E 7817 (Pages : 2) Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, NOVEMBER 2017

First Semester

Complementary Course—Physics

PROPERTIES OF MATTER, MECHANICS AND PARTICLE PHYSICS

[For the Subjects : Chemistry and Geology]

(2013—2016 Admissions)

Time : Three Hours Maximum Marks : 60

Candidates can use clark's tables and Scientific non-progammable calculators.

Part A (Very Short Answer Questions)

Answer **all** *questions briefly.*
Each question carries 1 *mark.*

1. What is Poisson's ratio ?
2. State the difference between a beam and a cantilever.
3. Define uniform bending.
4. What is meant by moment of inertia of a body ?
5. Explain angular momentum with an example.
6. What are oscillatory motions ?
7. What is meant by forced oscillation ?
8. List a number of elementary particles.

(8 × 1 = 8)

Part B (Brief Answer Questions)

Answer any **six** *questions.*
Each question carries 2 *marks.*

9. Explain rigidity modulus.
10. What is non uniform bending ? Explain.
11. State the significance of I-form of girders.
12. Define shearing stress and shear.

Turn over

13. State perpendicular axis theorem.

14. What are the features of fly wheel ?

15. Explain SHM with examples.

16. What are under damped oscillations ? Explain.

17. Graphically represent the oscillations of a simple pendulum.

18. What are gauge particles ? Explain.

(6 × 2 = 12)

Part C (Derivations/Problems/Short Essays)

Answer any **four** *questions.*
Each question carries 4 *marks.*

19. Calculate Poisson's ratio for the material whose $Y = 12.25 \times 10^{10}\ Nm^{-2}$ and $n = 4.55 \times 10^{10}\ Nm^{-2}$.

20. A light metal rod of length 0.6 m and radius 1cm is clamped at one end and loaded at the free end with 5.5 kg. Calculate the depression at the free end if $Y = 9 \times 10^{10}\ Nm^{-2}$ and $g = 9.8 ms^{-2}$.

21. A steel wire of 1.00 mm radius is bent in the form of a circular arc of radius 50cm.Calculate the bending moment $Y = 2 \times 10^{11} Nm^{-2}$.

22. A grind stone weighing 40kg has a radius of 1.2 m. Starting from rest it acquires a speed of 150 rpm in 12 s. Calculate the torque acting on it.

23. Assuming earth to be a sphere of uniform density 5520 kgm^{-3} and radius 6400 km, calculate the moment of inertia about its axis of rotation.

24. A hollow sphere filled with water, used as pendulum bob. If water trickles out slowly through a hole made at the bottom, how will the time period be effected ?

(4 × 4 = 16)

Part D (Essay Questions)

Answer any **two** *questions.*
Each question carries 12 *marks.*

25. Derive the expression for the couple per unit twist of a uniform solid cylinder.

26. Discuss on uniform bending and arrive at the equation for the moment of the couple required to bend a uniform metallic bar into an arc of a circle of small curvature.

27. Discuss the perpendicular axis theorem for moment of inertia and state applications.

28. Establish the differential equation of motion for a damped harmonic oscillator and obtain an expression for displacement. Also discuss light and heavy damping.

(2 × 12 = 24)