Reg. No…….. Name…… **18U225**

B. Sc. DEGREE END SEMESTER EXAMINATION MARCH / APRIL 2018

SEMESTER **– 2: B. Sc. PHYSICS (CORE COURSE)**

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

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

Time: Three Hours Max. Marks: 60

Part A

(Very short answer questions)

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

1. Give two examples for conservative force and non-conservative force.
2. Define moment of inertia.
3. State the perpendicular axes theorem.
4. Write two uses of flywheel?
5. Define torque. Express it in vector form.
6. What is flexural rigidity?
7. What is neutral axis?
8. Define poissons ratio?

(1 x 8 = 8)

Part B (Short answer)

Answer **any six** questions. Each question carries 2 Marks

9. Derive the relation for the work done during rotation and the power developed.
10. Show that the work done per unit volume for a body undergoing linear strain is given as (½ x Stress x Strain).
11. Explain two applications of the principle of conservation of angular momentum.
12. Derive an expression for the maximum and minimum time periods of a compound pendulum
13. Find the expression for the M.I of a solid cylinder about its axis.
14. State the differential equation of a damped harmonic oscillator?
15. A needle can float in clean water, but sinks in soap solution. Why?
16. Distinguish between stream line and turbulent flow. (2 x 6 = 12)

Part C (Problem/Derivations)

Answer **any four** questions. Each question carries 5 Marks

17. Calculate the poisson's ratio for steel. Given that $Y=2x10^{11}$ N/m^2 and Rigidity modulus $8x10^{10}$N/m^2.
18. A circular disc of mass M is rolling on a horizontal plane with velocity v. Prove that its KE is ¾ Mv^2.
19. If the earth suddenly contracts to half its radius. What would be the length of the day.

20. A plate of area 10 Sq cm is separated from a large plate by a layer of glycerin 1mm thick. If the viscous coefficient of glycerin is 2 kg/msec. What force is required to keep the plate moving with a velocity of one cm per sec.
21. Calculate the MI of uniform disc of mass 0.4 kg and radius 0.1 m about an axis passing through its edge and perpendicular to the disc.
22. A copper wire of length 4m and diameter 2mm is hung vertically from a rigid support and a mass of 20 kg is attached to its lower end . Find the extension of the wire Y of copper $12x10^{10}N/m^2$.

(5 x 4 = 20)

Part D (Long answer questions)

Answer **any two** question. Each question carries 10 Marks

23. With necessary theory explain how the acceleration due to gravity is determined using Kater's pendulum.
24. Discussion in detail the theory of damped harmonic oscillation. Discuss also over; under and critically damped cases.
25. Discuss with theory on determining the Young's modulus of a rectangular bar using a cantilever.
26. Explain the theory on determining the rigidity modulus of a wire using torsion pendulum method.

(10 x 2 = 20)

****