QP CODE: 23505500

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Reg No : .....

Name : .....

INTEGRATED MSC DEGREE EXAMINATION, APRIL 2023

First Semester

INTEGRATED MSC BASIC SCIENCE-PHYSICS

CORE - IPH1CR02 - MECHANICS AND PROPERTIES OF MATTER

2021 Admission Onwards

D90CAEEE

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. Define unit vector. Give its physical significance.
2. What is triangle law of vector addition?
3. Define curl of a vector function
4. Why angular momentum is termed as moment of momentum
5. Explain the principle of flywheel.
6. What is elastic fatigue?
7. Give the equation of continuity. Explain the term involved.
8. Plot acceleration versus time graph of a simple harmonic oscillator.
9. What do you meant by an equivalent simple pendulum?
10. Define SI unit of sound.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. The radius of a circle is $x = (3.0 \pm 0.2)$ cm. Find the circumference and its uncertainty.
12. Derive the relation between cartesian and spherical polar coordinate system.
13. Calculate the MI of a uniform disc of mass 0.4Kg and radius 10cm about an axis passing through its edge and perpendicular to the plane of the disc.

14. A rectangular bar of length 1m, breadth 2.5 cm and depth 1 cm is firmly clamped at one end and loaded with 2.5 kg at the other end. If the loaded end is depressed by 2 mm, what is the Young's modulus of the a material of the bar?

15. A liquid flows through a horizontal tube of length 0.2 m and internal radius 1×10^{-3}m under a constant head of the liquid 0.2 m high. In a time of 10 minutes, 6×10^{-3} m^3 of liquid is coming out of the tube. Determine the co-efficient of viscosity of the liquid of the density is 0.9×10^3 kg/m^3.

16. Calculate the Reynold's number for a liquid of density 1 gm/cm^3 , viscosity $8x10^{-4}$ Pa.s flowing at 0.5 m/s through a pipe of diameter 4 cm?

17. The dispacement of a particlr executing simple harmonic motion along the y-direcrtion is given by y=asinwt. At what displacement, the kinetic energy and potential energy are equal?

18. A particle executing SHM of period 5s . Its velocity is found to be 4 cm/s after 0.8 s it has crossed the mean position. Calculate its velocity when the displacement is 2.5 cm.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. Check whether the force F=(2xy+z^2)i+x^2 j+2xzk is conservative. If so calculate the work done on a particle in moving it from (0,1,2) to (5,6,8).

20. What are torsional oscillations? Obtain an expression for the time period of a torsion pendulum. How will you use the result to determine the rigidity modulus of the material of a wire?

21. Obtain an expression for the excess pressure inside a liquid drop and a bubble.

22. Describe the acoustic-diffraction method for determining velocity of ultrasonic waves.

(2×5=10 weightage)