Reg. No…….. Name…… **20U226S**

B. Sc. DEGREE END SEMESTER EXAMINATION – MARCH 2020

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

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

(Common for Improvement 2018/Supplementary 2018 /2017/2016 /2015/2014 Admissions)

Time: Three Hours Maximum Marks: 60

PART A (Very short answer questions)

*Answer **all** questions, Each question carries **1** Mark*

1. Write the expression for the period of a simple harmonic motion.
2. What is the value of potential energy at the equilibrium position of a simple pendulum
3. What is centripetal force?
4. What is Poisson's ratio?
5. Define flexural rigidity.
6. What is the moment of inertia of disc about its diameter?
7. What is the expression for excess pressure inside a soap bubble?
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 Perpendicular axes.
10. What is the moment of inertia of a solid cylinder about an axis passing through its centre and perpendicular to its length?
11. Obtain the relation between surface tension and surface energy.
12. Obtain an expression for bending moment.
13. Small liquid drops are spherical. Why?
14. Obtain an expression for the force between two plates separated by thin layer of liquid.
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** questions, Each question carries **5** Marks*

17. A solid sphere of mass3kg and diameter 0.2m is suspended from a wire. The torque required to twist the wire is $5x10^{-2}$ Nm/radian. Calculate the period of oscillation.
18. A cantilever of length 0.6m is depressed by 20mm at the loaded end. What is the depression at a distance of 0.4m from the fixed end?
19. Find the work done in spraying a drop of water of 2mm diameter in to a million droplets all of the same size. Surface tension of water is $72x10^{-3}$ Nm^{-1}?

20. Calculate the terminal velocity with which an air bubble of diameter 0.8mm rises in a liquid of viscosity 0.25Nsm^{-2} and density 0.95x10^{3}kgm^{-3}. Density of air is 1.3Kgm^{-3} g= 9.8 ms^{-2}?
21. A fly wheel is accelerated by a steady torque of 25Nm so that it makes 3 revolutions in the first second of its motion. The mass of the flywheel is 15 kg. Calculate the radius of gyration of the flywheel.
22. A compound pendulum is formed by suspending a heavy ring from a point on its circumference. Calculate the period of oscillation if its radius is 2m. (5 x 4 = 20)

PART D (Long answer questions)

*Answer **any Two** question, Each question carries **10** Marks*

23. Give the theory of Compound pendulum and explain how acceleration due to gravity is determined with it.
24. Describe an experiment to determine the moment of inertia of a flywheel.
25. Derive an expression for the depression of the midpoint of a beam loaded at the center.
26. Explain the theory of damped oscillator. Discuss under damped and over damped oscillations.

(10 x 2 =20)

****