

**E 6543**



00006543



Reg. No.....

Name.....

**B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, SEPTEMBER 2024**

**First Semester**

Complementary Course—Physics

PROPERTIES OF MATTER, MECHANICS AND PARTICLE PHYSICS

(For the Subject Chemistry and Geology)

[2013—2016 Admissions]

Time : Three Hours

Maximum Marks : 60

**Part A**

*Answer **all** questions briefly.*

*Each question carries 1 mark.*

1. Define couple per unit twist.
2. State the difference between uniform and non uniform bending.
3. Explain torque.
4. What is a flywheel ?
5. Write the expression for MI of a sphere.
6. What are damped oscillations ?
7. What is meant by quark ?
8. What are anti particles ?

(8 × 1 = 8)

**Part B**

*Answer any **six** questions.*

*Each question carries 2 marks.*

9. Explain torsional oscillations.
10. What is uniform bending ? Explain.

**Turn over**





E 6543

11. Differentiate between angular momentum and acceleration.
12. What do you mean by conservation of angular momentum ? Explain.
13. State parallel axis theorem.
14. Obtain the MI of a rod along one end.
15. Give the differential equation for SHM.
16. What are over damped oscillations ? Explain.
17. State the salient features of interactions in nature.
18. What is quark model ? Explain.

(6 × 2 = 12)

### Part C

*Answer any **four** questions.*

*Each question carries 4 marks.*

19. For aluminium  $Y = 7 \times 10^{10}$  Pa and  $n = 2.5 \times 10^{10}$  Pa. Calculate Poisson's ratio for the same.
20. The shear modulus of a metal is  $5 \times 10^{10} \text{ Nm}^{-2}$ . Suppose a shear force of 200 N is applied to the upper surface of a cube of this metal that is 3cm on each side. How far the top surface be displaced ?
21. A brass bar 1 cm. square in cross section is supported on two knife edges one meter apart. A load of 1 kg. at the center of the bar depresses that point by 2.51 mm. What is the young's modulus of the bar ?
22. A fly wheel of mass 100 kg. and radius of gyration 0.5 m. is rotating with a speed of 50 r.p.m. Calculate the torque required to bring it to rest in 4 minutes.
23. A particle executes SHM of period 10 seconds and amplitude 5 cm. Calculate the maximum amplitude of velocity.
24. In an oscillatory circuit  $L = 0.5$  H,  $C = 1.8$  microfarad. What is the maximum value of resistance to be connected so that the circuit may produce oscillations ?

(4 × 4 = 16)





E 6543

**Part D**

*Answer any **two** questions.*

*Each question carries 12 marks.*

25. Obtain an expression for the depression produced at the free end of a cantilever which is loaded at its free end, neglecting the weight of the beam.
26. Discuss the parallel axis theorem for moment of inertia and give one application.
27. Derive an expression for the moment of inertia of a uniform solid sphere about its diameter and about its tangent.
28. Give a detailed account on fundamental interactions in nature and classification of particles.

(2 × 12 = 24)

