QP CODE: 25800344

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Reg No : .....

Name : .....

INTEGRATED MSC DEGREE EXAMINATION, JANUARY 2025

First Semester

INTEGRATED MSC BASIC SCIENCE-PHYSICS

CORE - IPH1CR02 - MECHANICS AND PROPERTIES OF MATTER

2021 Admission Onwards

F688F85F

Time: 3 Hours Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. Give the expression for the angle between two vectors.
2. State Parellelogram law of vector addition.
3. Discuss Stokes's theorem.
4. Define the term Torque.
5. What is meant by elasticity of a body? Distinguish between elastic and plastic bodies.
6. What do you mean by torsional couple? Discuss its origin.
7. The correct expression for Reynold's number is
8. A particle of mass m is executing SHM of frequency V. Give values of its (i)K.E.(ii)P.E.(iii)total energy
9. What is meant by resonance?
10. What are conditions for an oscillatory motion to be simple harmonis?

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. x = (2.0 ± 0.2) cm, y = (3.0 ± 0.6) cm. Find z = x - 2y and its uncertainty.
12. Derive the expression for acceleration in spherical polar coordinate system.
13. A torque of 1 Nm is applied to a wheel of mass 10 kg and radius of gyration 50 cm. What is the resulting acceleration?

14. A light metal rod of length 80 cm and diameter 1.5 cm is firmly clamped at one end and loaded with 3 kg at the free end. What is the depression at the free end. Given Y=190 GPa.

15. Water is flowing at a rate of $2m^3/S$ through a tube with a diameter of 1 m. If the pressure at this point is 80 kPa, what is the pressure of the water after the tube narrows to a diameter of 0.5 m?

16. Calculate the pressure inside an air bubble of diameter 0.2 mm stuated just below the surface of water. Given , surface tension of water = 0.072 N/m.

17. A particle vibrates simple harmonically with amplitude of 13 cm.The time period of oscillation is π seconds. Calculate the velocity of vibrating particle when the displacement is 5cm.Also calculate the frequency of oscillation

18. Explain sharpeness of resonance.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. Calculate laplacian of the following functions (a) $ø=x^2+2xy+3z+4$, (b) $F=x^2i+3xz^2j+2xzk$

20. Define moment of inertia. Describe in detail the method to determine experimentally the moment of intertia of flywheel about its axis of rotation.

21. Discuss the Poiseuille's method of determining the viscosity of liquids.

22. Set up and solve the differential equation for Simple Harmonic Motion and hence derive expression for potential energy, kinetic energy and total energy

(2×5=10 weightage)