Reg. No…….. Name…… **16U225**

B. Sc. DEGREE END SEMESTER EXAMINATION MARCH 2017

SEMESTER **– 2: (CORE COURSE)**

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

(Common for Regular 2016 admission and Supplementary 2015 & 2014 admission)

Time: Three Hours Max. Marks: 60

PART A

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

1. Give two examples for contact force and action at a distance force.
2. Define Radius of gyration.
3. State the parallel axes theorem.
4. What is a kater's pendulam?
5. Distinguish between periodic and oscillatory motion.
6. What is a cantilever?
7. What is bending moment?
8. Define velocity gradient. (1 x 8 = 8)

PART B

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

9. Derive the relation connecting the three elastic moduli.
10. Draw and explain the Stress –Strain diagram.
11. Explain why "girders are made in the form of the letter I ".
12. State the condition for minimum and maximum period for a compound pendulum.
13. Find the expression for the M.I of a solid sphere about a tangent.
14. State the differential equation of a damped harmonic oscillator?
15. Discuss the variation of surface tension with temperature?
16. In some cases, engineers prefer liquids of low viscosity. But in some cases they prefer liquids of high viscosity. Give example for each. (2 x 6 = 12)

PART C

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

17. The Moment of inertia of a grindstone is 600 Kg.m^2. A constant torque is applied to it when at rest. After 10 seconds it is found to have a speed of 150 rpm. Calculate the torque.
18. Calculate the MI of a ring of mass 200 gram and radius 20 cm about (i) an axis passing through its centre and perpendicular to its plane (ii) about its diameter?
19. A liquid flows through two capillary tubes under the same pressure head. The lengths of the tubes are in the ratio 2:1 and the ratio of their diameters is 2:3. Compare the ratios of flow of liquid through the tubes?

20. A metal plate 100 cm^2 in area rests on a layer of oil 2mm thick. Calculate the horizontal force required to move the plate with a velocity of 2 cm/sec. η= 1.56 Nsm^{-2}
21. A 2m long wire of cross sectional area 0.1 cm^2 is stretched by applying a force of 300 N at each end of it. Find the total elongation of the wire. Y of the material of the wire is 1.5 x 10^{11} N/m^2.
22. Calculate the poisons ratio for steel. Given that Y=$2x10^{11}$ N/m^2 and Rigidity modulus 8 x 10^{10} N/m^2.

(5 x 4 = 20)

PART D

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

23. Deduce Poiseuille's formula to determine the coefficient of viscosity of a viscous liquid.
24. Derive the excess pressure on a curved liquid surface. Hence obtain the expression for the excess pressure inside a bubble.
25. Discuss, with necessary theory, the experiment to determine the moment of inertia of a flywheel.
26. Discuss in detail the theory of forced oscillation. Hence explain resonance. (10 x 2 = 20)

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