K22U 3429

Reg. No. : .....

Name : .....

I Semester B.Sc. Degree (C.B.C.S.S. – O.B.E. – Regular/Supplementary/ Improvement) Examination, November 2022
(2019 Admission Onwards)
COMPLEMENTARY ELECTIVE COURSE IN PHYSICS
1C01PHY : Mechanics

Time : 3 Hours Max. Marks : 32

SECTION – A

Answer **all** questions, **each** carries **1** mark.

1. State Hooke's law of elasticity.
2. The moment of inertia of a ring about an axis perpendicular to the plane passing through the center of gravity is MR^2. Its radius of gyration about a parallel axis at a distance, 2R from the first axis is _____
3. The differential equation of a damped harmonic oscillator is _____
4. How a roaring sea can be made calm ? (Explain using the concept of surface tension.)
5. Unit of intensity of a wave is _____ **(5×1=5)**

SECTION – B

Answer **any 4** questions, **each** carries **2** marks.

6. What is Elastic Hysteresis ?
7. Explain the excess of pressure of the curved surfaces of a liquid.
8. Why two streamlines cannot cross each other ?
9. State and prove parallel axes theorem.

P.T.O.

10. Distinguish between free oscillation and damped oscillation.

11. Prove that equation of plane progressive harmonic wave is periodic in x and t. **(4×2=8)**

SECTION – C

Answer **any 3** questions, **each** carries **3** marks.

12. Find the work done in twisting a steel wire of radius 10^{-3} m and length 0.25 m through an angle of 45°. Given the rigidity modulus n = 8×10^{10} Nm^{-2}.

13. Calculate the work done in spraying a spherical drop of mercury of radius 10^{-3} m into a million drops of equal size. Surface tension of mercury is 0.465 Nm^{-1}.

14. A uniform thin bar of mass 3 kg and length 0.9 m is bent to make an equilateral triangle. Calculate the moment of inertia about an axis passing through the centre of mass and perpendicular to the plane of the triangle.

15. A simple harmonic motion is represented by $x = 2\sin\left(t + \frac{\pi}{3}\right)$. Find the maximum acceleration and maximum velocity.

16. Plane harmonic waves of frequency 500 Hz are produced in air with amplitude 1×10^{-3} cm. Find the pressure amplitude, energy density and energy flux of the wave. V = 340 ms^{-1} and ρ = 1.29 kgm^{-3}. **(3×3=9)**

SECTION – D

Answer **any 2** questions, **each** carries **5** marks.

17. Derive Poiseuille's equation and mention the method of determining the coefficient of viscosity.

18. Derive an expression for moment of inertia of solid sphere about the diameter.

19. Derive the differential equation for a damped harmonic oscillator and explain the conditions for underdamped harmonic oscillations.

20. Define plane progressive harmonic wave. Derive the expression for energy density and intensity of a progressive wave. **(2×5=10)**
