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INDIAN SCHOOL SOHAR
PRE-FINAL EXAM- 2016
PHYSICS – THEORY

CLASS:XI
DATE: 07 /02/2016

MARKS: 70
TIME: 3Hrs

General Instructions:

1. All questions are compulsory.
2. There are 26 questions in all .Questions 1 to 5 carry one mark each, questions 6 to 10 carry two marks each, questions 11 to 22 carry three marks each. Question 23 is a value based question carrying four marks and questions 24 to 26 carry five marks each.
3. There is no overall choice. However, internal choice has been provided in one question of two marks, one question of three marks and all three questions of five marks each.
4. You have to attempt only one of the given choices in such questions.
5. Use of calculator is not permitted.

SECTION-A

1. At what height above the earth's surface, the value of g is same as in a mine 80km deep. (1)
2. An insect trapped in a circular groove of radius 12 centimeters moves along the groove steadily and completes seven revolution in 100 seconds. What is the angular speed and linear speed of the motion? (1)
3. What do you mean by a least count? Name the device used to measure length 10^{-4} part of a metre. (1)
4. What should be the angle between the force and the displacement for maximum and minimum work ? (1)
5. What is a quasi-static process? (1)

SECTION-B

6. A ship is streaming towards east with a speed of 12m/s. A woman runs across the deck at the speed of 5m/s in the direction at right angle to the direction of motion of the ship. What is the velocity and direction of the woman relative to the sea. (2)
7. State and explain zeroth law of thermodynamics. How does it lead to the concept of temperature. (2)
8. During a complete solar eclipse ,the moon almost entirely covers the sphere of the sun. Write the relation between the distances and the sizes of the sun and moon. (2)
9. Establish the kinematic equation $v^2 - u^2 = 2as$ from velocity-time graph for a uniformly accelerated motion. (2)

10. The length and breadth of a field are measured as (200 ± 5) m and (100 ± 4) m respectively. What is the area of the field?

OR

10. A trolley of mass 20 kg rests on a horizontal surface. A massless string tied to the trolley passes over a frictionless pulley and a load of 5 kg is suspended from other end of string. If coefficient of kinetic friction between trolley and surface be 0.1, find the acceleration of trolley and tension in the string. (take $g = 10 \text{ m/sec}^2$) (2)

SECTION-C

11. (a) When can you say that a body is performing a SHM.

(b) If A is the amplitude of a particle in SHM then obtain an expression for the total energy of the particle in SHM. (3)

12. (a) Obtain an expression for principle of moments for a lever with the help of diagram.

(b) Mention the condition such that small effort can be applied to lift a large load. Justify your answer. (3)

13. State the Kepler's law of periods. If the radius of the earth were increased by a factor of 3, by what factor would its density have to be changed to keep 'g' the same? (3)

14. Derive an expression for shearing strain. A square lead slab of side 50 cm and thickness 10 cm is subject to a shearing force of 9.4×10^4 N. The lower edge is fixed to the floor. How much will the upper edge be displaced? (shear modulus of lead = $5.6 \times 10^9 \text{ N/m}^2$). (3)

15. (i) State the Pascal's law of transmission of fluid pressure (ii) in a car lift compressed air exerts a force F_1 on a small piston having radius of 5 cm. This pressure is transmitted to a second piston of radius 15 cm. If the mass of the car to be lifted is 1350 kg. Calculate F_1 . What is the pressure necessary to complete this task? ($g = 9.8 \text{ m/sec}^2$). (3)

16. State Newton's law of cooling. Obtain an expression to calculate the time of cooling of a body using the law. Justify your answer with the help of graph. (3)

17. (i) What is regelation? Explain it with help of an activity. (ii) "Anomalous behavior of water saves the life of aquatic plants and animal" Justify your answer. (3)

OR

17. Define triple point. Explain it with help of P-T diagram. Explain all the curves. (3)

18. Define surface energy with the help of an example. Hence obtain an expression for excess pressure for a bubble in air. (3)

19. On the basis of kinetic theory, derive an expression for the pressure exerted by an ideal gas. (3)

20. Describe the operation of a Carnot's engine and obtain an expression for its efficiency. (3)

21. Explain relative velocity. A train is moving with speed 50 km/hr on a straight track and B train is moving with speed 40 km/hr on the parallel straight track in the

same direction. What is the velocity of **A** train relative to **B** train and velocity of **B** train relative to **A** train? (3)

22. A balloon starts rising from the ground with an acceleration of 1.25 m/s^2 . After 8s, a stone is released from the balloon. Find the time taken by the stone to reach the ground after its release. Take $g=10 \text{ m/s}^2$. (3)

SECTION-D

23. Joseph wanted to know the height of the ceiling of the hall in his house. There was long pendulum extended from the ceiling almost to the floor of the hall. He was confused how to calculate the height of the ceiling. His son Peter found the time period of the pendulum and told his father, the height of ceiling.

- (a) How Peter measured the height of ceiling by finding the time period of the pendulum?
(b) What values are shown by peter? (4)

SECTION-E

24.(i) Obtain an expression for the time period of simple pendulum.(ii) What is the length of simple pendulum if its time period is two seconds? (iii) What would be the time period of the simple pendulum if its length is half of the original length? (5)

OR

24.What are forced oscillations ? Obtain an expression for its amplitude. What would be the amplitude if driving frequency is much smaller than natural frequency. What would be the amplitude if driving frequency is close to the natural frequency. Hence define resonance. Give example of resonance in our daily life. (5)

25. (a)Derive an expression for the Bernoulli's principle.
(b) The magnitude of the x and y components of vector **A** are 7 and 6 respectively. Also, the magnitudes of x and y components of **A+B** are 11 and 9 respectively. Calculate the magnitude of vector **B**. (5)

OR

- 25.(a) What is conduction. Derive an expression for thermal conductivity. Mention its units.
(b) A woman stands on a spring scale on an elevator. In which case, will the scale record the minimum reading and the maximum reading.(i) elevator stationary (ii) elevator cable breaks, free fall (iii) elevator accelerating upwards and (iv) elevator accelerating downward. (5)

26. (a) What do you mean by viscosity. Obtain an expression for terminal velocity of a body.
(b) A flywheel rotates at a constant speed of 2400 revolutions per minute. Calculate the angle described by the shaft in one second. (5)

OR

26. (a) Obtain an expression for the speed of efflux and hence state the Toricelli's law.
(b) A bullet of mass 0.012 kg moving with horizontal speed of 70m/s strikes a block of wood of mass 0.4kg and comes to rest. The block is suspended from the ceiling by means of a thin wire. Calculate the amount of heat produced in the block. (5)