Candidate's Examination No. _____

THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION AND VOCATIONAL TRAINING
FORM TWO SECONDARY EDUCATION EXAMINATION, 2013

0031 **PHYSICS**
TIME: 2½ HOURS

INSTRUCTIONS

1. This paper consists of sections A, B and C.
2. Answer **ALL** questions.
3. **ALL** answers must be written in the spaces provided.
4. Write your examination number at the top right corner of every page.
5. **ALL** writing must be in blue or black ink **EXCEPT** drawings which must be in pencil.
6. Cellphones and calculators are not allowed in the examination room.
7. You may use the following constants in your calculations:
   Density of water = 1 g/cm^3 or 1,000 kg/m^3
   Density of mercury = 13.6 g/cm^3 or 13,600 kg/m^3
   Acceleration due to gravity = 10 m/s^2
   Standard Temperature and Pressure (STP): T = 273 K, P = 760 mm Hg.

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SECTION A (20 MARKS)

1. Write the letter of the correct answer in the box provided for each of the following items:

(i) The relation of Physics with Chemistry is in making:
- A. algebra, trigonometry and chemical change
- B. insect killers, perfume and fertilizers
- C. photosynthesis and food
- D. rain gauge, wind vane and thermometer

(ii) Which of the following groups of instruments is used to measure the basic fundamental quantities?
- A. beam balance, stop watch, and Vernier caliper
- B. chemical balance, stop watch, and measuring cylinder
- C. measuring cylinder, beam balance, and metre rule
- D. spring balance, stop watch, and micrometer screw gauge

(iii) Swelling of soaked beans in water is a demonstration of:
- A. capillarity
- B. diffusion
- C. osmosis
- D. viscosity

(iv) Which of the following is a property of a solid state?
- A. inter-particle distances are large
- B. particles are closely packed together
- C. particles are not closely packed together
- D. particles move randomly

(v) An instrument which is used to observe objects around obstacles is called:
- A. microscope
- B. periscope
- C. plane glass
- D. telescope

(vi) The relationship between pressure and area is that on:
- A. changing area, nothing happens
- B. decreasing area, pressure decreases
- C. decreasing pressure, volume increases
- D. increasing area, pressure decreases

(vii) A piece of metal with a volume of 0.00012 m^3 has a mass of 0.12 kg. The density of metal will be:
A. 100 kg/m^3
B. 1,000 kg/m^3
C. 10,000 kg/m^3
D. 1,000,000 kg/m^3

(viii) If a student gets an electric shock and falls down unconscious in a Physics laboratory, which of the following would you do first to help the victim?
A. administer breathing exercise
B. call a medical doctor immediately
C. call other students to surround the victim
D. call a Physics teacher to give the victim medicine

(ix) The Sun is an example of a luminous body because it:
A. is a big star
B. is made by God
C. produces its own light
D. reflects light from the Earth

(x) A smell of rotten body can be felt through the process of:
A. diffusion
B. evaporation
C. osmosis
D. transpiration

(xi) The energy due to the rising and falling in the level of water in the oceans or seas is known as:
A. electric energy
B. tidal energy
C. water energy
D. wind energy

(xii) The following are applications of magnetism in daily life **EXCEPT**:
A. banks make use of magnetic ink on cheques
B. flour is passed near a magnet before being packed
C. magnets are used to separate sand from glass
D. VHS tapes are manufactured as a result of magnetism

(xiii) A measuring cylinder contains liquid to a level *x*. An object of volume *z* is totally immersed in the liquid contained in the cylinder. The new reading of the level of the liquid will be:
A. x
B. $x - z$
C. $x + z$
D. $z - x$

(xiv) An objet with low centre of gravity and a wide base is:
- A. neutral
- B. stable
- C. unequilibral
- D. unstable

(xv) A ball of mass 0.6 kg is kicked vertically up to a height of 6 m. The potential energy acquired by the ball is:
- A. 0.36 J
- B. 3.6 J
- C. 36 J
- D. 360 J

(xvi) From Archimedes' principle, the upthrust acting on a body is equal to the:
- A. apparent loss in weight
- B. apparent weight
- C. weight of a body in air
- D. weight of a body in water

(xvii) What is the total resistance of two resistors, $R_1 = 2\ \Omega$ and $R_2 = 3\ \Omega$, connected in parallel?
- A. 1.2 Ω
- B. 5 Ω
- C. 6 Ω
- D. 12 Ω

(xviii) The SI unit of electric charge is:
- A. ampere
- B. coulomb
- C. ohm
- D. second

(xix) The acceleration of a body of mass 30 kg when a constant force of 150 N is applied on it, will be:
- A. 0.05 m/s^2
- B. 0.5 m/s^2
- C. 5.0 m/s^2
- D. 50 m/s^2

(xx) The materials which allow electricity and heat to pass freely are termed as:
- A. conductors
- B. insulators
- C. semi conductors
- D. semi insulators

SECTION B (40 MARKS)

2. Match each item in List A with a correct response in List B by writing its letter below the number of the corresponding item in the table provided.

LIST A	LIST B
(i) Attractive force between molecules of the same substance	A. Adhesive force
(ii) Bodies that give out light	B. Beam balance
(iii) Device used to put on and off an electric current	C. Clinical thermometer
(iv) Instrument used to convert wind energy to mechanical energy	D. Cohesive force
(v) Magnetic field is zero	E. Luminous objects
(vi) Measures body temperature	F. Magnetic field
(vii) Measures mass of the body	G. Momentum
(viii) Product of mass and velocity	H. Neutral point
	I. Six's thermometer
	J. Spring balance
	K. Switch
	L. Wind mill

ANSWERS

LIST A	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)
LIST B								

3. Complete each of the following statements by writing the correct answer in the spaces provided.

(i) In the velocity time graph, the slope represents _____

(ii) The weight of a body when in water is known as _____

(iii) Devices for storing charge are called _____

(iv) The type of force which causes the size and volume of an object to decrease is known as _____

(v) The tendency of an object to remain on the surface of a fluid due to the force exerted by the fluid is called _____

4. (a) Define the term "Pressure" _____

   (b) A rectangular object whose dimensions are 1.4 m by 0.1 m by 2.0 m has a density of 200 kg/m^3. Calculate the minimum pressure when placed on a table.

5. (a) Define each of the following terms as applied in Physics:

   (i) Volume _____

   (ii) Moment of force _____

   (b) An object of 100 kg is lifted to a height of 5 m above the ground in 3 seconds. Calculate its:

   (i) Work done

   (ii) Power

6. (a) Define the term "force" and state its SI unit _____

   (b) A spring balance reads 12 N when a metal block is suspended from it and 10 N when the block is completely immersed in water. Calculate the:

   (i) Upthrust on the block

   (ii) Relative density of the block

SECTION C (40 MARKS)

7. (a) Define the following terms as applied to machines:

   (i) Load _____

   (ii) Effort _____

   (iii) Efficiency _____

   (b) A load of 500 N is raised through 5 m by a machine when its effort moves simultaneously though a distance of 25 m. If the efficiency of the machine is 80%, calculate its mechanical advantage.

8. (a) (i) State the law of conservation of linear momentum.

   (ii) Define the term "elastic collision".

   (b) A body of mass 8 kg moving with a velocity of 20 m/s collides with another body of mass 4 kg moving with a velocity of 10 m/s in the same direction. The velocity of the 8 kg body is reduced to 15 m/s after the collision. If the bodies do not stick together after the collision, calculate the final velocity of the 4 kg body.

9. (a) Differentiate a ray of light from a beam of light.

_____

_____

(b) Mention four properties of an image formed by a plane mirror.

(i) _____

(ii) _____

(iii) _____

(iv) _____

10. (a) State the law of magnetism. _____

_____

_____

(b) For each of the following, sketch the resulting magnetic field and mark the position of the neutral point if any, when:

(i) Two N-poles are brought close to each other but not touching.

(ii) N-pole and S-pole are brought close to each other but not touching.