

Southern province

Gisagara District

GS ST PHILIPPE NERI

GISAGARA

CLASS : S₂ ALL

HOLIDAY PACKAGE OF

SECOND TERM

SECTION A. (Attempt all questions/70 marks)

1. Circle the letter corresponding to the correct statement. (3marks)

a) A student draws a velocity–time graph for a body moving with constant acceleration. The graph is a straight line sloping upward. The area under the graph represents:

- A. Acceleration
- B. Distance traveled
- C. Force
- D. Final velocity

b) A car moving at 30 m/s applies brakes and stops uniformly in 6 s. Which statement is correct?

- A) The acceleration is positive
- B) The acceleration is zero
- C) The acceleration is negative
- D) The velocity increases during motion

c) The slope of a velocity–time graph represents:

- A. Acceleration
- B. Distance
- C. Displacement
- D. Momentum

2) choose the letter corresponding to the correct statement.

(4 marks)

a) A thermometer consistently reads 0.5°C higher than the actual temperature every time it is used. This is an example of:

- A. Random error
- B. Gross error
- C. Systematic error
- D. Instrumental error

b) Which of the following is a fundamental (base) quantity in the SI system?

- A. Electric current
- B. Force
- C. Velocity
- D. Pressure

c) How many significant figures are there in the number 0.00540?

- A) 6 B) 5 C) 2 D) 3

d) In an experiment, the measured value of a quantity is 9.5 and the true value is 10.0. What is the relative error?

- A) 0.5 B) 0.005 C) 0.05 D) 5.0

3) Fill in the blank spaces with the missing words:

(4 marks)

➤ Pressure tells us how concentrated a ----- is. It is measured in ----- or ----- and is calculated using the equation: $p = \frac{F}{A}$. A force of 12N acting over an area of 2m² causes a pressure of ----- . If the area were less, the pressure would be ----- The dimensions of velocity are ----- The dimensions of pressure are -----

4) Circle a letter of the best option.

(6 marks)

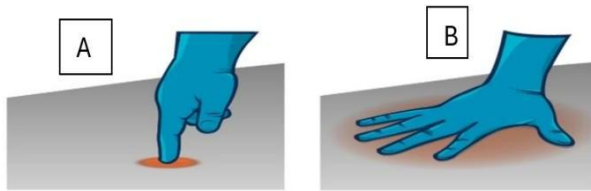
i) The pressure at a depth of 20 m in seawater of density 1,025 kg/m³? ($g = 10 \text{ m/s}^2$) is:

- A. 205,000 Pa
- B. 20,500 Pa
- C. 2,050 Pa
- D. 102,500 Pa

ii) A force of 300 N is applied over an area of 0.05 m^2 . What is the pressure exerted?

- A. 15 Pa
- B. 600 Pa
- C. 6,000 Pa
- D. 60,000 Pa

iii) Two students A and B pressed the surface as shown below:



➤ Among the two, who will cause most penetration? Why?

.....

.....

5) Match the following physical quantities with their respective dimensional formula. (5 marks)

Physical quantities	Dimensional formula
a) Area	i. $[\text{ML}^2\text{T}^{-2}]$
b) Density	ii. $[\text{MLT}^{-2}]$
c) Acceleration	iii. $[\text{ML}^{-3}]$
d) Energy	iv. $[\text{LT}^{-2}]$
e) Force	v. $[\text{L}^2]$

6) Use TRUE for correct statement and FALSE for wrongly stated statement: (5 marks)

- a) Pressure difference between two points in a static fluid depends only on the vertical height difference between the two points, not on the shape of the container.....
- b) 1 atmosphere (atm) is exactly equal to 100,000 Pa (100 kPa)
.....
- c) 1 Pascal is equivalent to 1 Newton per square centimeter (N/cm²)
.....
- d) If the absolute pressure of a gas in a container is 250,000 Pa and atmospheric pressure is 101,325 Pa, then the gauge pressure is approximately 148,675 Pa.....
- e) A pressure of 2 atm is equivalent to approximately 202,650Pa
.....

7) Circle the letter corresponding to the best answer: **(4 marks)**

- a) A sphere of mass 4 kg is fully submerged in a liquid. The weight of liquid displaced is 30 N. The weight of the sphere in liquid is:

A) 30N B. 120N C. 10N D. 40N

- b) A metal sphere of mass (m) is floating in oil (density = 800 kg/m³). The volume of the sphere is 0.002 m³. What is the buoyant force?

c) A.16N B.20N C.12N D. 10 N

- 8) Fill in the blank space provided with the missing words as are used in Archimede's principle: **(equal, density, upthrust, sink, fluid)**. **(5 marks)**

➤ Archimedes' principle states that a body wholly or partially immersed in a fluid, experiences an upward force called the _____. The magnitude of the buoyant force is equal to the weight of the _____ displaced by the body. If a solid floats in a liquid, the buoyant force is _____ to the weight of the solid. A solid denser than the liquid will _____ in the liquid. The fraction of a floating body submerged in a liquid is equal to the ratio of the body's density to the _____ of the liquid.

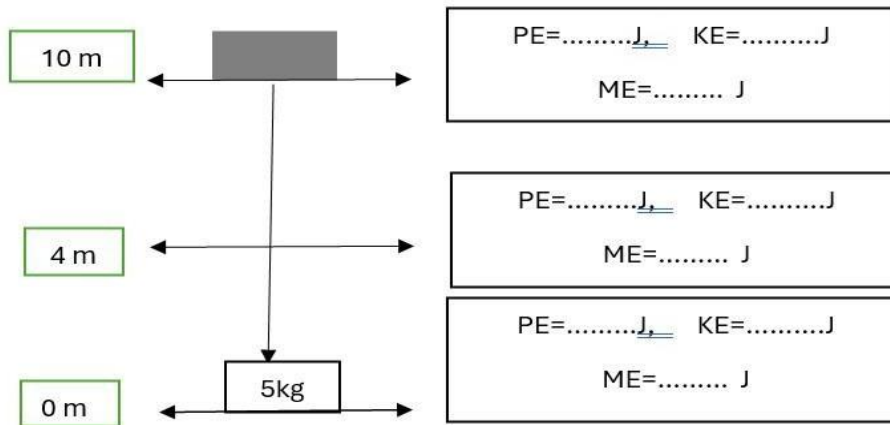
- G) Match items in column A with their energy transformations in column B. (5 marks)**

Column A	Column B
1. A pendulum swinging in air without friction	A. Gravitational potential energy is transformed into kinetic energy and then into electrical energy
2. A stretched spring released on a frictionless surface	B. Kinetic energy is transformed into heat due to friction
3. Water stored in a dam flowing through turbines	C. Kinetic energy converts to potential energy and back, total mechanical energy remains constant
4. A car braking on a road	D. Elastic potential energy converts into kinetic energy and vice versa
5. A battery powering a bulb	E. Chemical energy is transformed into electrical energy and then into light energy

- 10) Complete the following statements with suitable terms from the box (5 marks)**

Nature	heat	motion	less	reduce
--------	------	--------	------	--------

- Friction opposes the Between the surfaces in contact with each other. Friction depends on the of surfaces. Friction produces , Sprinkling of powder on the carrom board friction. Sliding friction isthat the static friction.
- 11) A 5 kg box falls from a height of 10m. Fill in the potential, kinetic and total mechanical energy of a box in indicated gaps. (6 marks)**



12) a) Define power and derive a formula of how it is related to work and Energy, ($P=F \times V$) **(3 marks)**

b) A crane lifts a 200 kg load vertically 5 m in 10 s. Calculate the power developed by the crane. **(3 marks)**

13) Calculate the pressure difference between two isobaric lines in a static liquid of density 1020 kg/m^3 at depth of 30 m and 42 m **(3 marks)**

14) a) State the law of conservation of energy **(1 mark)**

b) A 580 kg roller coaster is going 7.5 m/s on the top of 1.2 m tall hill, how fast is it going on top of a 3.5 m tall hill? (Neglecting friction force) **(4 marks)**

15) A student measured two distances: $d_1 = (5.0 \pm 0.1) \text{ m}$, $d_2 = (3.0 \pm 0.2) \text{ m}$
The total distance is calculated by adding the two values. **(4 marks)**

a) Calculate the total distance.

b) Determine the total absolute error.

SECTION B (Answer all questions in this section /50 marks)

16) A 12 kg wooden box is placed on a rough horizontal floor. The coefficient of static friction between the box and the floor is 0.4, and the coefficient of kinetic friction is 0.3. Take $g=10 \text{ m/s}^2$

a) Define the term friction force. **(1 marks)**

b) Determine the maximum static friction acting on the box. **(2 marks)**

c) A horizontal force of 35 N is applied to the box.

i) State whether the box will move or not. **(1 mark)**

ii) Give a reason for your answer. **(1 marks)**

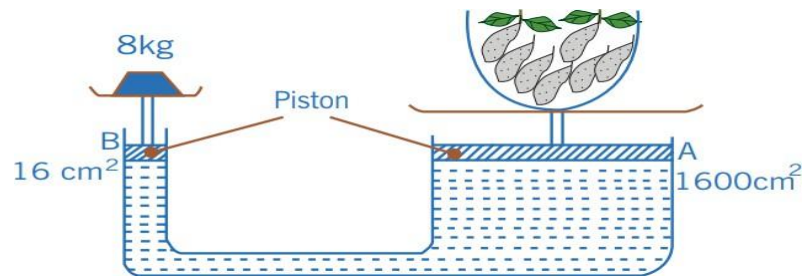
d) If a horizontal force of 60 N is applied and the box starts moving:

i. Calculate the kinetic friction acting on the box. **(2 marks)**

ii. Determine the net force acting on the box. **(2 marks)**

iii. Calculate the acceleration of the box. **(1 mark)**

17) Figure below shows a hydraulic weight bridge which works on the principle of Pascal's law.



a) State pascal's principle **(2 marks)**

b) What is the pressure at B? **(2 marks)**

c) What is the pressure at A? **(2 marks)**

d) What is the weight of the vegetable on the large piston A if the weight bridge is in equilibrium? **(2 marks)**

e) What are two applications of the above principle in our daily life? **(2marks)**

18 i) Which of the following have the same units? **(2 marks)**

A. Energy and power

B. Energy and work

C. Power and work

D. Kinetic energy and power

ii) The rate of doing work is measured in **(2 marks)**

A. watts

B. joules

C. newtons

D. meters

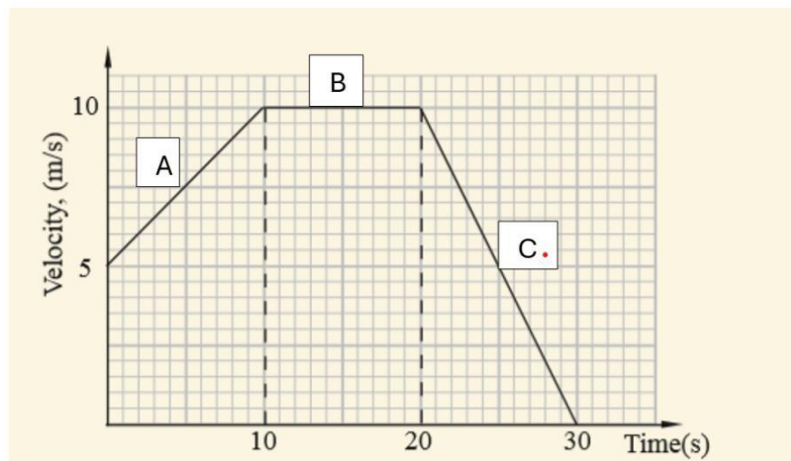
iii) A person of mass 40 kg runs up a flight of 50 stairs each of height 20 cm in 5 s. Calculate

- a) The work done. **(3 marks)**
- b) The average power of the person. **(2 marks)**
- c) Explain why the energy the person uses to climb up is greater than the calculated work done. **(1 marks)**

19) Balloon has a volume of 3.0 L at 50 °C. It is heated to 90 °C at constant pressure.

- a) Calculate the new volume. **(3 marks)**
- b) State the gas law used **(2 marks)**
- c) Pure helium gas is contained in a leakproof cylinder containing a movable piston. The initial volume, pressure, and temperature of the gas are 15m³, 2.0 atm, and 310K, respectively. If the volume is decreased to 12m³ and the pressure is increased to 3.5atm, find the final temperature of the gas. **(5 marks)**

20) Fig. below represents the velocity-time graph of a body during a period of 30 s.



- a) Describe the motions of body represented by letter A, B, and C. **(3 marks)**
- b) Calculate the acceleration of body in first 10 seconds. **(2 marks)**
- c) What is the retardation of the body? **(1 mark)**
- d) find the displacement of the body in 30 s. **(4 marks)**

