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Reg. No. : .....

Name : .....

First Semester B.Sc. Degree Examination, December 2016
(First Degree Programme Under CBCSS)
PHYSICS
Core Course – I
PY 1141 : Basic Mechanics and Properties of Matter
(2014 Admission Onwards)

Time : 3 Hours Max. Marks : 80

SECTION – A

Answer **all** questions in **one** or **two** sentences. **Each** question carries **one** mark.

1. Define Poison's ratio.
2. Define centre of mass of a system of particle.
3. Why is S.H.M. so called ?
4. What is the Fourier expression for simple harmonic motion ?
5. On hot water oil remains as a drop, but it spreads on cold water. Why ?
6. Distinguish between moment and momentum.
7. A car is moving along a straight level road. What is the work done on the car ?
8. State the law of conservation of energy.
9. State Hooke's law of elasticity.
10. Can the surface tension of a liquid be zero ?

SECTION – B

Answer **any eight** questions, **not** exceeding **a** paragraph. **Each** question carries **two** marks.

11. A boy is swinging in a swing. If he stands up how will the time period be affected ? Explain.
12. State Bernoulli's theorem.
13. A drop of liquid under no external forces is always spherical in shape. Explain.

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14. State parallel and perpendicular axes theorem.

15. Define moment of inertia and radius of gyration.

16. Draw the graphs of PE and KE of a spring.

17. State Sabine's formula for the reverberation time. Explain the terms.

18. Obtain an expression for the displacement of a particle executing S.H.M.

19. Draw a stress strain graph. Mark elastic limit, yield point on the graph.

20. What is the expression for the work done in stretching ? What happens to this work ?

21. A spinning cricket ball in air does not follow a parabolic trajectory. Why ?

22. State Newton's law of viscosity.

SECTION – C

Answer **any six** questions. **Each** question carries **four** marks.

23. The length of a wire increases by 'l' when a weight W is hung. If the radius of the wire is doubled, all other conditions are the same, what will be the increase in its length ?

24. If a particle moves in a potential energy field $U = U_0 - ax + bx^2$, where a and b are positive constants. Obtain an expression for the force acting on it as a function of position. At what point does then force vanish ? Is this a point of stable equilibrium ? Calculate force constant, time-period and frequency of the particle.

25. A gold wire, 0.32 mm in diameter, elongates by 1 mm when stretched by a force of 330 g wt and twists through 1 radian when equal and opposite torques of 145 dyne-cm are applied at its ends. Find the value of Poisson's ratio for gold.

26. A long capillary tube with both ends open is filled with water and set in a vertical position. What will be the length of the column of water remaining in the capillary if the radius is 1 mm ?

27. Calculate the percentage change in the time-period of a simple pendulum if the angular amplitude of the pendulum be
    i) 30°
    ii) 60°

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28. Two soap bubble of radius 0.5 cm and 1.2 cm coalesce under isothermal condition. Find
    i) the radius of the common surface
    ii) the radius of the single bubble formed.

29. A ring of mass 100 g and radius 10 cm make 120 revolutions in one minute about its axes.
    Calculate :
    i) Moment of inertia of the ring
    ii) Kinetic energy of rotation and
    iii) Angular momentum of rotation.

30. What will be the density of lead under a pressure of 20000 newton/cm^2 ? (Density of lead = 11.4 g/m^3 and Bulk modulus of lead is 0.80×10^{10} newton/m^2).

31. A particle executes S.H.M. of amplitude 25 cm and the period 3s. What is the minimum time required for the particle to move between two points 12.5 cm ?

SECTION – D

Answer **any two** questions. **Each** question carries **fifteen** marks.

32. Discuss the stress-strain graph for a metallic wire. From the graph how do you interpret ductile and brittle substances ?

33. Deduce the expressions for period, kinetic energy, potential energy and total energy of a particle executing S.H.M. Plot the variation of K.E, P.E. and total energy against displacement of particle from the mean point.

34. Define work and its unit. Deduce an expression for work. How do you findout the work done by a variable force ?

35. Define surface tension. Give its unit and dimension. How is surface tension related to the surface energy of a liquid ? Explain the determination of surface tension by Jager's method.

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