

Reg. No..... Name .....

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**BSC DEGREE END SEMESTER EXAMINATION APRIL - 2015**  
**SEMSTER 2: PHYSICS (CORE COURSE)**  
**COURSE: U2CRPHY2-MECHANICS AND PROPERTIES OF MATTER**

Time: 3 Hours  
 Maximum: 60 Marks

**Part A**

(Very short answer questions)

Answer **all** questions, each question carries 1 mark.

1. Distinguish between simple pendulum and compound pendulum
2. Write the expression for kinetic energy of a rolling body.
3. What is meant by resonance?
4. Define bending moment.
5. Explain the action of detergents.
6. Define critical velocity.
7. Explain the importance of lubricants?
8. Explain law of conservation of angular momentum.

(1 x 8 = 8 marks)

**Part B**

(Short answer Questions)

Answer any **6** questions. Each question carries 2 marks

9. Obtain the general expression for simple harmonic motion.
10. Explain I - form of girders.
11. Show that surface Energy is numerically equal to surface tension.
12. Distinguish between streamline flow and turbulent flow.
13. Distinguish between uniform bending and non-uniform bending.
14. A solid sphere and hollow sphere of same radius and mass are allowed to roll on an inclined plane from the same height. Which one will reach ground first? Why?
15. Angular momentum of a body increased by 20%. What will be the increase in its rotational kinetic energy?
16. Define Poisson's ratio. Obtain the limiting values of Poisson's ratio.

(2 x 6 = 12 marks)

### Part C

(Problem/ Derivations)

Answer any **4** questions. Each question carries 5 marks

17. Earth is rotating with an angular velocity  $7.3 \times 10^{-5}$  rad/s. what is the tangential force needed to stop the earth in one year? Moment of inertia of earth about its axis of rotation =  $9.37 \times 10^{37}$  kgm<sup>2</sup>. Radius of earth =  $6.4 \times 10^6$  m.
18. A particle of mass 5 kg executing SHM along a straight line has a velocity 1.5 m/s at its equilibrium position and acceleration  $14.2 \text{ m/s}^2$  at the extreme position. Calculate its Kinetic energy, potential energy and total energy when it is at a distance of 5 cm from the mean position
19. A mass of 10 kg is suspended at one end of a wire of length 5m and radius 1mm. the elongation produced for the wire is 1mm. find the energy stored per unit volume of the wire.
20. The excess pressure inside a soap bubble of radius 3mm is balanced by 6mm column of oil of density  $700 \text{ Kg/m}^3$ . Find the surface tension of soap solution.
21. A metal plate 2cm x 2cm rests on a layer of oil 1 mm thick whose coefficient of viscosity is  $2.01 \text{ Nsm}^{-2}$ . Find the horizontal force required to move the plate with a velocity 1cm/s
22. The mass of a disc is 3.0 kg and its radius is 10cm. Calculate the radius of gyration of the disc about an axis passing through its centre of gravity and perpendicular to it.

(5 x 4 = 20 marks)

### Part D

(Long answer questions)

Answer any **2** questions. Each question carries 10 marks

23. Explain the determination of moment of inertia of a flywheel.
24. With the help of necessary theory explain the formation of beats.
25. Derive Poiseuille's formula.
26. Explain the theory of damped oscillator. Discuss under damped and over damped oscillations.

(10 x 2 = 20 marks)

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