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Rathnavali Balika Vidyalaya - Gampaha

01 E I

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First Term Test - 2018 November

12 ශ්‍රේණිය
Grade 12

Physics I

Time :- 02 Hours
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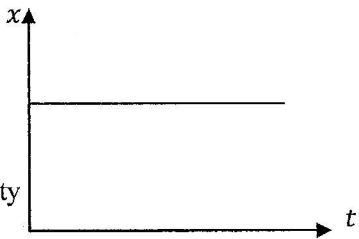
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Class :-

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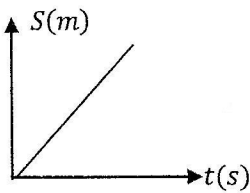
- (1) Which of the following is not a SI fundamental unit.
 (1) m (2) s (3) mol (4) J (5) A

- (2) Figure shows variation of quantity (x) with time t of a projectile
 That quantity would be.

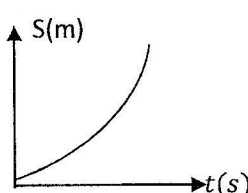


- (1) Acceleration (2) Displacement
 (3) Velocity (4) Horizontal component of velocity
 (5) vertical component of velocity

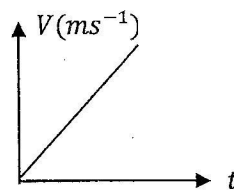
- (3) Which of the following is not graph corresponding to an object moving at positive acceleration.



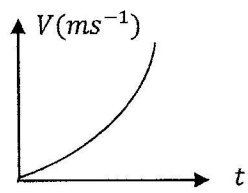
(A)



(B)



(C)



(D)

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

- (4) Which of the following measurement were not taken by a meter ruler, Vernier caliper and micrometer screw guage

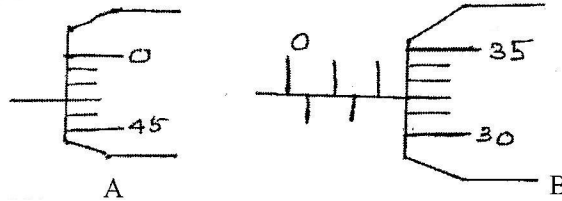
- (A) = 10.5 cm (B) = 2.235cm (C) = 10.667cm (D) 20.57cm
 (1) Only A and B (2) Only B and C (3) Only C and D
 (4) Only A and D (5) All A, B, C and D

- (5) A bird is flying horizontal at an altitude 180m when this bird is directly above his head a boy throws a stone at speed $120ms^{-1}$ and as it makes 30° with horizontal if this stone hits the bird speed of bird should be.

- (1) $100ms^{-1}$ (2) $120ms^{-1}$ (3) $60ms^{-1}$ (4) $60\sqrt{3}ms^{-1}$ (5) $150ms^{-1}$

- (6) Displacement (x) of a particle executing simple harmonic motion is given as $x = A \sin(\omega t + \alpha)$ where t is time and A and ω are constants. Dimension of product $A\omega$ is,
 (1) L (2) T (3) LT (4) L^2T (5) LT^{-1}

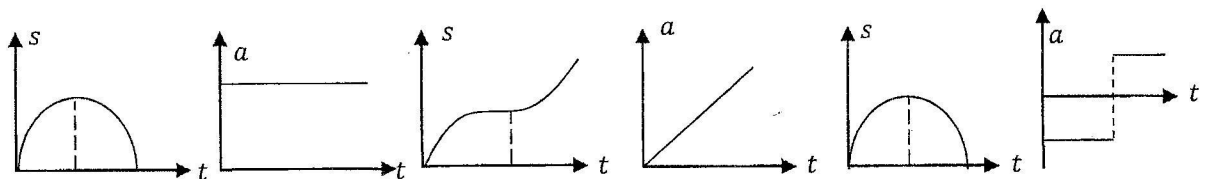
- (7) Figure (A) shows the arrangement of scales when spindle touches the anvil and Figure (B) shows the arrangement of scales when micrometer screw gauge is used to measure diameter of a cable. The diameter of cable should be



- (1) 2.32 mm (2) 2.35 mm (3) 2.29 mm (4) 2.80 mm (5) 1.94 mm

- (8) A particle projected vertically upward at velocity 40ms^{-1} from the top of the tower hits on the ground after 10s. The height of tower should be
 (1) 50m (2) 100m (3) 200m (4) 300 m (5) 500m

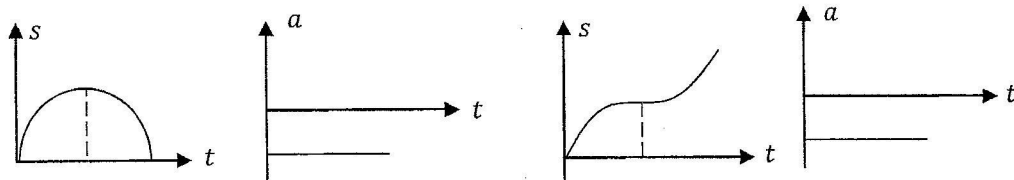
- (9) Displacement time curve and acceleration time curve for an object projected vertically upward is



(1)

(2)

(3)



(4)

(5)

- (10) When thickness of a thin sheet is measured, it reads 1.20mm. When a stack is made by using three such sheets it measures thickness as 3.80mm. The zero error of instrument is

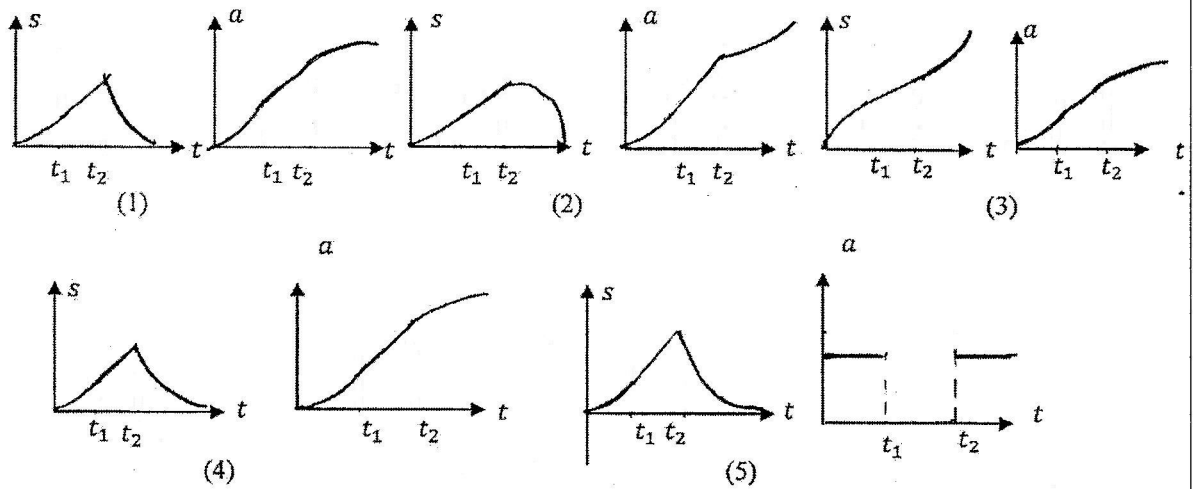
- (1) 0.10mm and it should be added
 (2) 0.10mm and it should be subtracted
 (3) 0.01mm and it should be added
 (4) 0.01mm and it should be subtracted
 (5) Non of above

- (11) Consider the following statements made regarding a particle describes a projectile

- (A). Velocity is zero at the maximum height of its path.
 (B). Total vertical displacement of particle is zero
 (C). It is subjected to a constant acceleration

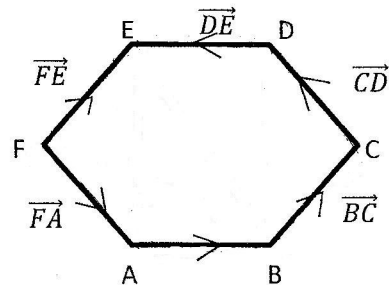
- (1) Only A (2) Only B and C (3) Only A and C
 (4) All A, B and C (5) All are incorrect

- (12) Two objects X and Y are separated by 5m each second, when they are moving opposite and the approach 1m in each second, when they are moving in same direction, velocities of X and Y should be
 (1) $1ms^{-1}, 2ms^{-1}$ (2) $2ms^{-1}, 5ms^{-1}$ (3) $1ms^{-1}, 5ms^{-1}$
 (4) $3ms^{-1}, 2ms^{-1}$ (5) $2ms^{-1}, 5ms^{-1}$
- (13) Inertia of a system is measured by
 (1) Mometum (2) Kinetic Energy (3) Velocity
 (4) Acceleration (5) Mass
- (14) Objects starts its motion at rest and moving under uniform acceleration in time t_1 . then in uniform velocity in time t_2 . Then it returns back to initial position under deceleration corresponding displacement - time curve and acceleration time curve for this motion is ,



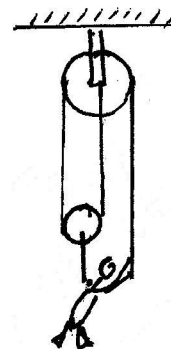
- (15) Figure shows a system at vectors . If $ABCDEF$ is a regular hexagon. what is the resultant of system of vectors is,

- (1) O (2) $2\vec{BC}$ (3) \vec{AC}
 (4) \vec{EF} (5) \vec{ED}



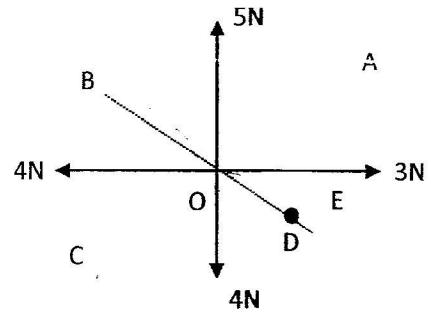
- (16) Percentage errors of three quantities a, b and c are 1%, 1.5% and 2% . Quantity A is given as $A = ab^2c$. Percentage error of quantity A is
 (1) 1% (2) 1.5% (3) 2% (4) 5% (5) 6%

- (17) A boy of mass 60kg is in equilibrium by drawing the cable. Downward, which is going over two smooth pulleys if he is free from floor, the force applied by boy on the cable is given by
 (1) 600N (2) 450N (3) 300N
 (4) 200N (5) 150N



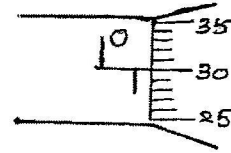
(18) Figure shows four vectors. What is the direction of fifth vector. If the resultant of system of vectors is zero

- (1) \vec{OD} (2) \vec{OA} (3) \vec{OB}
 (4) \vec{OC} (5) \vec{OE}



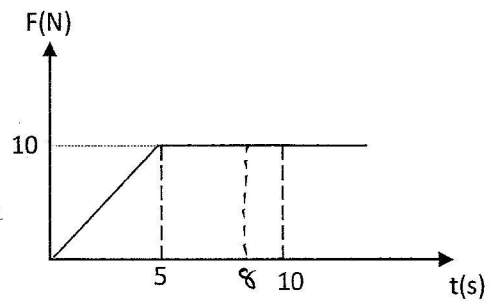
(19) Circular scale of micrometer screw gauge of pitch 0.5mm has been divided in to 50 equal parts. When micrometer screw gauge is used to measure diameter of a cable arrangement of two scales are given as follows.

- The percentage error of diameter measurement is
 (1) 0.5% (2) 1% (3) 0.8%
 (4) 1.25% (5) 5%



(20) Variation of force F applied on a body of mass 2kg moving on a horizontal plane at speed $10ms^{-1}$ is given as follows. Velocity of this objects after 8 S is

- (1) $10ms^{-1}$ (2) $15ms^{-1}$ (3) $37.5ms^{-1}$
 (4) $47.5ms^{-1}$ (5) $50ms^{-1}$

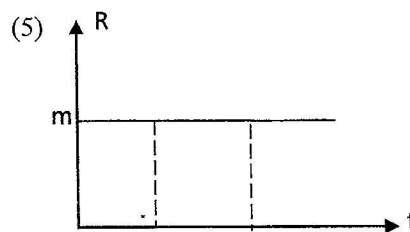
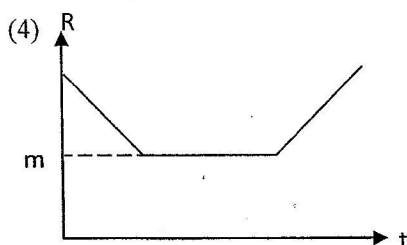
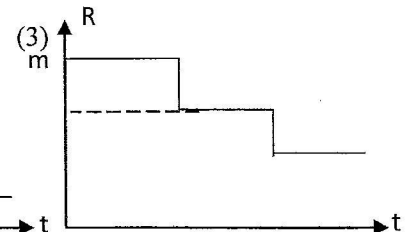
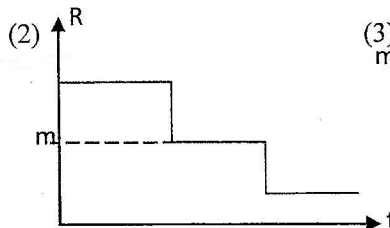
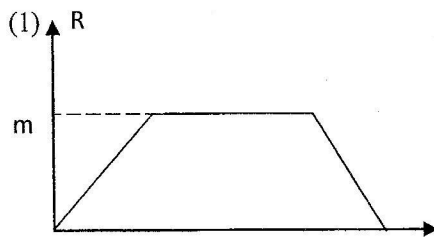


(21) Two objects A and B of masses $3kg$ and $2kg$ are connected by a heavy rope of mass $1kg$. what is the tension of rope at mid point when 12N force is applied on A on a smooth horizontal plane.

- (1) 4N (2) 5N (3) 6N (4) 10N (5) 12N



(22) A child of mass m is standing on a weighing machine placed in an ascending elevator. It starts motion at rest and then accelerated at constant a_1 then it travels at steady speed and finally decelerates at a_2 ($a_2 > a_1$)
 The correct variation of reading of machine with time is



- (23) A car accelerates from rest at constant rate α for some times after which it decelerates at constant rate β to come rest. If the total time elapsed is t then the maximum velocity attained is

(1) $\frac{\alpha\beta t}{2(\alpha + \beta)}$

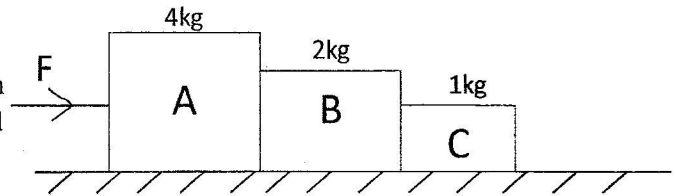
(2) $\frac{\alpha\beta t}{(\alpha + \beta)}$

(3) $\frac{2\alpha\beta t}{(\alpha + \beta)}$

(4) $\frac{2\alpha\beta t}{(\alpha + \beta)}$

(5) $\frac{\alpha\beta t}{(\alpha^2 + \beta^2)}$

- (24) Three objects A, B and C of masses $4kg$, $2kg$ and $1kg$ respectively are placed in contact with each other. A $3N$ force on A. The force generated on B by C is



(1) $1N$

(2) $2N$

(3) $3N$

(4) $4N$

(5) $6N$

- (25) A monkey of mass $20kg$ is climbing a ladder connected to a parachute. Find descending velocity of parachute with respect to earth, when monkey climbs at $4ms^{-1}$ steady with respect to ladder.

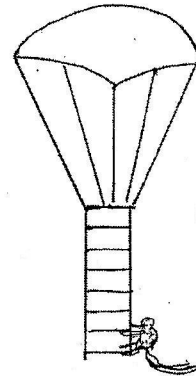
(1) $1ms^{-1}$

(2) $1.5ms^{-1}$

(3) $2ms^{-1}$

(4) $2.5ms^{-1}$

(5) $3ms^{-1}$



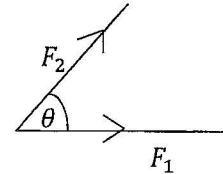
Part B - Essay

(1)

(a) In the equation, $F = KA^x \cdot V^y \cdot d^z$, F - Force, A - Area, V - Velocity and d - density and k is a dimensionless constant, Find x, y and z using the analysis of dimension.

(b) Percentage error of length measurement of a cube is 2%. Find the percentage error of cross sectional area

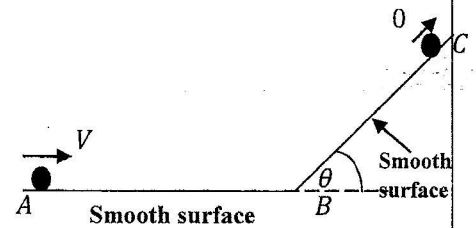
(c) F_1 and F_2 are two forces having same magnitude F
evaluate $(F_2 - F_1)$, if angle between two forces is θ



(d) When train B starts its motion at 10ms^{-1} , A train starts motion at 20ms^{-1} 100m ahead B. How long will it take to separate two trains by 1000m.

(e) (i) Object starts its motion from point A at speed V and travels to C and then returns back to A. Draw velocity time graph for object

(ii) Also draw speed - time graph for this motion.

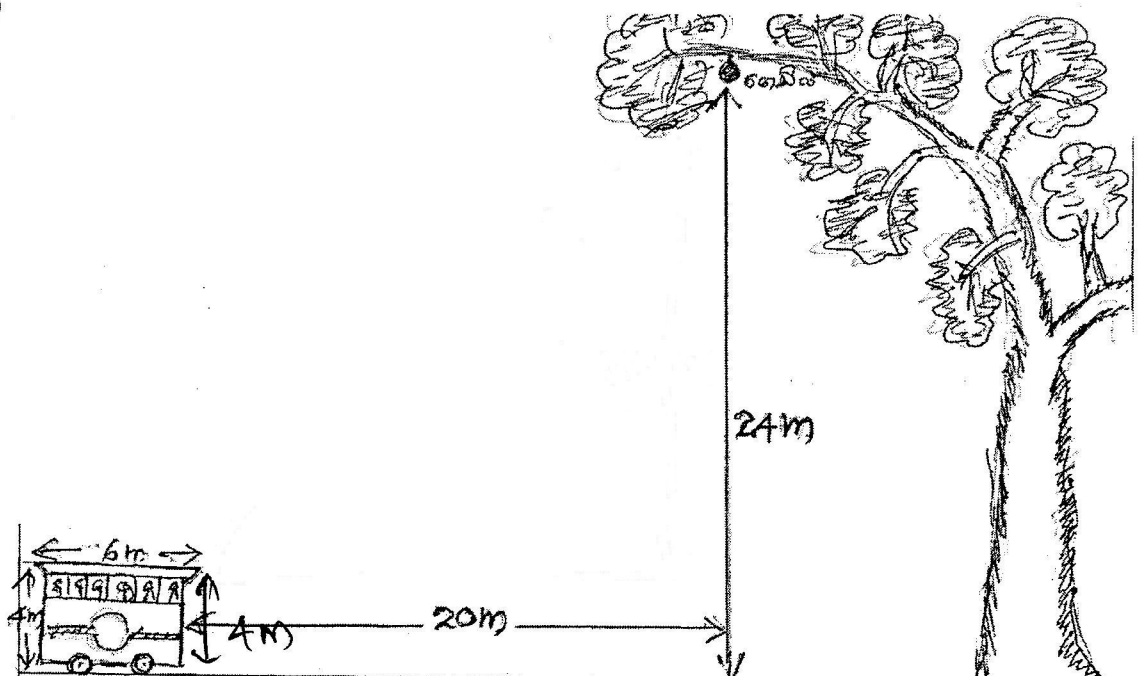


(f) An object is projected at speed 80ms^{-1} and as it makes angle 60° with horizontal. Find the magnitude and direction of velocity of projectile after 3S

(2)

(a) Write down two requirements to fall an object under the constant gravitational acceleration.

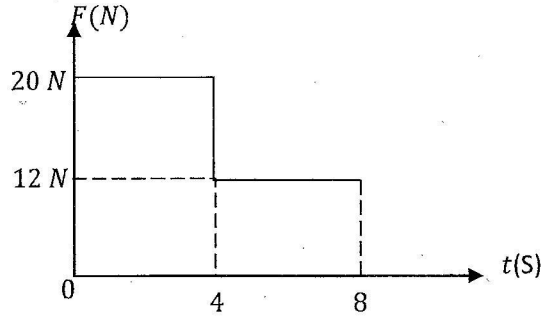
(b)



A bus of length $6m$ and height $4m$ travels along a horizontal path of speed U . A fruit falls from a tree of height $24m$ when the gap between tree and bus is $20m$.

- Find the speed of bus U_1 , if fruit just clears the front end of the bus.
- Also find the speed U_2 of bus if fruit just clear the rear end of bus.

(c) Force acting on a body of mass $4kg$ which is initially at rest is given in figure.



- Find the velocity of body after first 4 seconds.
- Find the velocity after 8 seconds.
- It travels $128m$ more before coming to rest. Find the deceleration of the body.
- Draw displacement-time graph for the entire motion.

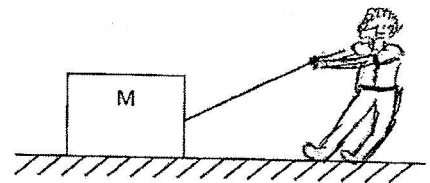
(3)

- Write down the theory of conservation of linear momentum.
- Two children are sitting on two trolleys A and B.

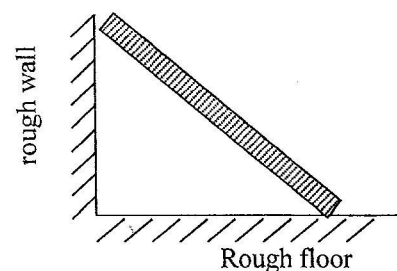
Mass of trolley A with child is M and mass of trolley B with child is m . Trolleys are pushed by two children by applying two equal forces by their hands. Find the distance travelled by trolley A when the separation between two trolleys is d (floor should be horizontal).

(c) Draw all the forces on an object in the following cases.

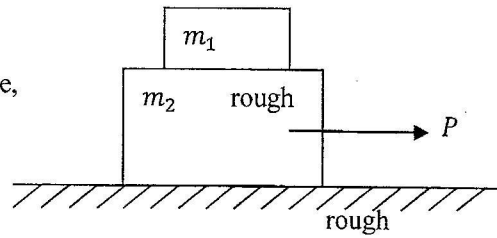
- When an object of mass M placed on a rough floor is pulled.



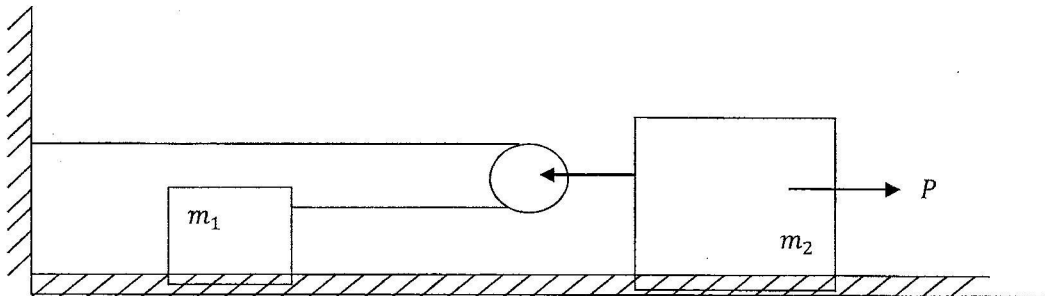
- When a uniform rod placed on a rough floor is lean against a rough wall.



- (iii) . When a rough object of mass m_1 is placed on an object of mass m_2 placed on rough plane, which is pulled by horizontal force P



- (d) Two blocks placed on a smooth horizontal table are connected by light inextensible strings and a pulley as shown in figure and block of mass m_2 is drawn by horizontal force P



- (i) . If the linear accelerations of m_1 and m_2 are a_1 and a_2 , What is the relationship between a_1 and a_2
- (ii) . Calculate a_1 and a_2 when m_2 is drawn by force P