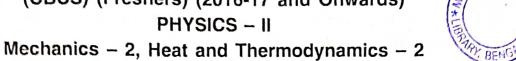
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## Il Semester B.Sc. Examination, May 2017 (CBCS) (Freshers) (2016-17 and Onwards) PHYSICS – II



Time: 3 Hours

Max. Marks: 70

Instruction: Answerfive questions from each Part.

## PART-A

An	SW	er any five questions. Each question carries eight marks. (5×8=40)
1.	a)	What is periodic motion? Give an example.
	b)	What is compound pendulum? Deduce an expression for its time period. (2+6)
2.	a)	Arrive at the relation between elastic constants $K = \frac{q}{3[1-2\sigma]}$ where symbols
		have their usual notations.
	b)	Write the theoretical and practical limiting values of Poisson's ratio. (6+2)
3.	a)	Give the significance of thermodynamic potentials.
	b)	Using Maxwell's thermodynamic relations obtain an expression for the difference in specific heats for a perfect gas. (2+6)
4.	a)	Explain melting and sublimation of a solid.
		Deduce an expression for Joule-Thomson coefficient. (2+6)
5.	a)	Distinguish between inertial and non-inertial frames of reference.
	b)	Show that acceleration is invariant under Galilean transformations. (2+6)
6.	a)	State the postulates of special theory of relativity.
	b)	Obtain Lorentz transformation equations. (2+6)



- 7. a) Define moment of inertia.
  - b) Deduce an expression for moment of inertia of a solid sphere about an axis passing through its diameter. (2+6)
- 8. a) What is wave motion? Mention the characteristics of a wave.
  - b) Derive the equation of a progressive wave.

(4+4)

## PART-B

Answer any five problems. Each problem carries 4 marks.

 $(5 \times 4 = 20)$ 

- 9. A particle of mass 0.01 kg, executing SHM makes 30 oscillations in 2s with an amplitude of 0.08 m. Find the maximum velocity of the particle.
- 10. A sphere is suspended from a wire of length 1 m and radius  $0.5 \times 10^{-3}$  m. If the period of torsional oscillations is 1.23 s and moment of inertia of the sphere about an axis through its diameter is  $0.03 \times 10^{-2}$  kg m<sup>2</sup>, calculate rigidity modulus of the material of the wire.
- 11. Calculate the decrease in the melting point of ice when the pressure changes by 1 atmosphere, specific volume of ice at 273 K is  $1.091 \times 10^{-3} \, \text{m}^3 \, \text{kg}^{-1}$  and that of water at 273 K is  $10^{-3} \, \text{m}^3 \, \text{kg}^{-1}$  and latent heat of ice, L =  $3.36 \times 10^5 \, \text{J kg}^{-1}$ , one atmosphere =  $10^5 \, \text{Nm}^{-2}$ .
- 12. The Van der Waals constant for hydrogen are  $a = 0.02 47 \text{ Nm}^4 \text{ mol}^{-2}$ ,  $b = 2.65 \times 10^{-5} \text{ m}^3 \text{ mol}^{-1}$ .  $R = 8.31 \text{ J mol}^{-1} \text{ K}^{-1}$ . Find the inversion temperature of hydrogen.
- 13. Calculate the expected fringe shift in Michelson-Morley experiment. If the effective length of each path is 6 m, velocity of the earth round the sun is  $3 \times 10^4$  ms<sup>-1</sup> and wave length of monochromatic light used is 5000Å (Velocity of light is  $3 \times 10^8$  ms<sup>-1</sup>).
- 14. Calculate the velocity at which the mass of the electron is  $\sqrt{3}$  times its rest mass. (Velocity of light is  $3 \times 10^8$  ms<sup>-1</sup>).



- 15. Calculate the moment of inertia of a uniform disc of mass 0.2 kg and radius 0.05 m about an axis passing through its edge and perpendicular to the plane of the disc.
- 16. The equation of a progressive wave is  $y = 4 \sin 2\pi \left[ \frac{t}{0.02} \frac{x}{400} \right]$  metre. Find its amplitude and velocity.

## PART-C

Answer any five questions. Each question carries two marks.

 $(5 \times 2 = 10)$ 

- 17. a) What should be the time period of a simple pendulum in a freely falling lift? Explain.
  - b) Justify the statement that Poissons ratio cannot be negative.
  - c) The melting point of ice decreases and that of wax increases with an increase in pressure. Explain.
  - d) Ideal gas does not show Joule-Thomson effect. Why?
  - e) Ether was assigned self contradictory properties. Explain.
  - f) Moving clock runs slow. Explain.
  - g) There are two spheres of same mass and same radius. One is solid and the other is hollow. Which of them has a larger moment of inertia about an axis through the diameter.
  - h) Which properties of the medium are necessary for the propagation of a mechanical wave through it?