\text{J/kg}$ .