الجامعة الوطنية
National University
Science & Technology
كلية عمان البحرية الدولية
International Maritime College Oman

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) Archimedes' Principle states that the buoyant force on a body immersed in a fluid is equal to: (1/2 mark)

(a) Mass of the liquid displaced by the object (b) Weight of the object
(c) Weight of the liquid displaced by the object (d) mass of the object

(ii) Read each statement carefully and indicate **"✓"** whether it is true or false. (1/2 mark)

(a) The buoyancy of every individual object depends upon the material they are made of. (TRUE/FALSE)

(b) Buoyancy also depends upon the densities of the fluid. If the density of the liquid increases the buoyancy will decrease. (TRUE/FALSE)

(c) The buoyancy of an object does not depend upon the volume of the object. (TRUE/FALSE)

(d) If the density of the object is less than the density of water the object will sink and if the density of the object is more than the density of water, the object will float. (TRUE/FALSE)

(iii) If an object's weight is 50N and the buoyant force is 30 N, the apparent weight is: (1/2 mark)

(a) 20 N (b) 30 N (c) 50 N (d) 80 N

(iv) Read each statement carefully and circle the correct answer: (1/2 mark)

A ship floats despite being made of heavy materials like steel because:

(a) The density of the steel is larger than the density of water.

(b) The upthrust of the water is more than the weight of the ship.

(c) Steel density is decreasing inside the water.

(d) Its density, including the hollow parts, is less than water.

(v) If the velocity 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

(vi) The unit of spring constant is: (1/2 mark)

(a) kN/m^3 (b) N/m (c) kJ/cm (d) Nm/kg

(vii) The commercial unit of energy is: (1/2 mark)

(a) Watt (W) (b) kilo joule (KJ)

(c) mega newton (MN) (d) KWh

(viii) When retarding forces becomes equal the weight of the objects they will move with: (1/2 mark)

(a) Constant acceleration (b) Constant velocity

(c) Drift velocity (d) Terminal velocity

(ix) Newton's first law of motion is also called law of _____ which is directly proportional to the mass of the object. (1/2 mark)

(x) Friction always working in: (1/2 mark)

(a) opposite direction of the applied force
(b) parallel with applied force
(c) in upward direction of the weight
(d) downward direction of the weight

Question 2 **[10 marks]**

(a) Explain Archimedes principle in two different ways. Write the mathematical relation for both statements. (3 marks)

(b) The mass on an object is 600 kg. When it is completely submerged in the sea water, its weight is 4500 N. Why does the weight of immersed objects decrease inside the liquids. (1 mark)

(c) Calculate the buoyant force acting on the object and discuss the condition of object inside the water. (3 marks)

(d) If the density of sea water is 1.03 g/cm^3, calculate the volume and density of the given object by using the Archimede's principle (3 marks)

Question 3 **[12 marks]**

(a) Differentiate between kinetic energy and potential energy by giving any three differences for each. (3 marks)

Kinetic Energy	Potential Energy

(b) A dock side crane is lifting a 6-tone container to a vertical height of 10.8 m in 3 minutes.

(i) Calculate the work done by the crane to lift the container at this height. (3 marks)

(ii) Determine the power consumed by the crane while performing this work. (2 marks)

(iii) The crane is driven by electrical motor. The input electrical energy provided to the crane is 1000 kJ. Determine the efficiency of the crane. (2 marks)

(iv) Discuss all possible factors, why input energy supplied to the motor should be greater than the output. (2 marks)

Question 4 **[13 marks]**

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

Forces (N)	25	50	75	100	150	200	300
Extension (cm)	8.9	17.8	26.6	35.7	62.5	95.2	187.5
K (---------)							

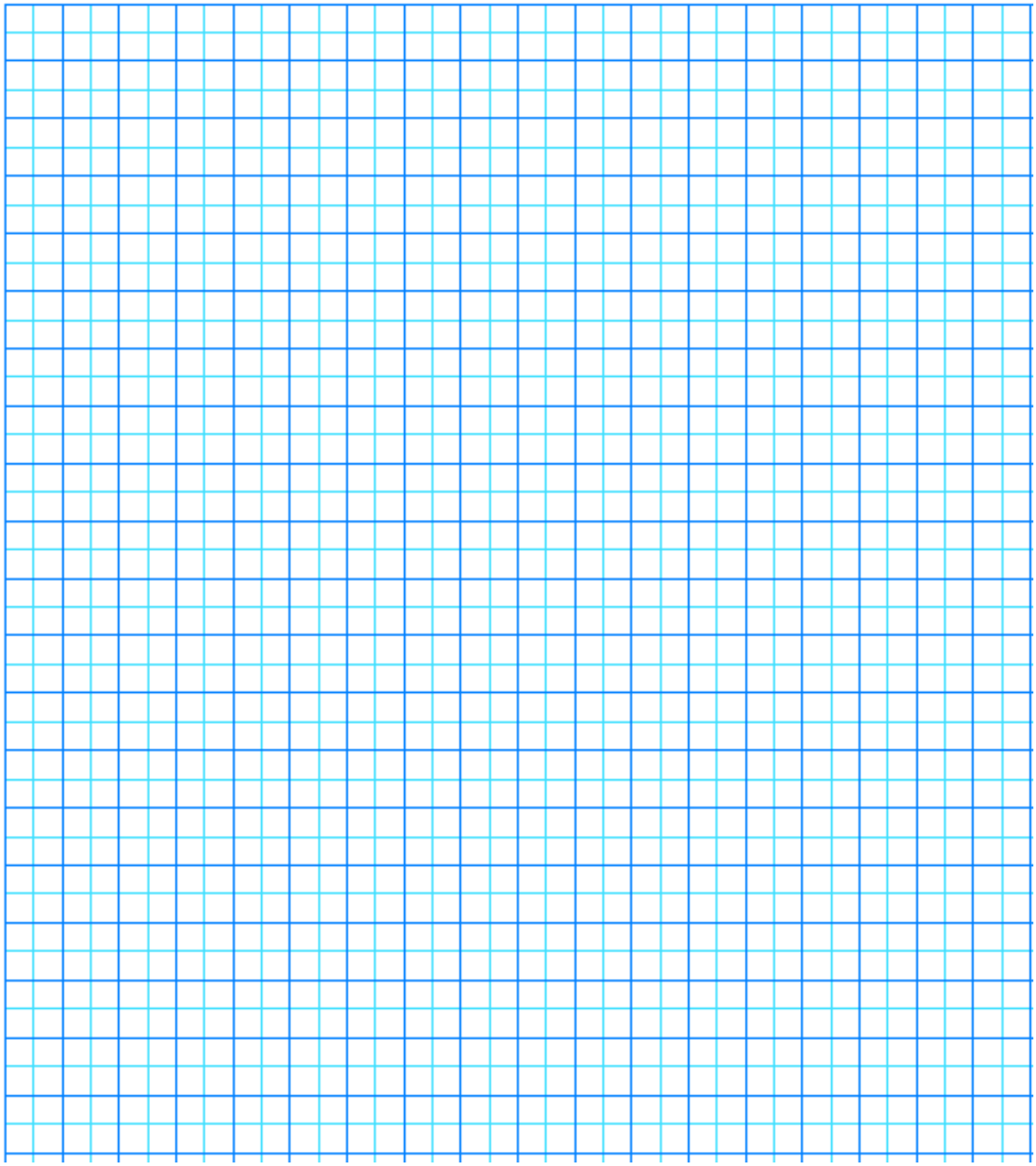
(a) Define Hook's Law and write their mathematical relation. (2 marks)

(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: (3 marks)

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} μm*	*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} μg*	*1 second*	*10^{6} μs*
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} μg*	*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

1mph (miles per hour) = 1.60934 km/h (kilo meter per hour)

1Km/h (kilo meter per hour) = 0.621371mph (miles per hour)

1Knot = 1.15078 mph (miles per hour)

1 mph (miles per hour) = 0.868976 Knot

1 Knot = 1.852 Km/h

1 Km/h = 0.539957 Knot

1 Km/h = 0.277778 m/s

1 m/s = 3.6 Km/h