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Reg. No. : .....

Name : .....

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

Time : 3 Hours Max. Marks : 80

SECTION – A

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

1. What is work energy theorem ?
2. What is radius of gyration ?
3. How will you connect acceleration and displacement of a particle under SHM ?
4. State theorem of parallel axis.
5. How will you explain the shape of a drop ?
6. State Sabines reverberation formula.
7. What is critical velocity ?
8. What is cohesive force ?
9. Define angular momentum of a body.
10. State and explain Stoke's formula.

(10×1=10 Marks)

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SECTION – B

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

11. State and explain surface tension on molecular basis.
12. Obtain the relation between rotational kinetic energy and angular momentum about the same axis.
13. Define Poisson's ratio. Obtain its limiting values.
14. Obtain the relation connecting the three elastic modulii.
15. Distinguish between streamline and turbulent flow.
16. Obtain the expression for moment of inertia of a ring about a diameter.
17. What are the factors affecting acoustics of buildings ?
18. State and explain perpendicular axis theorem.
19. How will you distinguish conservative and non conservative forces with examples ?
20. What are the limitations of Poiseuille's formula ?
21. Obtain the conditions for maximum and minimum time periods for a compound pendulum.
22. Differentiate between angle of twist and angle of shear. (8×2=16 Mark

SECTION – C

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

23. Calculate the frequency of oscillation of a system of two masses of 30 gm and 70 gm connected by a spring of length 15 cm and force constant 700 n/m.
24. A cantilever of length 50 cm is depressed by 15 mm at the loaded end. Calculate the depression at distance 30 cm, from the fixed end.
25. A grind stone has a moment of inertia of 50 SI units. A constant couple is applied an the grind stone is found to have speed of 150 revolutions per minute after starting from rest. Find the couple.
26. A copper wire 3 metres long for which Young's modulus is 12.5×10^7 Nm^{-2} has a diameter of 1 mm. If a mass of 10 Kg is attached to one end, what extension is produced ? If Poisson's ratio is 0.26, what lateral strain is produced ?

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27. If the excess pressure inside a spherical bubble is balanced by that due to a column of oil (sp. gravity 0.8), 2 mm high, when radius of the bubble = 1.0 cm, find the surface tension of the soap bubble.

28. Calculate the mass of water flowing in 10 minutes through a tube 0.1 cm in diameter, 0.4 m long, if there is a constant pressure head of 20 cm of water. The coefficient of viscosity of water is 0.89×10^{-3} NSm^{-2}.

29. What is the wavelength of longitudinal waves of frequency 400 in an alloy whose density is 5500 Kg/m^3 and Young's modulus 8.8×10^{10} N/m^2 ?

30. A solid sphere of mass 0.1 Kg and radius 0.025 m rolls without sliding with a uniform velocity of 0.1 m/sec along a straight line on a smooth horizontal table. Calculate its total energy.

31. A solid sphere of mass 4 Kg and radius 0.05 m is suspended from a wire. Find the period of oscillation, if the torque required to twist the wire is 4×10^{-2} N-m/radian. **(6×4=24 Marks)**

SECTION – D

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

32. Describe plane progressive harmonic wave. Obtain the expression for energy density of a plane progressive wave.

33. With necessary theory, briefly explain the determination of moment of inertia of a flywheel.

34. Obtain the expression for torsional couple. What is the work done in twisting a wire ?

35. State and explain Bernoulli's theorem. How will you measure the amount of flow of a liquid in a pipe using a venturimeter. **(2×15=30 Marks)**

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