B.Sc. DEGREE END SEMESTER EXAMINATION - MARCH/APRIL 2019

SEMESTER - **2: PHYSICS (CORE COURSE)**

COURSE: **15U2CRPHY2: MECHANICS AND PROPERTIES OF MATTER**

(Common for Regular 2018 / Supplementary/Improvement 2017/ 2016/2015 & 2014 Admission)

Time: Three Hours   Maximum Marks: 60

PART (Very short answer questions)
*Answer **all** questions. Each question carries **1** Mark*

1. What are the limiting values of Poisson's ratio?

2. State Hooke's law.

3. What is centripetal force?

4. What is a cantilever?

5. Define Coefficient of viscosity

6. What is the moment of inertia of a ring about its diameter?

7. What is surface tension?

8. Write the differential equation of a SHM.   (1 x 8 = 8)

PART B (Short answer)
*Answer **any Six** questions. Each question carries **2** Marks*

9. State and prove the theorem of Parallel axes.

10. Define Flexural rigidity.

11. Explain surface tension based on molecular theory.

12. Obtain an expression for bending moment.

13. Small liquid drops are spherical. Why?

14. Derive an expression for the excess pressure inside a drop

15. Distinguish between steady flow and turbulent flow.

16. Obtain the differential equation of a damped harmonic oscillator?   (2 x 6 = 12)

PART C (Problem/Derivations)
*Answer **any Four** question. Each question carries **5** Marks*

17. Calculate the work done in twisting a steel wire of radius 10^{-3} m and length of 0.25m through an angle of 45^0 . The modulus of rigidity of the material is 8×10^{10} Nm^{-2}

18. A gold wire having a diameter of 32×10^{-5} m elongates by 10^{-3} when stretched by a force of 3.234N and twists through 1 radian when equal and opposite torques of 1.45×10^{-5} Nm are applied at its ends. Calculate the Poisson's ratio for gold?

19. Calculate the loss of energy when 27 drops of water each of radius 0.6mm. coalesce to form a single drop?

20. A liquid flows through two capillary tubes under same pressure head. The lengths of the tubes are in the ratio 2:1and the ratio of their diameters is 2:3. Compare the rates of flow of liquid through the tubes?

21. The mass of a disc is 0.4kg and its radius is 20 cm. Calculate the radius of gyration of the disc about an axis passing through its center of gravity and perpendicular to its length.

22. A metal disc of radius one meter with its plane vertical can be made to swing about a horizontal axis passing through any one of the holes bored along its diameter. Calculate the minimum period.

(5 x 4 = 20)

PART D (Long answer questions)
*Answer **any Two** question. Each question carries **10** Marks*

23. Give the theory of Kater's pendulum and explain how acceleration due to gravity is determined with it.

24. Derive an expression for the Moment of Inertia of a sphere about its diameter and also about its tangent

25. Derive an expression for the depression at the free end of a cantilever.

26. Derive the Poiseuille's formula for the flow of a liquid through a pipe. Mention the correction to be applied to the formula

(10 x 2 = 20)

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