

Second Term Evaluation - 2025

Grade

12

Subject

Physics I

Time

Two hours

Name

- ★ Answer all the questions.
- ★ In each of the questions 1 - 50 pick one of the alternatives (1) , (2) , (3) , (4) , (5) which is correct of most appropriate and mark your response on the answer sheet with a cross (x) on the number of the correct option.
- ★ Use of calculators is not allowed

$$\text{Speed of light} = 3 \times 10^8 \text{ ms}^{-1}$$

$$\text{Avegadros constant} = 6.022 \times 10^{23} \text{ mol}^{-1}$$

$$\text{Plank constant (h)} = 6.626 \times 10^{-34} \text{ Js}$$

$$g = 10 \text{ N kg}^{-1}$$

(01) The dimension of light year is

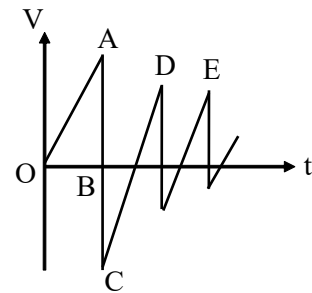
- (1) $L T^{-1}$ (2) T (3) $ML^2 T^{-2}$ (4) L^2 (5) L

(02) The resultant force acting on a stationary mass when it is made to move with uniform acceleration is,

- (1) Propotional to the displacement from the fixed point.
 (2) Propotional to the velocity.
 (3) Zero.
 (4) Non - zero value.
 (5) Increases with time.

(03) A tennis ball released from a high position collides with a rough horizontal surface and bounces back. The graph showing the velocity changes with time. Which point indicates the point at which the maximum height is reached after the first bouncing.

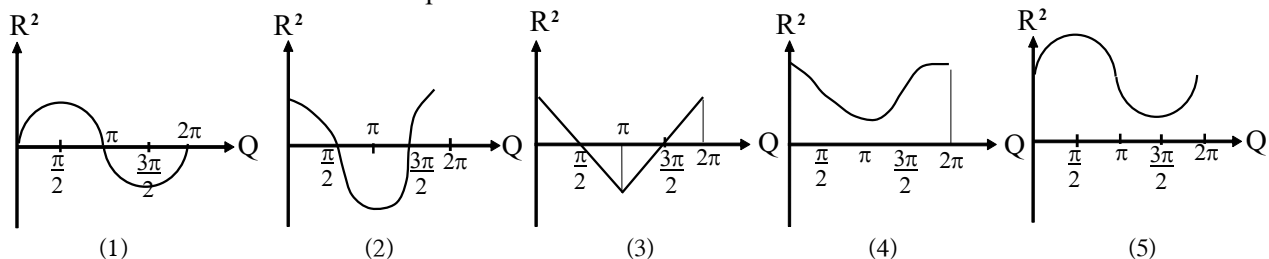
- (1) A (2) B (3) C (4) D (5) O



(04) The mass is suspended by a spring of spring constant K is obtained frequency $F = Cm^x Ky$. The value of x and y are

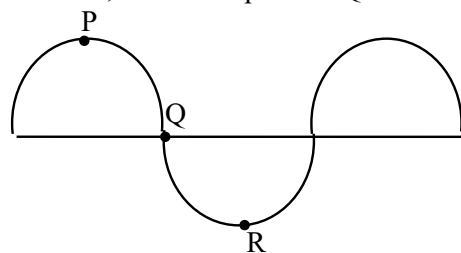
- (1) $x = \frac{1}{2}$, $y = \frac{1}{2}$ (2) $x = \frac{1}{2}$, $y = -\frac{1}{2}$ (3) $x = -\frac{1}{2}$, $y = \frac{1}{2}$
 (4) $x = 0$, $y = \frac{1}{2}$ (5) $x = \frac{1}{2}$, $y = 0$

(05) The resultant of two constant forces P and Q inclined at an angle θ to each other is R. The variation of R^2 is best represent when increase from 0 to 2π .



- (06) The position of a transverse wave propagating along a string in the right direction at a certain instant is shown in the figure.

- (A) - There is a $\frac{\pi}{2}$ phase difference between the particle P and R.
 (B) - The speed of P and R particle are maximum while the speed of Q particle is minimum
 (C) - The particle P and R are moving in the direction of wave, while the particle Q remain stationary.



Of the above statements,

- (1) Only A is true (2) Only B is true
 (3) Only C is true (4) All statements are true.
 (5) All are false

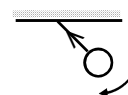
- (07) The mass of object when it weighs in air is m_1 and the mass of object when it weighs in water is m_2 . The relative density of object is,

- (1) $\frac{m_1}{m_2}$ (2) $\frac{m_1}{m_2 - m_1}$ (3) $\frac{m_2}{m_2 - m_1}$ (4) $\frac{m_2}{m_1}$ (5) $\frac{m_1 + m_2}{m_1 - m_2}$

- (08) Two people moving from the same place in opposite directions towards each other along the straight line at speed 4 m s^{-1} and 6 m s^{-1} . How long will it take to get separation between them to be 55m.

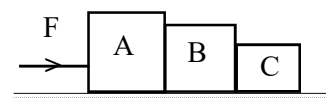
- (1) 4s (2) 4.5s (3) 7.5s (4) 5.5s (5) 6s

- (09) A simple pendulum oscillates on a vertical plane as shown in the figure. The correct force diagram acting on the bob when the bob is at the moment shown in figure.



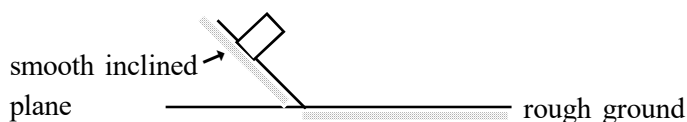
- (1) (2) (3) (4) (5)

- (10) Three objects A, B and C of mass m , $2m$ and $2m$ are placed on a smooth surface and a force of magnitude F is applied horizontally on A. If the system is moving with uniform acceleration what is the horizontal net force acting on B?

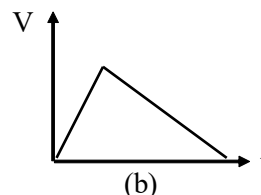


- (1) $\frac{F}{5}$ (2) $\frac{F}{3}$ (3) $\frac{2F}{5}$ (4) $\frac{3F}{5}$ (5) F

- (11)

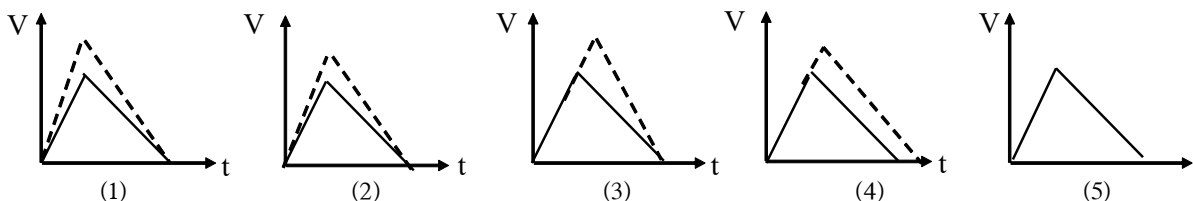


(a)



(b)

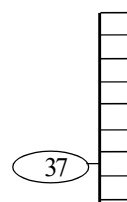
The graph (b) shows the change in velocity with time of an object placed at rest on smooth inclined plane until it slides down and moving along the rough ground. If the object is released from a higher point on the plane than the level at which it was initially released, the appropriate velocity time graph is given by dotted line. What is the best graph for the motion?



- (12) The circular scale of a sphere with 0.5 mm pitch is divided into 50 divisions.

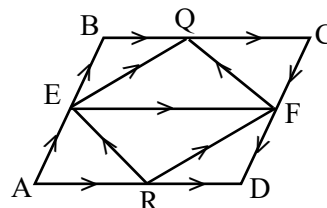
The reading shown in the figure is,

- (1) 2.87 mm (2) 2.37 mm (3) 2.13 mm
(4) 2.57 mm (5) 2.63 mm



- (13) The resultant of given coplanar system is,

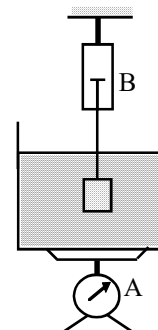
- (1) \vec{EF} (2) $5 \vec{EF}$ (3) $3 \vec{EF}$
(4) $4 \vec{EF}$ (5) 0



- (14) A uniform cylinder of volume 30 cm^3 was suspended from the spring balance B and immersed into the water content beaker that placed on the compression balance.

The cylinder weighs 295 g before it is immersed in water and 90 g after it is submerged. When the cylinder is completely immersed in water the new reading it produces is,

- (1) $(295 + 90)$ and 90 g
(2) $(295 + 60)$ and 60 g
(3) $(295 + 90)$ and 60 g
(4) $(295 + 30)$ and 60 g
(5) $(295 + 60)$ and 30 g



- (15) When a gymnast pulls his knees towards his chest while doing a squat. Which of the following quantities increases? (around the horizontal axis passing through his centre of mass)

- (A) - His angular momentum.
(B) - His moment of inertia.
(C) - His angular velocity.

Which of the above is/ are true?

- (1) All A, B, C (2) Only A and B (3) Only B and C
(4) Only A (5) Only C

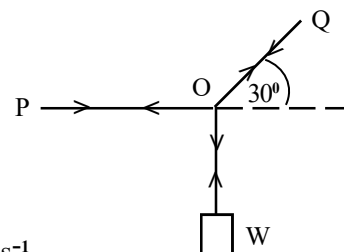
- (16) The length of one part of main scale of a certain caliper is $x \text{ cm}$ and the "n" number of division in vernier caliper is coinciding with $(n - 1)$ number of parts of main scale. The least count of vernier scale is,

- (1) $\frac{n-1}{n}$ (2) $\frac{nx}{n-1}$ (3) $\frac{x}{n}$ (4) $\frac{x}{n-1}$ (5) $\frac{x}{n+1}$

- (17) PO and OQ are two light inelastic string. A weight W is hung at O.

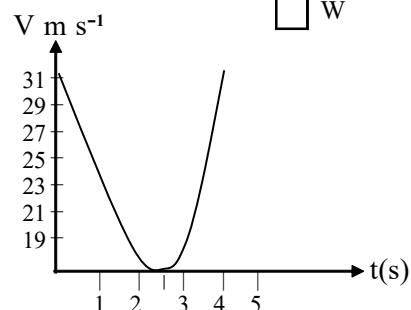
When the system is in equilibrium the tension along the PO is

- (1) $W \tan 60^\circ$ (2) $W \tan 30^\circ$
(3) $\frac{W}{\sin 30^\circ}$ (4) $\frac{W}{\cos 30^\circ}$ (5) $W \sin 60^\circ$



- (18) The graph shows the variation of the speed of the ball with time (t) when a golfer hits a golf ball horizontally on horizontal surface at $t = 0$. What is the displacement at the time $t = 4 \text{ s}$?

- (1) 19 cm (2) 38 cm
(3) 62 cm (4) 76 cm
(5) 124 cm



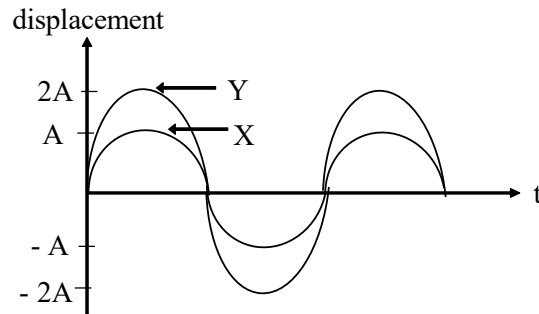
- (19) The air resistance force f against the motion of a car travelling on a straight road with velocity V is given by the equation $F = 4V$. When the velocity is in meters per second, the values of F is given in Newtons. The power required for a car to maintain a uniform velocity on a horizontal road is,
- (1) 360 kW (2) 108 kW (3) 27 kW (4) 7.2 kW (5) 3.6 kW

- (20) The displacement - time graph of two objects when they execute simple harmonic motion is shown in figure.

- (A) - The frequencies of X and Y are equal.
 (B) - The maximum velocity of the Y is twice that of the X .
 (C) - At any given moment, the magnitude of the acceleration of Y is greater than that value of X .

Which of the above statement is true ?

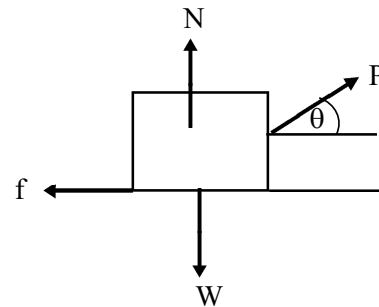
- (1) Only A
 (2) Only B
 (3) Only C
 (4) Only A and B
 (5) All A, B and C



- (21) A student applies a force P to an object which is on a rough horizontal surface and pulls it in right with uniform velocity.

Which of the following statement is true ?

- (1) $P > f$ and $N < W$
 (2) $P > f$ and $N = W$
 (3) $P = f$ and $N > W$
 (4) $P = f$ and $N = W$
 (5) $P < f$ and $N = W$

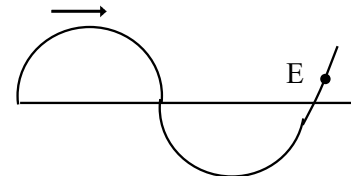


- (22) A hydrometer floats in oil of 0.9 g cm^{-3} density with $\frac{1}{5}$ th of its total volume above the liquid surface. If it floats in a liquid with $\frac{1}{10}$ th of its volume above the liquid surface, what is the density of liquid?

- (1) 0.29 g cm^{-3} (2) 0.45 g cm^{-3} (3) 0.8 g cm^{-3} (4) 1.1 g cm^{-3} (5) 1.8 g cm^{-3}

- (23) If the wave is propagating forward then after the indicated moment, that particle E , will be directed to

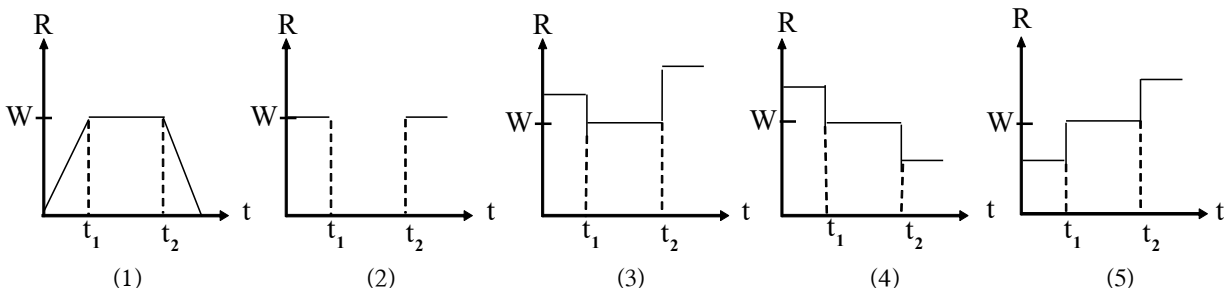
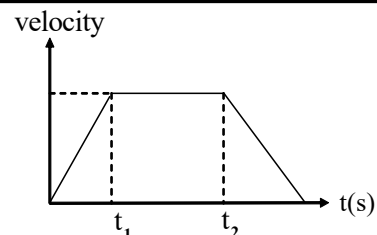
- (1) (2) (3) (4) (5)



- (24) Objects A and B have masses M_1 and M_2 and contain equal kinetic energies. What is the ratio between momentum of A and B ?

- (1) $\frac{M_1}{M_2}$ (2) $\frac{M_2}{M_1}$ (3) $\frac{\sqrt{M_2}}{\sqrt{M_1}}$ (4) $\frac{M_1^2}{M_2^2}$ (5) 1

- (25) An object of weight W is placed on a pane of compression balance which is placed inside the elevator. Velocity time graph of elevator is shown. The vertical direction is considered to be upward. The variation of reading R with time is correctly expressed by



- (26) A wheel rotates at a speed of 1200 rpm and it also deceleration with angular deceleration of 4 rad s^{-2} . The number of turns it rotated before coming to rest is ,
 (1) 143 (2) 272 (3) 314 (4) 502 (5) 722

- (27) Two projections X and Y are projected from top of hill at the same instant in the horizontal direction, X with the velocity 20 m s^{-1} and Y projected with an angle 60° to the vertical at the velocity 40 m s^{-1} .

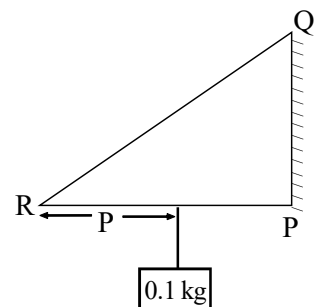
If their motion occurs in the same plane which of the following statements is true ?

- (A) - X and Y travel equal vertical distance in equal time.
 (B) - X and Y travel equal horizontal distance.
 (C) - X and Y are never meet.

Which of the above statements is true ?

- (1) Only A (2) Only C (3) Only A and B
 (4) Only B and C (5) All A, B, C

- (28) A uniform meter ruler of mass 0.5 kg is hinged at one end and other end R is attached to the string. At the Q, the string is fixed to the wall and held ruler horizontally. An object of mass 0.1 kg is attached at the distance of 30 cm from R. The magnitude of the moment about the point P due to the tension in the string.

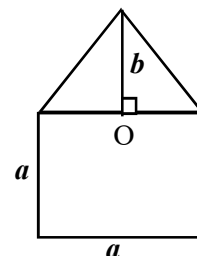


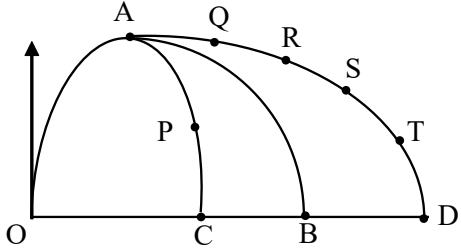
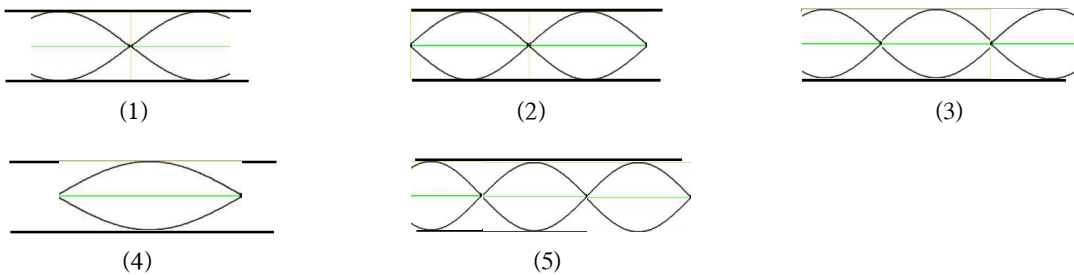
- (1) 3.2 Nm (2) 1.05 Nm (3) 0.75 Nm
 (4) 0.70 Nm (5) 0.25 Nm
- (29) The time period of simple pendulum of length l is T . By what value should the length of simple pendulum change to make its time period in to $2T$.

- (1) $\frac{1}{2} l$ (2) $4l$ (3) $2l$ (4) $\frac{2}{3} l$ (5) $3l$

- (30) The centre of gravity of composite object made by placing triangular lamina of height b on a square lamina with a side length a from the same sheet is O. The value b is equal to

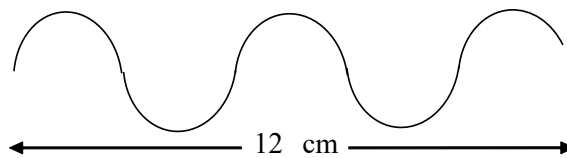
- (1) $\sqrt{2a}$ (2) $\sqrt{2a}$ (3) $\frac{a}{\sqrt{2}}$ (4) $\frac{a}{\sqrt{3}}$ (5) $\frac{\sqrt{3}a}{2}$



- (31) A sound wave produced in one medium enters another medium. Which of the following statements about that wave is true ?
- The frequency remains the same but the wave length changes.
 - The wave length remains the same but frequency changes.
 - Both frequency and wavelengths are change.
 - Both frequency and wavelength are not change.
 - The direction of propagation is not change.
- (32) A coin is placed on a disk rotation at a speed of 2 revs^{-1} . The coefficient of friction between the coin and disk is 0.4. The maximum radius of rotation of the coin to remain stationary relative to the table. ($\pi^2 = 10$)
- 1 cm
 - 2.5 cm
 - 10 cm
 - 25 cm
 - 100 cm
- (33) In the equation $v^2 = K (a^2 - x^2)$,
 v = velocity a = amplitude x = displacement
 Dimension of K is ,
- $L^2 T^{-2}$
 - LT^{-2}
 - LT^{-1}
 - T^{-2}
 - T^{-1}
- (34) The path OAB refers to the projection of an object from any point on the earth's surface. If it had exploded into only two identical parts at point A one part would have travelled along the path AC and the other along the path AD. What is the point at which the segment along line AD reaches when the segment along line AC arrives at the P.
- Q
 - R
 - S
 - T
 - Given informations are not suffucient
- 
- (35) A simple pendulum is suspended from the roof of a train. It's length is l and mass is m . When the train is travelling around 200 m horizontal curve at a speed of 20 m s^{-1} . The string makes an angle with vertical is ,
- $\sin^{-1}(0.2)$
 - $\cos^{-1}(0.2)$
 - $\tan^{-1}(0.2)$
 - $\tan^{-1}(5.0)$
 - $\cos^{-1}(0.5)$
- (36) The waxe pattern of first overtone of an open tube is
- 
- -
 -
 -
 -
- (37) Which of the following wave properties does not cause a sound wave in air.
- Diffraction
 - Refraction
 - Interference
 - Polarization
 - Reflection

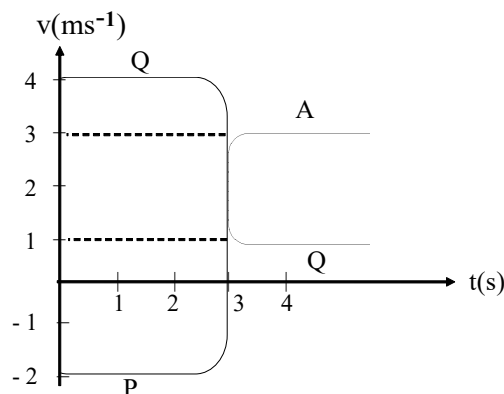
- (38) The diagram shows a section of a rope along which a transverse wave travels. The wavelength of wave is,

- (1) 10 cm (2) $\frac{10}{5}$ cm
 (3) $\frac{10}{3}$ cm (4) 1 cm (5) $\frac{20}{5}$ cm



- (39) The velocity time graph for two cars P and Q of masses m_1 and m_2 is shown in the figure. Three second later the two cars collide and the motion after the collision also shown in figure. The correct relationship between m_1 and m_2 is ,

- (1) $m_1 = 3 m_2$ (2) $3 m_1 = m_2$
 (3) $3 m_1 = 5 m_2$ (4) $3 m_1 = 7 m_2$
 (5) $5 m_1 = 3 m_2$

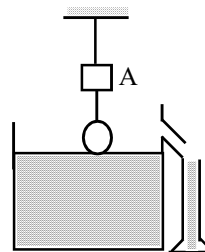


- (40) To obtain the linear graph that passing through the origin from the equation $V = \sqrt{\frac{g\lambda}{2\pi}}$ The graph should be

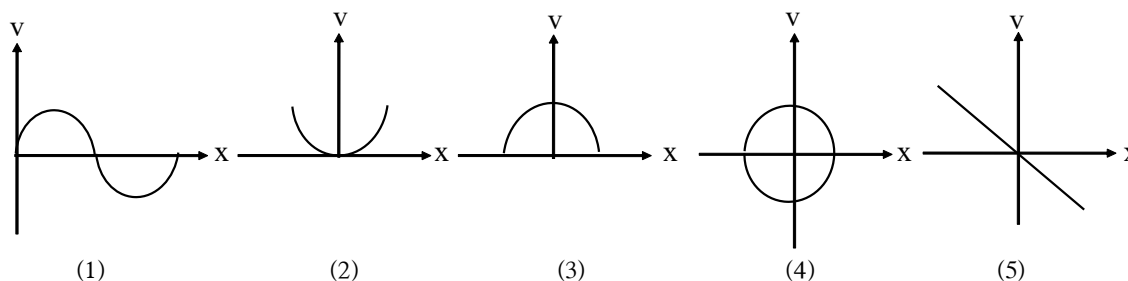
- (1) λ Vs f^2 (2) $\frac{1}{\lambda}$ Vs f^2 (3) λ Vs f (4) $\frac{1}{\lambda}$ Vs f^2 (5) $\frac{1}{\lambda^2}$ Vs f^2

- (41) When an object is suspended from a spring balance , the reading is 50 g when it completely immersed in coconut oil. The coconut oil is displaced 10 cm^3 when the object is in the coconut oil the reading of spring balance is,

- (1) 60 g (2) 58 g (3) 50g
 (4) 42 g (5) 40 g



- (42) The graph showing the velocity of an object when it execute simple harmonic motion. The graph of velocity Vs displacement of an object when it execute simple harmonic motion is best represented by



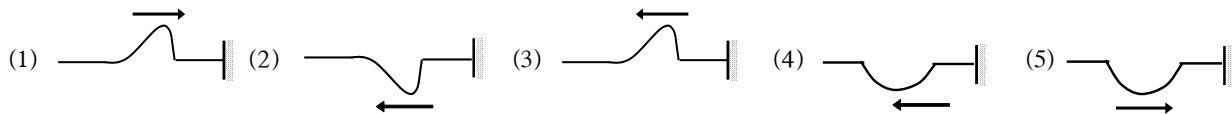
- (43) An invisible feature of a standing wave is ,

- (1) There is point with zero displacement
 (2) There is point with maximum displacement
 (3) Energy transmission
 (4) The distance between two consecutive nodes is half the wave length
 (5) The presence of particles in the same phase between two consecutive nodes.

- (44) A wooden cub has base length 6 cm and when it placed in water it sink to a height of 1.5 cm. The relative density of wooden is,

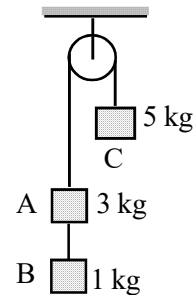
- (1) $\frac{1}{2}$ (2) $\frac{1}{4}$ (3) $\frac{3}{8}$ (4) $\frac{5}{16}$ (5) $\frac{3}{16}$

- (45) The figure shows a portion of wave that travels through a string which is fixed to a certain point. The shape of reflected wave accurately shows



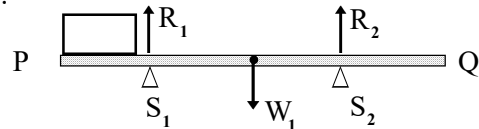
- (46) The tension of strings which are connected to the loads A and B are,

- (1) g (2) $\frac{g}{9}$
(3) $\frac{5g}{9}$ (4) $\frac{10g}{9}$ (5) $2g$



- (47) The speed of air flowing over the roof during a tornado is 50 m s^{-1} . The effective area of the roof is 1000 m^2 . The density of air inside the house is 1 kg m^{-3} . If the air inside the house is stationary, the minimum mass the roof must have to prevent it from removing is,
(1) 125 kg (2) $125 \times 10^3 \text{ kg}$ (3) $125 \times 10^2 \text{ kg}$ (4) $125 \times 10^4 \text{ kg}$ (5) $125 \times 10^5 \text{ kg}$

- (48) The uniform rod of length PQ is placed on two supports S_1 and S_2 . The two supports of the rod are placed at equal distance from the center of the rod. The weight of the rod is W_1 . A wooden box of weight W_1 is placed close to the point S_1 . The reaction of S_1 and S_2 are R_1 and R_2 respectively. Which of the following is true if the rod does not start to slip.

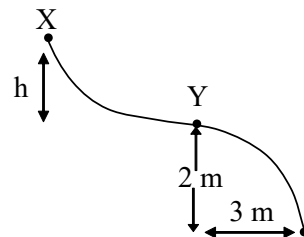


- (A) - $R_1 + R_2$ always equal to $W_1 + W_2$.
(B) - R_1 always greater than R_2 .
(C) - As the box moves closer to P, R_1 gradually decreases and R_2 increases.

- (1) Only A (2) Only B (3) Only A and B
(4) Only A and C (5) All A, B, C

- (49) The particle released from X moves in a smooth curved path and reaches Y, and then falls back to earth under gravity. The value of h is equal to

- (1) $\frac{9}{8} \text{ m}$ (2) $\frac{4}{3} \text{ m}$ (3) 2 m
(4) 3 m (5) 4 m



- (50) The figure shows a pitot tube placed in a flowing liquid. The pressure gauge indicates the variation in the velocity of the flowing liquid corresponding to the difference in height of two liquid columns. The graph that correctly shows the above is,

