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

ACADEMIC YEAR 2023 - 2024

Program	Year	Semester	Paper
DO	1	1	MAIN

MODULE NAME:	**PHYSICS – I**		
MODULE CODE:	**DPHYS – I**	**EXAM DATE:**	**27/12/2023**
INSTRUCTOR's NAME:	**Jahanzeb Khan**	**DURATION:**	**2 hrs**

Questions to be answered on:	**Allowed tools:**	**Number of pages**
✓ Space provided on the question paper	Pen, Pencil & Calculator	(Incl. cover page)**:** **08**

Points of attention:

- For each question, the maximum earned points are mentioned between brackets at the end of each question.
- Write very clearly! Answers that are not readable are not marked and don't get points!
- Make sure your answers are written to the point.
- All answers should be written **in English.**
- Write all the answers in **blue or black pen only.**
- Use the **pencil** only for **diagrams & 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.

FINAL MARKS

	50
	10

STUDENT NAME:

STUDENT ID:

Number of answer scripts:……..…….

Invigilator:……..……..

Student's signature: ……

Time of receipt:……..…..

Question 1 **[Total Marks 10]**

(a) The volume of engine oil inside a ship engine is 26 m^3. Convert m^3 to cm^3 and write your answer using scientific notation. (2 marks)

(b) The volume of a cylindrical tank is $8x10^5$ m^3 and it is completely filled by light crude oil. If the height of the tank is 10 m then, Calculate the diameter of the tank. (3 marks)

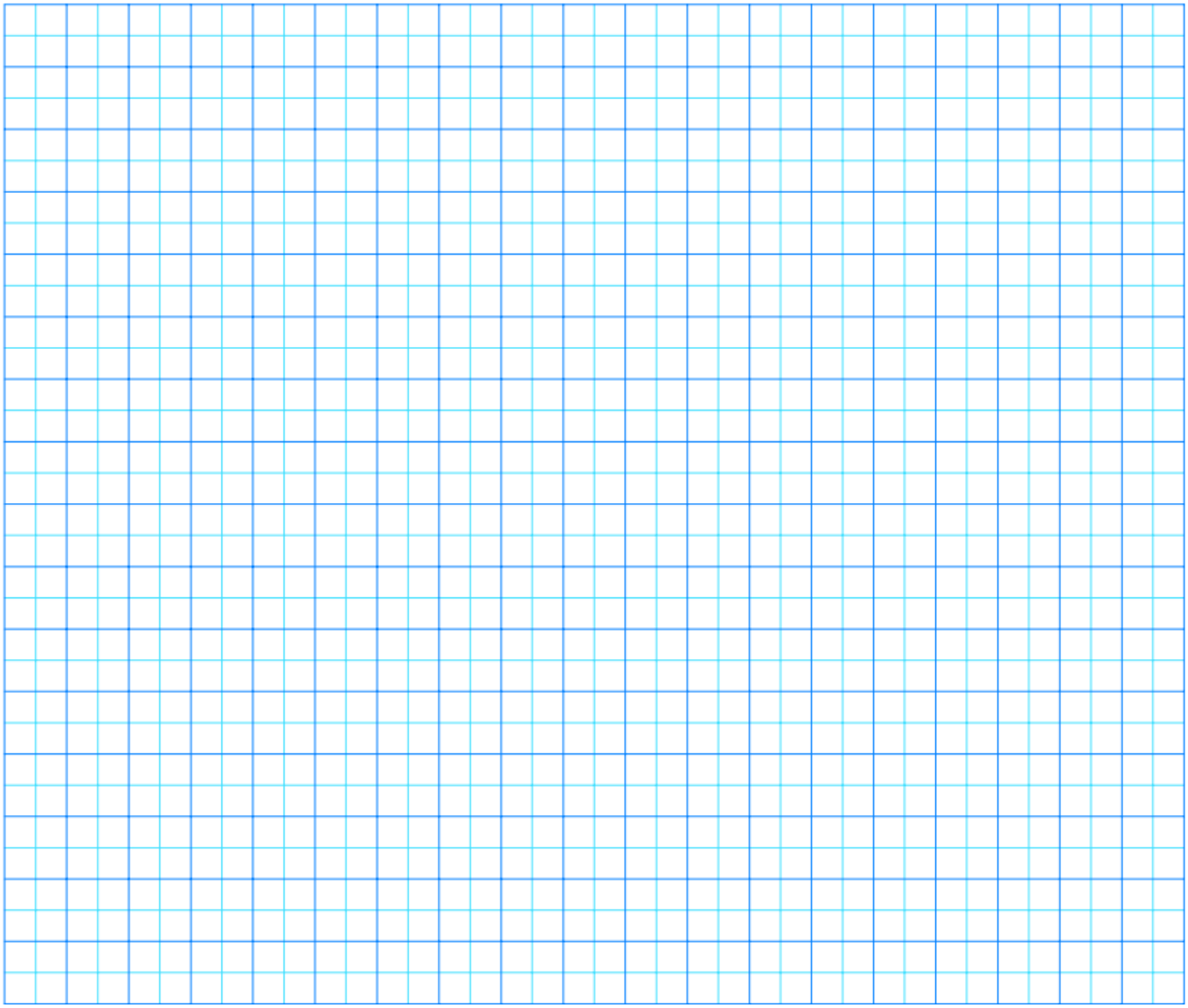
(c) If the density of light crude oil is 0.86 g/cm^3. Calculate the total mass of the oil in the tank. (3 marks)

(d) During engine operation, a significant amount of heat will be absorbed by the engine oil. How the heat affects density. (2 marks)

Question 2 **[Total Marks 10]**

A cargo ship is passing through Panama Canal. Before entering the Panama Canal the ship moves with and average speed of 15 km/h for 2 hours. While entering the Panama Canal the speed of the ship reduces to 8 km/h in 2 hour. Its then continue its journey at the same speed for the next 9 hours. After exiting the Panama Canal, the speed of the ship increases from 8 km/h to 15 km/h in 2 hours.

(a) Plot the graph for the whole journey of the ship during this observed time. (4 marks)



(b) Calculate the positive acceleration of the ship in SI Units. (2 marks)

(c) Calculate the total distance travelled by the ship during this observed time. (4 marks)

Question 3 **[Total Marks 10]**

The total mass of an oil tanker is 180,000 Tonnes. The oil tanker is taking 3 hours to gain an average speed of 30 km/h from rest.

(a) Calculate the total weight of the oil tanker and write your answer in scientific notation. (3 marks)

(b) Determine the force acting upon the ship for 3 hours to gain an average speed of 30 km/h. (5 marks)

(c) The engine is continuously exerting the same force as calculated in part (b), but the speed of the ship remains constant after 3 hours. Discuss the factors due to which the speed of the ship is not increasing. (2 marks)

Question 4 **[Total Marks 10]**

A dock side crane is loading a 40 feet container to a vertical height of 30 m on the ship.

The total mass of the container is 3.5 tonne and the crane takes 4 minutes to lift the container.

(a) Calculate the workdone by the crane to lift the container to the height of 30 m. (4 marks)

(b) Calculate the power consumed by the crane to lift the container to the height of 30 m. (3 marks)

(c) If electrical energy of 1.8 MJ is supplied to the motor of the crane. Determine the efficiency of the crane. (3 marks)

Question 5 **[Total Marks 10]**

(a) Differentiate between the real weight and the apparent weight of an object. Also explain buoyancy in terms of apparent weight. (3 marks)

(b) The mass of an object is 180 kg. When it is completely submerged in sea water, its apparent weight is 1350 N. By using the Archimedes' Prinicple calculate the buoyant force acting upon object and discuss the condion of object inside the fluid. (3 marks)

(c) Using the equeations of buoyancy estimate the volume and density of the object taking the density of sea water as 1.03 g/cm^3. (4 marks)

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 Tone*	*10^{3} Kg*	*1 second*	*10^{12} ps*
1 nautical mile	*1.852 Km*	*1 Kg*	*10^{-3} Tone*	*1 ps*	*10^{-12} seconds*
1 Km	*0.5399 nautical mile*				