

Reg. No.:..... Name :..... **15U130**

**BSc DEGREE END SEMESTER EXAMINATION - OCTOBER 2015**

SEMESTER - 1: PHYSICS (COMPLEMENTARY) FOR BSC CHEMISTRY  
COURSE - 15U1CPPHY2: PROPERTIES OF MATTER, MECHANICS AND PARTICLE PHYSICS

Time: Three Hours

Max. Marks: 60

**Part A**

Answer all questions, 1 mark each

1. Explain Strain and discuss about its dimensions.
2. Write down the relation between Young's modulus and Bulk modulus and explain various terms.
3. What are the limiting values of the Poisson's ratio?
4. If there were a great migration of people toward the equator, how would this affect the length of the day?
5. Can a body have acceleration without having velocity?
6. What do you mean by the term elementary particle?
7. Explain the features of the particle that mediates between masses.
8. What do you understand by the term Epoch? (1 x 8 = 8)

**Part B**

Answer any six questions, 2 marks each

9. Explain why hollow shafts are preferred to solid ones of the same mass and area of cross section.
10. Write down any two assumptions made during the theory of bending.
11. What is a torsion pendulum and why is it called so?
12. Discuss the motion of a harmonic oscillator when it is critically damped.
13. What is meant by sharpness of resonance?
14. Discuss the law of conservation of momentum with examples.
15. State and explain the perpendicular axis theorem.
16. What are the different Leptons? (2 x 6 = 12)

**Part C**

Answer any four questions, 5 marks each

17. Find the load to be suspended at the end of a brass wire, whose Young's modulus is 90 GPa, length 8m and diameter 0.4 mm to make it stretch through 1 cm.
18. A motor cyclist is making a vertical loop inside a death well. What is the minimum speed required to perform a vertical loop if the radius of the chamber is 25 m.

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19. Find the M.I. of a system of three particles of masses 1.kg, 2 kg, 3 kg placed at the corners of an equilateral triangle of side 1 m about an axis along the altitude of the triangle passing through 1 kg.
20. A flywheel of mass 500 kg and 0.5 m radius makes 500 r. p. m., assuming the mass to be concentrated at the rim, Calculate the angular velocity, M.I. and kinetic energy of the fly wheel.
21. Explain conservation laws and symmetry.
22. The equation for the displacement of a particle executing S.H.M. is  $X(t) = 0.6 \sin(2\pi t + \pi/3)$ m. Calculate the maximum speed of the particle, speed at  $t = 0$ , period and frequency of motion. (5 x 4 = 20)

### **Part D**

Answer any **two**, 10 marks each.

23. Explain a cantilever giving two examples seen around you. Derive an expression to find the depression in a cantilever fixed at one end and loaded at the other and explain an experimental method used to find the Young's modulus of a cantilever.
24. Derive an expression for moment of inertia of a thin ring (Hoop)
  - a. About an axis through its centre and perpendicular to its radius.
  - b. About a diameter.
  - c. About a tangent in the plane of a ring.
25. Define simple harmonic motion. Derive expression for (1) velocity, (2) acceleration, (3) period and (4) energy of a particle executing simple harmonic motion.
26. Discuss elementary particle quantum numbers and their conservation laws with at least one example.

(10 x 2 = 20)

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