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

B.Sc. DEGREE END SEMESTER EXAMINATION - OCTOBER 2019
SEMESTER – 6: PHYSICS (COMPLEMENTARY COURSE FOR CHEMISTRY)
COURSE: 15U1CPPHY2: PROPERTIES OF MATTER, MECHANICS AND PARTICLE PHYSICS

(Common for Improvement 2018/ Supplementary 2018/2017/2016 /2015 admission)

Time: Three Hours   Max. Marks: 60

PART A
*Answer **all** questions, **1** mark each*

1. State Hooke's law.
2. The Young's modulus for a plastic body is………………………….
3. What is a torsion pendulum?
4. Define angular velocity.
5. State parallel axes theorem.
6. What is the moment of inertia of a solid sphere about its tangent?
7. Waves which do not require a medium for propagation are called………………………
8. Give examples for damped SHM.
9. Which is the strongest of all interactions in nature?
10. Gravitons have………………………spin.   (1 x 10 = 10)

PART B
*Answer **any seven** questions, 2 marks each*

11. Define Poisson's ratio. What are its limiting values?
12. Explain why hollow shafts are preferred to solid ones of the same mass and area of cross section.
13. Which is more elastic - steel or rubber? Why?
14. State and prove the law of conservation of angular momentum.
15. Derive an expression for the moment of inertia of a ring about its diameter.
16. What is a flywheel? Give two applications of flywheel.
17. Give the expressions for the velocity and acceleration of a simple harmonic oscillator.
18. Discuss the term resonance. What is resonant frequency?
19. What are hadrons? Discuss their features.   (2 x 7 = 14)

PART C
*Answer **any four** questions, 4 marks each*

20. A load 2 kg produces a certain extension in a wire of length 6m and diameter 1 mm. What is the lateral contraction produced if $\sigma = 0.25$ and $Y = 7.48 \times 10^{10}$ N/m^2.
21. A torsion pendulum with a wire of length 1 m, diameter 1.22 mm and modulus of rigidity 8×10^{10} N/m^2, oscillates with a period of 1.25 s. Find the moment of inertia of the suspended body about the axis of suspension.

22. The masses of the atoms of a diatomic molecule are m1 and m2 and are separated by a distance r. Calculate the M.I. of the system about an axis passing through its centre of mass and perpendicular to the line joining the masses.

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

24. Derive the differential equation for a harmonic oscillator. Obtain an expression for the time period.

25. A body having a mass of 4 gm executes simple harmonic motion. The force acting on the body when displacement is 8 cm is 24 gm. wt. Find the period. If the maximum velocity is 500cm/s, find the amplitude and maximum acceleration. (4 x 4 = 16)

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

26. What is a cantilever? 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.

27. Describe an experiment to determine the moment of inertia of a fly wheel.

28. Discuss the origin of damping. Derive the differential equation for a damped harmonic oscillator. Obtain the condition for critically damped, over damped and under damped cases.

29. Discuss the various elementary particle quantum numbers and their conservation laws. Give examples. (10 x 2 = 20)

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