21103148

QP CODE: 21103148

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) REGULAR / REAPPEARANCE EXAMINATIONS, DECEMBER 2021

Second Semester

Core Course - PH2CRT02 - MECHANICS AND PROPERTIES OF MATTER

(Common for B.Sc Physics Model I, B.Sc Physics Model II Applied Electronics, B.Sc Physics Model II Computer Applications, B.Sc Physics Model III Electronic Equipment Maintenance)

2017 ADMISSION ONWARDS

BEC4940E

Time: 3 Hours Max. Marks : 60

Part A

*Answer any **ten** questions.*

*Each question carries **1** mark.*

1. Write down the equation for plane progressive harmonic wave travelling along the positive x-direction.
2. What do you understand by first overtone and second overtone in strings?
3. A particle has a mass of o.5 kg. It is executing simple harmonic motion with a frequency of 70 Hz and amplitude 5 cm. Find the potential and kinetic energy at a point 2 cm from the mean position.
4. Compare the time displacement for curves of critically damped, overdamped and underdamped harmonic oscillators.
5. Write down the expression for moment inertia of a solid cylinder about an axis passing through the centre of mass and perpendicular to its length.
6. What is flywheel? What are the uses of flywheel?
7. Write down the expression for work done in deforming a body under shearing strain.
8. Nowadays rectangular steel pipes are commonly used for construction purpose. Why?
9. State Newton’s law of viscous force in streamline flow.
10. Which quantity is to be measured with greater care so that the error is minimum in an experiment to measure the viscosity of a liquid using Poiseuille’s equation?
11. Why soaps and detergents are used in washing clothes?
12. Why a soap bubble has excess pressure inside it?

(10×1=10)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. The limits of audibility of the ear in terms of wavelength are 13.8m and 0.017m. Calculate the lower and upper limits of audibility in terms of frequency. Velocity of sound in air is 345 m/s.

14. Calculate the velocity of sound in a gas where two waves of wavelength 50 cm and 50.5 cm produce 6 beats per second.

15. A compound pedulum is formed by suspending a heavy ring of radius 2m from a point on its circumference. Calculate the period of oscillations.

16. A symmetrical body is rotating about its axis at the rate of 3 revolutions per sec. Calculate the angular momentum if about its axis the moment of inertia is 2 kg m^2

17. A uniform meter scale has a mass 150g. What is its moment of inertia if the scale is rotated about its axis perpendicular to its length and passes through (a) the centre and (b) the 75cm mark?

18. If Young's modulus and Bulk modulus of a metal are $7.25\times10^{11}N/m^2$ and $11\times10^{10}N/m^2$ respectively, find the Poisson's ratio and rigidity modulus of the material.

19. Calculate the work done in twisting a wire of radius 1mm and length of 25cm through an angle of 450. Given the rigidity modulus of steel is $8\times10^{10}N/m^2$.

20. A uniform metal disc of diameter 0.1m and mass of 1.2kg is fixed symmetrically to the lower end of torsion wire in a torsion pendulum experiment. If the length of the wire is 1m and its diameter is 1.44mm and the time period of torsional oscillations is 1.98s, calculate the modulus of rigidity of the material of the wire.

21. Water flows through a horizontal pipe line of varying cross section. At a particular point the pressure of water is 0.05m of mercury and the velocity of flow are 0.25m/s. Calculate the pressure at another point where velocity of water is 0.4m/s. Given density of mercury is 13.6 times that of water.

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **10** marks.*

22. Define simple harmonic motion. Starting from the differential equation of simple harmonic motion, obtain the solution, velocity, acceleration and time period. Also discuss the conditions for maximum and minimum velocity and acceleration in this case.

23. State parallel and perpendicular axis theorems. Derive the expression for moment of inertia of a straight rod about an axis passing through its centre and perpendicular to its length.

24. Derive the expression for the elevation at the middle of a symmetrically loaded beam.

25. Derive the expression for the depression at the loaded end of a cantilever.

(2×10=20)