

ANGEL'S PUBLIC SCHOOL

SAMPLE PAPER

HALF YEARLY EXAM SESSION 2025 – 26

CLASS – XI SUBJECT: PHYSICS CODE – 42

TIME: 3 HRS

M.M: 70

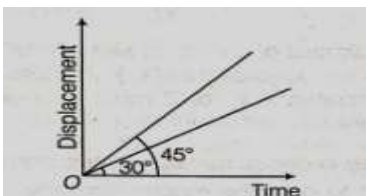
General Instructions.

- (a) All questions are compulsory.
- (b) Section – A contains question number 1 to 16, multiple choice questions of 1 mark each.
- (c) Section – B contains question number 17 to 23, short answer type questions of 2 mark each.
- (d) Section – C contains question number 24 to 30, long answer questions of 3 mark each.
- (e) Section – D contains question number 31 & 33, very long answer questions of 5 mark each.
- (f) Section – E contains Question no. 34 of 4 mark. **(CASE BASED QUESTIONS)**

SECTION – A

I. Multiple choice question:

1. The physical quantity which is equal to the change in momentum of a body is known as _____.
(a) force (b) acceleration (c) impulse (d) reaction
2. Action and reaction _____.
(a) act on the same body (b) are equal and act in the same direction
(c) cancel each other (d) act on two different bodies
3. A ten paise coin is placed on a revolving table and flies off tangentially. This is due to the _____.
(a) inertia of direction (b) inertia of rest (c) inertia of motion (d) none of these
4. The force of friction between a solid body and a fluid depends on the speed (v) of the solid body. For low speed of body, force of friction between a solid body and fluid is _____.
(a) directly proportional to V^2 (b) directly proportional to V
(c) inversely proportional to V (d) independent of V
5. Acceleration of a body moving with constant speed in a circle is _____.
(a) zero (b) ωr (c) ω^2 / r (d) $r \omega^2$
6. The displacement – time graphs of two moving particles make angles of 30° and 45° with the X– axis. The ratio of their velocities is _____.



- (a) 1 : 3 (b) 1 : 2 (c) 1 : 1 (d) 3 : 2
7. If a particle is thrown upwards, the correct $v - t$ graph will be _____.
 8. If the maximum horizontal range of a projectile is 400m, then maximum height attained by it will be _____.
(a) 100 m (b) 200 m (c) 400 m (d) 800 m
 9. The horizontal range of a projectile is 3 times its maximum height. Its angle of projection will be _____.
(a) 30° (b) 45° (c) 60° (d) 90°
 10. A block of mass 2 kg is lying on an inclined plane, inclined to the horizontal at 30° . If the coefficient of friction between the block and the plane is 0.7, then magnitude of the frictional force acting on the block will be _____.
(a) 1109 N (b) 11.9 N (c) 0.119 N (d) 119 N
 11. The kinetic energy of a body becomes four times its original value. The new linear momentum of the body will be _____.

- (a) $\frac{1}{2}$ time (b) 4 times (c) 3 times (d) 2 times
12. The kinetic energy of a body increase by 300%, The linear momentum of the body increase by _____.
 (a) 300 % (b) 150 % (c) 100 % (d) 50 %
13. In the elastic collision, 100 % energy transfer takes place when _____.
 (a) $m_1 = m_2$ (b) $m_1 > m_2$ (c) $m_1 < m_2$ (d) $m_1 = 2 m_2$
14. The motion of planets in the solar system is an example of the conservation of _____.
 (a) mass (b) linear momentum (c) angular momentum (d) energy
15. A couple produces.
 (a) linear and rotation motion (b) no motion (c) purely linear motion (d) purely rotational motion
16. A wheel has angular acceleration of 3.0 rad/sec^2 and an initial angular speed of 2.00 rad/sec . In a time of 2 sec, it has rotated through an angle (in radian) of _____.
 (a) 10 (b) 12 (c) 4 (d) 6

SECTION – B

17. Taking velocity, time and force as fundamental quantities, find the dimension of mass?
18. The velocity time relation of an electron starting from rest is given by $v = kt$ where $k = 2 \text{ m/s}^2$. Calculate the distance travelled in 3 sec.

19. If $\vec{A} + \vec{B} = \vec{A} - \vec{B}$ then find the angle between A and B?
20. Two projectile of same mass have their maximum K.E in the ratio and ratio of their maximum heights is also 4 :1. Then what is the ratio of their ranges?

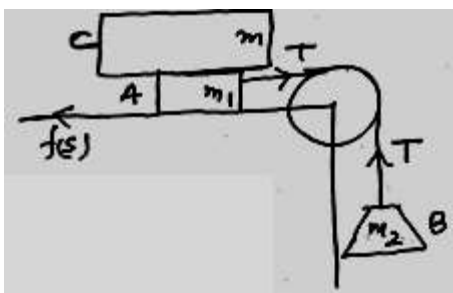
OR

Show mathematically that Impulse of force is equal to change in momentum produced by the force.

21. A person of mass 60 kg is inside a lift of mass 940 kg and presses the button on control panel. The lift start moving upward with an acceleration 1 m/s^2 . Find the tension in the supporting cable?
22. Show mathematically that the potential energy of an elastic stretched spring is $\frac{1}{2} kx^2$.
23. Derive the relation between torque and angular momentum.

SECTION – C

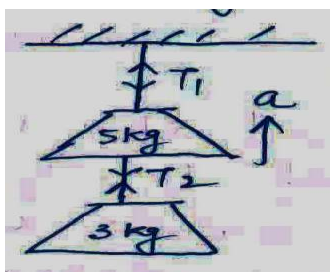
24. The displacement of a particle moving along x – axis is given by $x = 18t + 5t^2$. Calculate (i) the instantaneous velocity at ($t = 2 \text{ Sec}$) (ii) the average velocity between ($t = 2 \text{ s}$ and $t = 3 \text{ s}$) (iii) instantaneous acceleration.
25. Show that path followed by the projectile is parabolic in nature when object is thrown with angle θ from horizontal.
26. The mass of A and B are 10kg and 5 kg respectively. Calculate the minimum mass of c which may stop A from slipping. Coefficient of static friction between A and the table is 0.2.



OR

A balloon with mass M is descending down with an acceleration a where $a > g$. What mass m of its content must be removed so that it start moving up with acceleration?

27. Show that total mechanical energy of a freely falling body is always remain conserved.
28. What will be the duration of a day if earth suddenly shrink to $\frac{1}{64}$ of its original volume, mass remaining the same.
29. Two masses 5kg and 3 kg are suspended with the help of massless string as shown. Calculate T_1 & T_2 when whole system is moving upward with an acceleration of 2m/s^2 .



30. Prove that Newton's second law is the real law of motion.

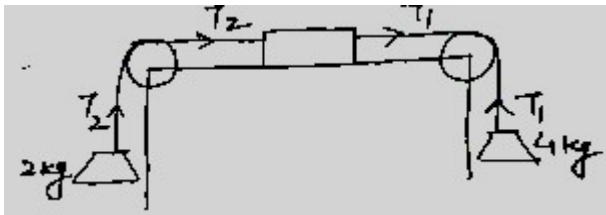
SECTION – D

31. (a) Two projectile A and B are projected with velocities $\sqrt{2}v$ and V . They have the same range. If A is thrown at angle of 15° with the horizontal then what is the angle of projection of B ?
 (b) Calculate the maximum height and horizontal range of the projectile.

OR

Find the value of T_1 and T_2 in the string as shown.

32. (a) What is banking of road? Find the velocity of the vehicle on the banked road to take sharp turn.



- (b) Derive the relation between linear velocity and angular velocity.

OR

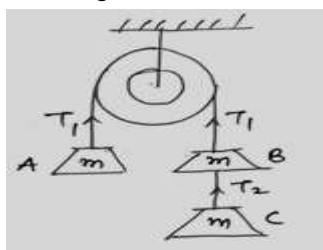
(a) The resultant vectors of P and Q is R. On reversing the direction of Q the resultant vector becomes S. Show that $R^2 + S^2 = 2(P^2 + Q^2)$

(b) Two forces whose magnitudes are in the ratio of 3 : 5 give a resultant of 35 N if the angle of inclination is 60° . Calculate the magnitude of each force.

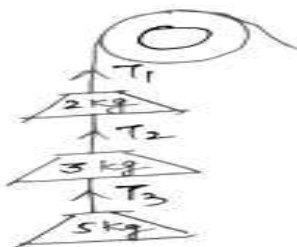
33. What is perfectly inelastic collision? Show that the kinetic energy is invariably lost in such collision.

OR

The bodies A, B and C each of mass m are hanging on a string over a fixed Pulley. What are the tensions in the string connecting bodies A to B and B to C.



- (a) Find the tensions T_1 , T_2 & T_3 when the whole system is moving upward with an acceleration of 2 m/s^2 .



SECTION – E (CASE BASED QUESTIONS)

34. According to Newton's second law of motion, $F = ma$, where F is the force required to produce an acceleration a in a body of mass m . If $a = 0$ then $F = 0$ i.e., no external force is required to move a body uniformly along a straight line. If a force F acts on a body for t seconds, the effect of the force is given by impulse = $F \times t$ = change in the momentum of the body.

(a) Newton's second law of motion can be represented by.

- (i) $F = ma$ (ii) $F \propto \frac{\Delta p}{\Delta t}$ here p is linear momentum

- (iii) $F \propto \frac{\Delta(mv)}{\Delta t}$, here v is velocity (iv) All of the above

(b) If an impulsive force of 100 N acts on a body for 1 sec then, the change in its linear momentum is.

- (i) 50 N s (ii) 100 N s (iii) 200 N s (iv) 40 N s

(c) A body of mass 50g is moving with a velocity of 10 m/s. Its velocity increases to 20 m/s in the same direction as a force exerted on it for 1s. The impulse of the force is.

- (i) 500 N s (ii) 0.5 N s (iii) 50 N s (iv) 5 N s

(b) The force acting on a body whose linear momentum changes by 10 kg m/s in 1 second.

- (i) 4 N (ii) 100 N (iii) 1 N (iv) 20 N