

Final Exam
DPHYS-I: PHYSICS 1
Fall 2025

Points of attention:

- For each question, the maximum earned points are specified in the question.
- Write clearly! Answers that are not readable are not marked and don't earn marks!
- All answers should be written in English using **blue or black pens** only.
- Use the pencil only for diagrams and graphs.
- Show all the calculation steps in the given space.
- When finished, submit the question paper, together with the answer scripts and the signed cover page to the invigilator.
- Any cheating/copying may result in an instant failing of the examination.

Exam Duration: 2 hours
Instructor's Name: JAHANZEB KHAN BAHADUR
Exam Date: 24/12/2025
Program: DO

	40
	10

Student Information

Name: ID:
Signature:

Invigilator

Initials: Student ID checked
Time received:

Question 1**[5 marks]**

Circle the correct answer/ Fill in the blank/ True or False wherever required for each question given below:

- (i) Which of the following forces is an example of a restoring force? (1/2 mark)
- (a) Frictional force (b) Upthrust
(c) Compressional force of spring (d) Drag force of air
- (ii) Read each statement carefully and indicate “✓” whether it is true or false. (1/2 mark)
- (a) Frictional force is directly proportional to the surface area.
(TRUE/FALSE)
- (b) Buoyancy also depends upon the densities of the fluid. If the density of the liquid increases the buoyancy will increase. (TRUE/FALSE)
- (c) The coefficient of friction is independent of surface area. (TRUE/FALSE)
- (d) Friction is directly proportional to the load. (TRUE/FALSE)
- (iii) If an object’s mass is 500 g and the apparent weight is 3.5 N, then the object will be: (1/2 mark)
- (a) 5 N (b) 3.5 N (c) 1.5 N (d) 3.0 N
- (iv) Read each statement carefully and circle the correct answer: (1/2 mark)
- A ship floats despite being made of steel materials like steel because.
- (a) The density of the liquid is larger than the density of ship.
(b) The volume of displaced water is more than the weight of the ship.
(c) Steel density is decreasing inside the water.
(d) The mass of water displaced by the ship is upthrust.
- (v) If the mass of the body becomes doubled the kinetic energy will be: (1/2 mark)
- (a) increased by 2 times (b) increased by 4 times
(c) decreased by 2 times (d) decreased by 4 times

Question 2**[10 marks]**

(a) Write complete description of the given equations of buoyancy:

(3 marks)

$F_b = m_w \times g$	
$F_b = F_{ga} - F_{gw}$	
$F_b = D \times V \times g$	

(b) Explain the effect of seawater and freshwater density differences on a ship's draft and buoyancy.

(2 mark)

(c) A steel anchor mass is 5 tonnes in air and sinks in seawater. If the anchor (3 marks) displaces 1.66 m^3 of the water, calculate the buoyant force acting on it.

(d) Use buoyancy equations to determine the apparent weight of the anchor (2 marks) seawater.

Question 3**[12 marks]**

(a) Define the following and write their formula and SI unit:

(6 marks)

Work	
Power	
Efficiency	

(b) 3 Marine engineers are pulling a generator by applying a force of 800 N (3 marks)

in workshop with the help of a long metal chain. The chain is making an angle of 53 degrees, and they slide this generator through 20 m.

Calculate the work done by the engineers and write your answer in scientific notation.

- (c) If the students are taking 6 minutes to complete this work then estimate (3 marks)
the power consumed by the students to complete this task.

Question 4**[13 marks]**

A large spring is stretched at different forces and extension produced according to the forces are given below:

Forces (N)	5	15	30	60	90	120
Extension (cm)	2	6	12	26	42	66
K (-----)						

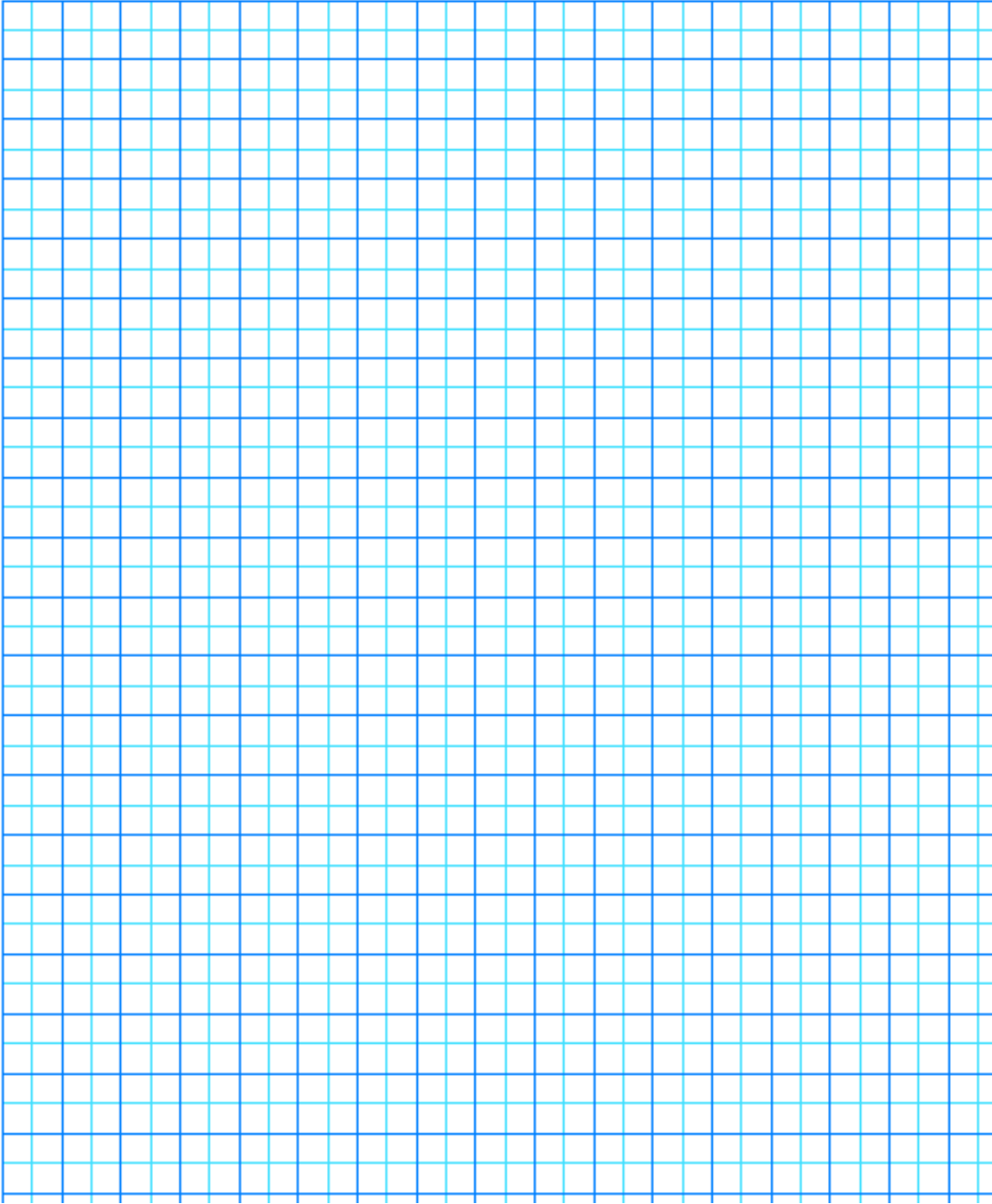
(a) Define Hook's Law and write their mathematical relation. (2 marks)

(b) Using the results in the table above, write the unit of the spring constant (k). Then, mathematically justify the limit of the deforming force within which the spring obeys Hooke's law. (4 marks)

(c) Draw the recorded data on the graph paper provided on page 9 and explain how the spring follows Hook's Law within the applicable deforming force limit. (4 marks)

(d) On the graph, clearly indicate the following:

- | | |
|------------------------|-----------------------|
| 1. Proportional region | 2. Proportional limit |
| 3. Elastic region | 4. Elastic limit |
| 5. Plastic region | 6. Breaking Point |



CONVERSION OF PHYSICAL QUANTITIES

Conversion of Length		Conversion of Mass		Conversion of Time	
1km	$10^3 m$	1 Kg	$10^3 g$	1 year	365 days
1m	$10^{-3} km$	1 g	$10^{-3} Kg$	1 month	30 days
1m	$10^2 cm$			1 day	24 hours
1cm	$10^{-2} m$	1 g	$10^3 mg$	1 hour	60 minutes
1m	$10^3 mm$	1 mg	$10^{-3} g$	1 minute	60 seconds
1 mm	$10^{-3} m$				
1m	$10^6 \mu m$	1 Kg	$10^6 mg$	1 second	$10^3 ms$
1 μm	$10^{-6} m$	1 mg	$10^{-6} Kg$	1 ms	$10^{-3} seconds$
1m	$10^9 nm$				
1 nm	$10^{-9} m$	1 g	$10^6 \mu g$	1 second	$10^6 \mu s$
1m	$10^{12} pm$	1 μg	$10^{-6} g$	1 μs	$10^{-6} seconds$
1 pm	$10^{-12} m$				
1 mile	1.60934 Km	1 Kg	$10^9 \mu g$	1 second	$10^9 ns$
1 Km	0.621371 miles	1 μg	$10^{-9} Kg$	1 ns	$10^{-9} seconds$
1 nautical mile	1.15078 miles				
1 mile	0.868976 nautical miles	1 Tonne	$10^3 Kg$	1 second	$10^{12} ps$
1 nautical mile	1.852 Km	1 Kg	$10^{-3} Tonne$	1 ps	$10^{-12} seconds$
1 Km	0.5399 nautical mile				

CONVERSION OF SPEED/VELOCITY

$$1 \text{mph (miles per hour)} = 1.60934 \text{ km/h (kilo meter per hour)}$$

$$1 \text{Km/h (kilo meter per hour)} = 0.621371 \text{mph (miles per hour)}$$

$$1 \text{Knot} = 1.15078 \text{ mph (miles per hour)}$$

$$1 \text{ mph (miles per hour)} = 0.868976 \text{ Knot}$$

$$1 \text{ Knot} = 1.852 \text{ Km/h}$$

$$1 \text{ Km/h} = 0.539957 \text{ Knot}$$

$$1 \text{ Km/h} = 0.277778 \text{ m/s}$$

$$1 \text{ m/s} = 3.6 \text{ Km/h}$$