

TB141360 A

Reg. No.....

Name :.....

B.Sc. DEGREE (C.B.C.S.S) EXAMINATION, NOVEMBER 2014
FIRST SEMESTER
COMPLEMENTARY COURSE FOR CHEMISTRY
PHY1PMMP – PROPERTIES OF MATTER, MECHANICS AND PARTICLE PHYSICS

Time: 3 Hours

Maximum: 60 Marks

(Candidates can use Clark's tables and scientific non-programmable calculators)

Part A

Very short Answer Questions.

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

1. State Hooke's law and draw the stress- strain graph.
2. Define flexural rigidity?
3. What is by Poisson's ratio? Give its limiting values.
4. Differentiate center of mass and center of gravity?
5. Give the physical significance of moment of inertia
6. What is Q factor?
7. Define retarding force?
8. State baryon number conservation law **(8 x 1 = 8 marks)**

Part B

Short Answer Questions

*Answer any **Six** questions. Each carries 2 marks*

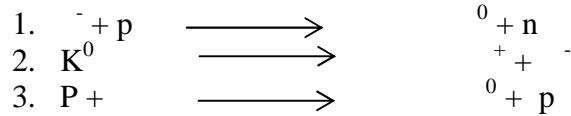
9. Explain why girders are I-shape?
10. Derive an expression for torsional potential energy?
11. Explain static torsion method to find rigidity modulus?
12. State and prove perpendicular axis theorem.
13. Define angular velocity and torque.
14. Find the moment of inertia of circular disc about its diameter?
15. Derive the expression for kinetic energy of harmonic oscillator and draw its variation with amplitude?
16. Distinguish between velocity resonance and amplitude resonance?
17. Derive an expression for the power dissipation in damped harmonic motion?
18. Write down the classification of elementary particles? **(6 x 2 = 12 marks)**

Part C

Problems/ Derivations

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

19. A uniform circular disc of radius 7 cm and mass 3 kg suspended by a wire of length 1 m, has a period of 8 s when used as a torsion pendulum. If the diameter of the wire is 1 mm, calculate the rigidity modulus of the material of the wire?
20. Show that work done per unit volume in deforming a body undergoing volume strain is $\frac{1}{2} \times \text{stress} \times \text{strain}$.
21. Four spheres of radius 'a' and mass 'm' each are placed with their centers at the four corners of a square of side 'b'. Find the moment of inertia of the square?
22. Calculate the moment of inertia and radius of gyration of a disc of mass 1.2 kg and radius 8 cm about (a) its diameter (b) an axis parallel to a diameter and tangential to the disc.
23. The quality factor of a harmonic oscillator consisting of a 50 gm mass attached to a massless spring is 200. It oscillates with amplitude of 2 cm in resonance with a periodic force of frequency 20 Hz. Determine the average energy stored in it and the rate of dissipation of energy?
24. Classify the following process in terms of the types of interaction.



(4 x 4 = 16 marks)

Part D

Long Answer / Problem Questions

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

25. Derive an expression for the depression produced at the midpoint of a uniform rectangular bar loaded at its middle. How is Young's modulus determined by this method?
26. Derive an expression for the moment of inertia of a sphere about (1) its diameter and (2) its tangent.
27. Explain damped harmonic motion. Obtain the differential equation for damped harmonic oscillation. Discuss the solution and explain the terms (1) under damped (2) over damped and (3) critically damped motion.
28. Briefly explain Quarks model?

(2 x 12 = 24 marks)