

HIGHER SECONDARY MODEL EXAMINATION FEB-2010

HSE 1

PHYSICS

Max.Marks:60

Time :2¼ hrs

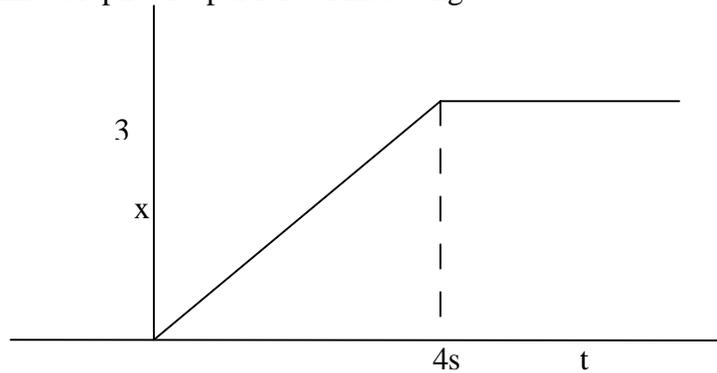
1. (a) Method of dimensions can be used to check the correctness of the equations. Name the principle involved in this ? (1)
- (b) A famous relation in physics relates moving mass m to rest mass m_0 of a particle in terms of its speed v and the speed of light c . A boy recalls the relationship almost correctly but forgets where to put the constant c . He writes $m = \frac{m_0}{(1-v^2)^{1/2}}$ (2)
Guess where to put c
2. (a) Draw acceleration- time graph , velocity –time graph and position -time graph of a freely falling body (3)
- (b) Distance travelled by a vehicle before it stops is ds . Using the equation $v^2 = v_0^2 + 2ax$ find the relation for ds . (1)
3. Fill in the blanks (2)

Force $F = at + bt^2$	Dimension of $a = \text{-----}$	Dimension of $b = \text{-----}$ -----
Displacement $= x$	Instantaneous velocity $v = \text{-----}$	Instantaneous acceleration $a = \text{-----}$

4. (a) Parallelogram law helps to find the magnitude and direction of the resultant of two forces .states the law $\vec{A} + \vec{B} = \vec{R}$ (1)
- (b) For two vectors \vec{A} and \vec{B} are acting at a point with an angle θ between them , Find the magnitude and direction of the resultant vector . (3)
- (c) What will be the direction of the resultant when $\theta = 0^\circ$ and $\theta = 180^\circ$ (2)
- (d) Calculate the value of $|\vec{A} \times \vec{B}|^2 + (\vec{A} \cdot \vec{B})^2$ (1)
5. A cricket ball is thrown at a speed of 28ms^{-1} in a direction 30° above the horizontal .
 - (a) What is the nature of the trajectory (1)
 - (b) Arrive at an expression for time of flight of the ball. (2)
 - (c) Calculate the maximum height and time to return to the same level (3)
6. A man of mass 70kg stands on a weighing scale in a lift which is moving
 - (a) Upward with a uniform speed of 10ms^{-1} (1)
 - (b) Downward with a uniform acceleration of 5ms^{-1} (1)
 - (c) Upward with a uniform acceleration of 5ms^{-1} . What would be the readings on the scale in each case? (1)

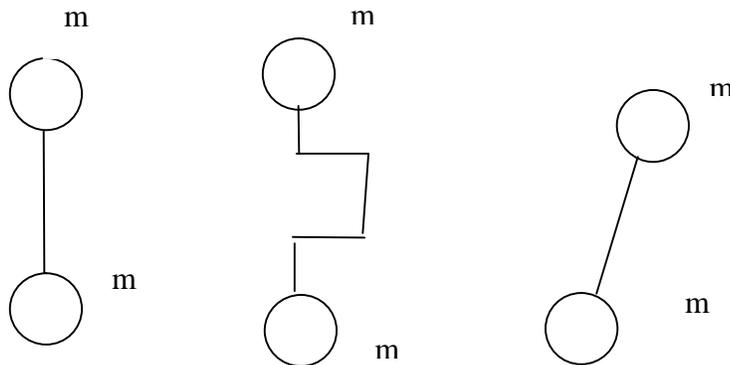
- (d) What would be the reading if the lift mechanism failed and it hurtled down freely under gravity (1)

7. Position –Time Graph of a particle of mass 4kg



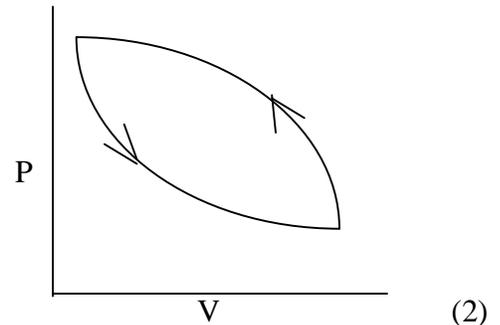
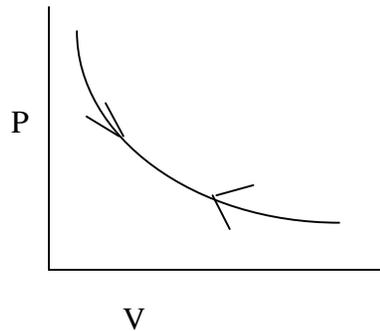
1. What is the force on the particle for $t < 0$, $t > 4s$, $0 < t < 4$ (2)
2. Impulse at $t=4s$ (1)

8. A body of mass m taken to height h in the following three ways



- (a) Is the work done same in all the three cases? (1)
 - (b) Write expression for gravitational potential energy in each case (1)
9. A platform diver holds his hands and legs straight and makes loops in air before entering into water
- (a) State the principle behind this (1)
 - (b) What happens when he tries to land in the pool by stretching his arms and legs (2)
 - (c) In the above situation rotational kinetic energy is not conserved explain (1)
 - (d) If the earth were to shrink suddenly what would happen to the length of the day (1)

10. Escape speed of a projectile on earth surface 11.2km/s . A body is projected out with thrice the speed .
- What do you mean by escape velocity (1)
 - Derive an expression for escape velocity (2)
 - What is the speed of the body far away from the earth ?Ignore the presence of sun and other planets (1)
11. Read the following two statements below carefully and state with reasons if it is true or false
- the Young's modulus of rubber is greater than steel (1½)
 - The stretching of a coil is determined by its shear modulus (1½)
12. To keep a piece of paper horizontal you should blow over not under it
- Write the principle behind that (1)
 - Derive an expression for this principle (3)
13. Triple point of neon and CO_2 are 24.57K and 216.55K respectively. Express these temperature on Celsius scale and Fahrenheit scale. (2)
14. (a) Name the process shown by the following indicator diagram



- What is Quasi static process? (1)
 - What is a heat engine and write the efficiency of heat engine? (2)
15. (a) Derive an expression for velocity and acceleration of a particle executing simple harmonic motion (3)
- Write the difference between longitudinal and transverse wave (2)
 - If two persons are talking on the surface of moon they cannot hear each other why?(1)

- 16.
- 17.