



THEMI HILL SCHOOLS
COVID 19 HOLIDAY
FORM FOUR OPEN EXAMINATION
PHYSICS SERIES ONE

031

Time: 3:00 Hours

04 MAY, 2020

INSTRUCTIONS

1. This paper consists of sections A, B and C with a total of eleven questions.
2. Answer all questions in sections A, and B and two (2) questions in section C.
3. Mathematical table and non programmable calculator may be used .
4. Cellular phones are not allowed in the examination room .
5. Write your index number on every page of your answer booklet (s).
6. Where necessary the following constants may be used:
 - i. Acceleration due to gravity $g = 10\text{M/S}^2$
 - ii. Density of water = 1g/cm^3
 - iii. Specific heat capacity of water = $42000\text{JKg}^{-1}\text{K}^{-1}$
 - iv. Specific latent heat of vaporization of water = 2268000JKg^{-1}

- v. Specific heat capacity of iron = $480\text{JKg}^{-1}\text{K}^{-1}$
- vi. Specific heat capacity of aluminium = $900\text{JKg}^{-1}\text{K}^{-1}$

SECTION A (15 MARKS)

1. For each of the items I – X choose the most correct answer among the given alternatives and write its letter besides the item number in the answer booklet provided.

i. Which among the scientific statements need to be proved through scientific research methods?

- A. Hypothesis
- B. Principle
- C. Measurement
- D. Experimentation

ii. A balloon is floating stationary high above the ground, in this case ;

- A. The air temperature inside the balloon is equal to the air temperature.
- B. The air Upthrust is equal to the balloon's weight

- C. The air density outside the balloon is greater than the air density inside .
- D. The air Upthrust is greater than the balloon's weight.
- iii. A horizontal electron beam passes between two parallel horizontal plates X and Y with X above Y. when a high tension battery is connected with its negative pole to X and its positive pole to Y, the beam is deflected;
- A. Upwards
- B. Sideway
- C. Upwards 45° to the horizontal
- D. Downwards
- iv. Which of the following statement is correct?
- A. For a given body friction force depends on area in contact with the surface
- B. Air friction can cause the body to become hot
- C. Friction acts in the same direction as the applied force
- D. Walking would be easy if friction did not exist.
- v. A concave mirror is often used as a shaving mirror, this is possible if the face is placed ;
- A. Beyond center of curvature

- B. Near the mirror
 - C. Between the principle focus and the pole
 - D. At the center of curvature
- vi. Some mercury is poured on clean glass plate, small drops are formed on the glass plate. This is because;
- A. Mercury has high cohesion
 - B. Mercury has high surface tension
 - C. Mercury has low cohesion
 - D. Mercury has high adhesion
- vii. The refractive index of a glass block cannot be evaluated from the following ratios;
- A. $\sin i$ to $\sin r$
 - B. Velocity of light in air to the velocity of light in glass
 - C. Frequency of light in air to the frequency of light in glass
 - D. Real depth to apparent depth
- viii. Cathode rays are;
- A. Stream of molecules
 - B. Stream of electrons
 - C. Stream of energy
 - D. Used to examine completely the machine without

dismantling it.

ix. A nucleus of an element X which is ${}_{84}^{202}\text{X}$ emits an alpha particle and then beta particle, the final nucleus formed has an atomic number of ;

- A. 83
- B. 82
- C. 198
- D. 200

x. Which of the following substance can be made a strong magnet?

- A. Nickel and copper
- B. Steel and brass
- C. Cobalt and copper
- D. Cobalt and iron

2. Match the items in list A with responses in list B by writing the letter of the correct response in your answer booklet.

List A	List B
i. The rise and fall of sea level caused by the combined effect of	A. Planets B. Stars C. Solar system

	gravitational force of the moon and the sun.	D. Galax
ii.	Explain convincingly the occurrence of day and night.	E. Tides
iii.	A group of stars that form a definite shape or pattern when viewed from the earth .	F. Breeze
iv.	A giant collection of stars, gases and dusts.	G. Geocentric theory
v.	Twinkles at night and appear to be moving from east to west.	H. Heliocentric theory
		I. Meteorites
		J. Constellation

SECTION B (60 MARKS)

Answer all questions in this section

3. Fill the correct answer in the space provided

i. The percentage ratio of work output to the work input is known

as

- ii. The angle formed between the magnetic meridian and the geographic meridian is called.....
- iii. The state of balance of a body is called.....
- iv. The curved surface of a liquid in a tube is called
- v. The point where the force of gravity is said to act is called.....
- vi. The slope of velocity-time graph represents.....
- vii. The rate of change of distance is called.....
- viii. The point where the earth quake begins is known as.....
- ix. A device used to store charge is known as
- x. Extension is directly proportional to tension provided elastic limit is not exceeded. This is known as

4. (a) Define the following terms

- i. Ampere
- ii. Coulomb
- iii. Volts
- iv. Ohms

(b) (i) State Ohm's law and its two limitations

(ii) Determine the internal resistance of a cell and the value of

R given that, the potential difference of the cell in open circuit is 1.5V, when connected to a 10Ω resistor its potential difference becomes 1.0V, but when connected to a resistor $R\Omega$, the potential difference falls to 0.5V.

(c) 200g of liquid at 21°C is heated to 51°C by a current of 5A at 6Volts for 50 minutes. What is the specific heat capacity of the liquid?

5. (a) (i) State the law of floatation and Archimedes principle.

(ii) A body weighs 0.52N in air. When it is totally immersed in water it weighs 0.32N while it is immersed in another liquid is 0.36N. Determine the density of the other liquid.

b) (i) Briefly explain how buoyant force is exerted by a fluid when arise.

(ii). A liquid mixture of water and alcohol has density of 900Kg/m^3 . Find the mass of alcohol in one litter of the mixture. (1lt = 1000cm^3).

(iii) (a) State the law of magnetism.

6. (a) Differentiate between acceleration and deceleration

(b) A car moves with a uniform velocity of 480m/s in 50seconds. It then decelerates to stop in 100seconds. Calculate the acceleration and deceleration of a car.

(c) Explain why efficiency of a machine is never 100%.

7. (a) What do you understand by the following terms?

- i. Doping
- ii. Charge carrier
- iii. Extrinsic semiconductor
- iv. Cathode ray

(b)(i). Mention five properties of X-rays

(ii). Differentiate between conductor and insulator in terms of energy band theory.

8. (a) What do you understand by the following terms

- i. Mechanical advantage
- ii. Velocity ratio

(b) A pulley system has two pulleys on the bottom block. It was found that an effort of 300N was added to raise a load.

- i. How much energy was supplied to the machine when the effort moved through 5Meters?
- ii. How far the load was moved if the effort moved 5M?
- iii. How much energy was gained by the load when the effort moved through 5M?

SECTION C (25 MARKS)

Answer two questions from this section

9. (a) (i) Define the term wavelength.

(ii) State two ways in which visible light differs from radio waves.

(b)i. Explain the difference between transverse wave and longitudinal waves. Give one example for each.

ii. Account for the fact that a distant lightning flash is seen before the thunder is heard

(c) Two men stand facing each other 200M apart on one side of high wall and at the same perpendicular distance from it. One fires a pistol the other hears a report 0.6seconds after the flash, and the second reports 0.25seconds after the first. Explain this phenomenon and calculate

i. The velocity of sound in air

ii. The perpendicular distance of men from the wall.

10. (a)

i. Explain why the image of an object formed by plane mirror is called a virtual image?

- ii. A concave spherical mirror of radius of curvature 20cm forms an erect image 30cm from the mirror and 5cm high. Find the position and size of the object (show by using ray diagram how the image forms).

(b)i. Explain what is meant by critical angle.

- iii. State the condition under which total internal reflection of light occurs.

11. (a) (i) What is meant by the term Transformer?

- (ii) Why does the transformer work with alternating current (a.c) only?

(b) The ends of the solenoid are connected together by the wire. Draw diagrams showing the direction of current (if any) induced in the solenoid when the N pole of the magnet is

- i. Thrust into the solenoid
- ii. At rest in the solenoid
- iii. Rapidly withdrawn

(c) Transformer is designed to supply 12V when connected to 240V main. If this transformer takes 0.55A from the main when used to light five 12V, 24W lamps in parallel, find;

- i. Its efficiency
- ii. The cost of using it for 10hours at 6P per unit.

THEM HILL SECONDARY SCHOOL

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