Total number of printed pages: 02

Diploma/Ist Sem./DPH105

2023

APPLIED PHYSICS - I

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	What is S. I. unit of Force and Kinetic Energy?	1
	b)	Write the difference between Scalar and Vector quantity.	4
	c)	Find the dimensional formula of the given physical quantities. Velocity, Gravitational Constant, Frequency, Volume, Strain.	5
	d)	What are the dimensions of 'a' and 'b' in Vander Waals equation $(P+a/V^2)(V-b)=RT$	4
	e)	Write the seven fundamental quantities and mention their S.I. units?	6
2.	a)	State Newton's 1st law of motion.	2
	b)	What is force? Write the relation between Newton and Dyne?	2
	c)	If the mass of a bus is 200 kg, what will the force required to accelerate it at rate 5.3 m/s^2.	3
	d)	Write few differences between mass and weight.	3
	e)	Define energy. State the law of conservation of energy.	4
	f)	Prove that the total energy is conserved for a body falling freely.	6
3.	a)	What condition must be met to produce a Simple Harmonic Motion (SHM)?	2
	b)	Define, time period (T), frequency (f), wavelength (λ) and phase (ϕ)	8
	c)	State Newton's law of gravitation.	3
	d)	Write the difference between 'G' and 'g'.	2
	e)	What is the universal gravitational constant? Why is it called a universal constant? Write the SI unit and its dimensional formula.	5
4.	a)	Define Stress and Strain. Write the S.I. units and dimensional formula of stress and strain.	2+2+2 = 6
	b)	Define Young's modulus, Bulk modulus and Modulus of rigidity with their mathematical expressions.	6
	c)	Define Hooke's law.	2
	d)	An aluminium cube of each side 4 cm is subjected to a tangential force. The top	6

face of the cube is sheared 0.012 cm w.r.t the bottom. Find (i) shearing strain (ii) shear stress and (iii) shearing force. Give that modulus of rigidity is 2.08×10^{10}N/m2.

5. a) What is the cause of the thermal expansion? Write a few examples of thermal expansions. 4

b) Define the co-efficient of linear expansion (α), co-efficient of superficial expansion (β) and co-efficient of volume expansion (γ). 6

c) Derive the relationship between the co-efficient of linear expansion (α), the co-efficient of superficial expansion (β) and the co-efficient of volume expansion (γ). 10

6. a) Define: Calorie, specific heat capacity, heat capacity, water equivalent, latent heat of fusion and latent heart of vaporization. 6

b) Write few differences between Evaporation and Ebullition (boiling). 4

c) A mass of 200g of copper having specific heat capacity 0.095 is heated at 100°C and placed in 100g of alcohol at 8°C contained in a copper calorimeter whose mass is 25g. The temperature of alcohol rises to 28.5°C. Find the specific heat capacity of alcohol. 5

e) How much steam at 100°C will just melt 3200g of ice at -10 °C? Specific heat of ice=0.5 and specific latent heat of steam= 540 cal/g and the specific latent heat of ice= 80cal/g. 5

7. a) What is the elastic or mechanical wave? 2

b) Write Newton's formula for the velocity of sound waves in air. Why and how did Laplace correct Newton's formula? 8

c) What is the audible range of sound? Write applications of ultrasound. 3

d) Write the difference between 'echo' and 'reverberation 'of sound. 4

e) Write a short note on Doppler's effect of sound. 3

*****