

HIGHER SECONDARY EXAMINATION

HSE I

PHYSICS

Total score : 60

Time: 2 hr

Answer any 5 questions from 1 to 7. Each carries 1 mark

1. The dimensional formula of force is
2. The slope of position - time graph of a particle gives
3. The surface tension of a liquid(increases/decreases) with temperature.
4. Which among the following possess the highest specific heat capacity?
i) Water ii) silver iii) copper iv) steel
5. What is the relation between period (T) and frequency (v) ?
6. The value of acceleration due to gravity is maximum at the(poles/equator).
7. 'Strain has no unit and dimension ' (true /false).

Answer any 5 questions from 8 to 14. Each carries 2 mark

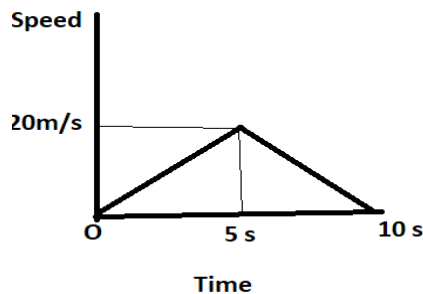
8. Draw graphically the variation of kinetic energy and potential energy with the height of a body.
9. The rotational analogue of force is called torque.
a) Turning effect of force is maximum when the angle between r and F is
10. Obtain an expression for acceleration due to gravity at a height h above the surface of earth.
11. a) The escape is (independent /dependent) on the mass of the object.
b) Explain why moon has no atmosphere?
12. When a wire is stretched with a very large force it breaks.
a) Represent variation of extension with load on a graph.
b) For which part of the graph Hooke's law is valid?
13. A tank of 15 m height is filled with water. Calculate the speed of efflux through a hole 5 m below the surface of water.
14. The value of total internal energy of a mole of given gas is $\frac{5}{2}R$. Calculate the adiabatic constant.

Answer any 6 questions from 15 to 21. Each carries 3 mark

15. A ball is thrown vertically upwards with a velocity of 20 m/s from the top of a multistoried building . The height of the point from where the ball is thrown is 25 m from the ground.
a) How high will the ball rise?
b) How long will it be before the ball hits the ground?
16. a) State Parallelogram law of vectors.
b) Derive the expression for magnitude of resultant of two vectors.
17. a) When a bullet is fired from a gun, the gun recoils back. Name the principle behind this.
b) A shell of mass .020kg is fired by a gun of mass 100 kg. If the muzzle speed of the shell is 80 m/s calculate the recoil speed of the gun.
18. Deduce the relation connecting torque and angular momentum.
19. What is escape velocity? Derive an expression to find escape velocity.
20. a) Define thermal expansion.
b) Why the bodies of water such as ponds and lakes, freeze at the top first?
21. A simple harmonic motion is represented by $x = 8 \sin \left(10\pi t + \frac{\pi}{4} \right) m$. Find i) amplitude ii) Angular frequency iii) period iv) frequency v) initial phase.

Answer any 3 questions from 22 to 25. Each carries 4 marks

22. a) Check the correctness of the equation $v^2 = u^2 + 2as$. Where v is the final velocity, u is the initial velocity, a is the acceleration and s is the displacement.
- b) Name and state the principle used here.
23. The speed -time graph of an object in straight line motion is given below.



- i) Name the physical situation described by the graph.
- ii) What is the significance of area of the graph?
- iii) Calculate the distance travelled by the body in 10 s.
24. a) State and prove law of conservation of energy in the case of a freely falling body.
- b) Draw a graph showing the variation of potential energy, kinetic energy and total energy of a freely falling body.
25. a) Give two examples of simple harmonic motion.
- b) Derive an expression for the time period of a simple pendulum.

Answer any 3 questions from 26 to 29. Each carries 5 marks

26. Thermodynamics deals with the concept of heat and exchange of heat energy.
27. a) State second law of thermodynamics.
- b) Draw Carnot's cycle and deduce expression for its efficiency.
28. a) Derive an expression for time to reach maximum height and hence the time of flight of a projectile.
- b) A bead undergoing uniform circular motion in a circle of radius 12 cm, completes 210 revolutions in 100s. What is the centripetal acceleration.
29. A circular track of radius 400m is kept with outer edge raised to make 5 degree with the horizontal.
- a) What do you call this type construction of tracks?
- b) Obtain an expression for the maximum permissible speed considering the force of friction.
- c) Calculate the permissible speed of the car if the coefficient of friction is 0.2.
30. With the help of a neat diagram, state and prove Bernoulli's principle.