Royal College - Colombo 07

Grade 12

First Term test – June 2023

Physics I

01 E I

Time : 1 hour

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

Answer all questions.

(1) The dimensions of change of momentum is

1) MLT^{-2} 2) MLT^{-1} 3) $ML^{-1}T^{-1}$ 4) $ML^{-1}T^{-2}$ 5) No diamensions

(2) The physical quantity and it's unit is correctly represented by,

1) momentum – Ns^{-1} 2) Impulse – $kg\ ms^{-1}$ 3) density – $g\ cm^{-3}$

4) pressure – $kgm^{-1}\ s^{-2}$ 5) luminance intensity – rad

(3) The ratio of the prinfixes is equal to 10^{-3} is given by,

1)	2)	3)	4)	5)
milli / kilo	killo / micro	Giga / Mega	Giga / Tera	nano / milli

(4) Consider the following statements regarding the dimensions.

A) The physical equations which are existed with logarithmic terms can be constructed using the dimensions.

B) The physical equations which are existed with trignometric ratioes can be constructed using the dimensions.

C) The physical equations which are related with four physical quantities can be constructed using the dimensions.

The true statement(s) from above is/are

1) A only 2) B only 3) C only

4) A and B only 5) B and C only

(5) A vector, scalar and a diamension less physical quantities are represented in order by,

1) momentum, force, relative density 2) displacement, time, frequency

3) pressure, distance, relative velocity 4) acceleration, energy, relative velocity

5) velocity, pressure, relative density

(6) The wrong statement regarding the meter ruler is,

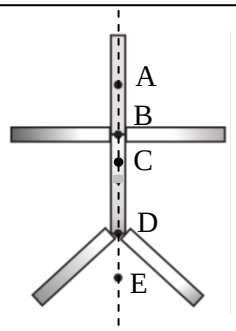
1) The maximum absolute error that can be occured when taking reading using a meter ruler is 1 mm.

2) Meter ruler is divided in 1 mm divisions.

3) Meter ruler is calibrated in centimeters.

4) The minimum measurement that can be taken by a meter ruler as a laboratory measurement is 10 cm.

5) The no parallelax error has to be considered when taking a reading using a meter ruler.

(7) 

The given frame is assembled by six identical rods. The centre of gravity of the frame is most possible at the point OF,

1) A 2) B 3) C
4) D 5) E

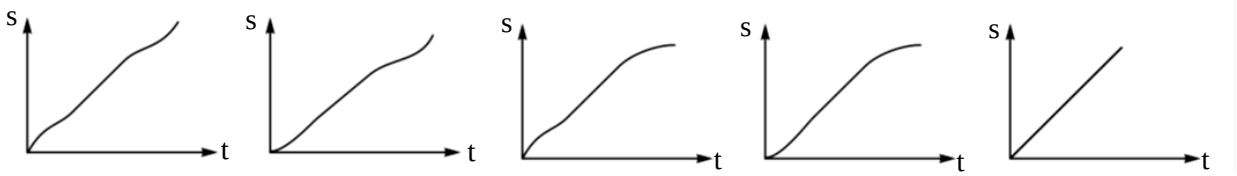
(8) Consider the following statements regarding the apparatus of parellelogram of force in the school lab.

A) The pullies are not on a same plane.
B) The pullies are not at a same horizontal level
C) The pans are connected at the end of the strings.

The reason(s) for not been vertical the diagonal of the parallelogram which is constructed to verify the law of parallelogram of forces is/are

1) A only 2) B only 3) C only
4) A and B only 5) A and C only

(9) The displacement – time graph of a lift which starts to move from the ground floor and ends at the third floor is best represented by,

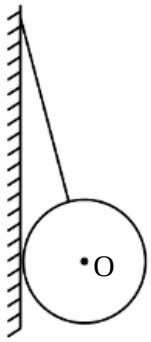


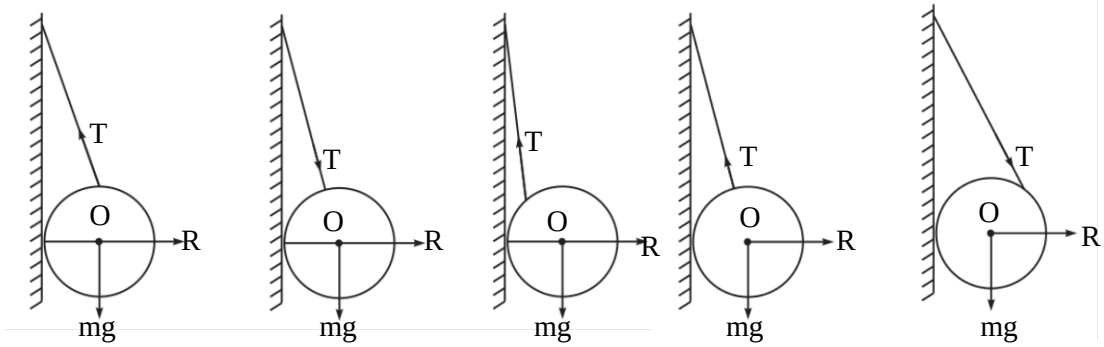
(1) (2) (3) (4) (5)

(10) The addition of two vectors **M** and **N** is equal to **P**. **M** and **N** are inclined in 135° each other. **P** and **M** are perpendicular to each other. The magnitude of **M** is 13. The magnitude of **P** is given by,

1) 13 2) $\frac{13}{\sqrt{2}}$ 3) $13\sqrt{2}$ 4) $\frac{13\sqrt{3}}{2}$ 5) $\frac{13}{2}$

(11) A spherical object is hung on a wall with an inextensible string which is connected to a point at the circumference of the sphere as shown in the figure. The correct free body diagram is given by





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

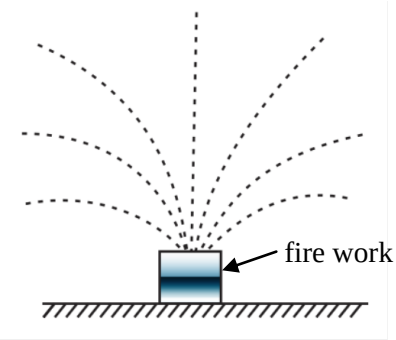
(12) The percentage errors when measuring the length of a side (l) and the mass (m) of a cube are 1% and 0.25% respectively. The density of the material (ρ) of the cube was determined interms of l and m. The relationship of the fractional errors of the density (ρ), mass (m) and length (l) measurement is given the equation of $\left[\frac{\delta\rho}{\rho}=\frac{3\delta l}{l}+\frac{\delta m}{m}\right]$. The percentage error of the density (ρ) is,

1) 0.50% 2) 0.75% 3) 1.00% 4) 1.75% 5) 3.25%

(13) A passenger who is at rest in a train A which is moving with 10 ms^{-1} velocity towards right respective to the earth observes that another train B, is moving towards him with 60 ms^{-1} velocity along a parallel lane. The velocity of B with respective to A is,

1) 0 ms^{-1} 2) 10 ms^{-1} 3) 50 ms^{-1} 4) 60 ms^{-1} 5) 70 ms^{-1}

(14)



A fire work on a horizontal floor is explored and a large number of parts are spread every directions in various angles with same u velocity. The maximum area covered by the parts of the fire works on the floor is given by (Neglect the height of the fire work)

1) $\frac{\pi u^2}{g}$ 2) $\frac{\pi u^4}{g^2}$ 3) $\frac{\pi u^2}{g^2}$

4) $\frac{\pi u^2}{g^4}$ 5) $\frac{\pi u^4}{g}$

(15) Ants who are comming out from an ant nest, start their journey at rest with constant 2 cm s^{-2} acceleration. Each and every 2 seconds, one ant is comming out from the nest and they are moving along a linear path. The gap between the second and third ant when the sixth ant is comming out from the nest is,

1) 6 cm 2) 14 cm 3) 21 cm 4) 28cm 5) 36cm

(16) The vehicle 'A' is moving along a horizontal path with 60 km h^{-1} velocity. The vehicle 'B' is moving behind A, with 70 kmh^{-1} uniform velocity. When the gap between these two vehicles is 2.5 km, the vehicle B starts to move with 20 kmh^{-2} retardation. The time taken to passing the vehicle A by the vehicle B is in hours.

1) 0.25 2) 0.5 3) 1 4) 1.5 5) 2

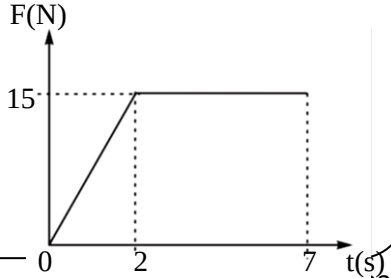
(17) An object is moving 2m distance within it's first 2s and 2.2 m within next 4s. The velocity of the object after the 7^{th} second is

1) 0.1 ms^{-1} 2) 0.2 ms^{-1} 3) 0.3 ms^{-1} 4) 0.4 ms^{-1} 5) 0.5ms^{-1}

(18) A horizontal F force is applied on an object of 3 kg mass, which is kept on a horizontal smooth plane. The variation of the force (F) with time (t) is given in the graph. The velocity of the object after 7 seconds is,

1) 5 ms^{-1} 2) 10ms^{-1} 3) 15ms^{-1}

4) 30 ms^{-1} 5) 70ms^{-1}

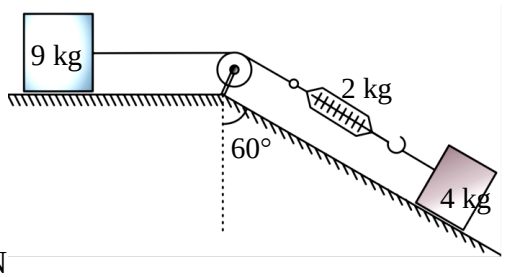


(19) An armored tank which is moving with 30 ms^{-1} velocity towards the north, suddenly changed it's direction to East and moving with 40 ms^{-1} velocity. The magnitude of the thange of the momentum and it's direction is given by,

1) 1 x 10^4 kg ms^{-1} ↖ 2) 1 x 10^4 kg ms^{-1} ↘ 3) 1 x 10^4 kg ms^{-1} ↗

4) 5 x 10^4 kg ms^{-1} ↘ 5) 5 x 10^4 kg ms^{-1} ↗

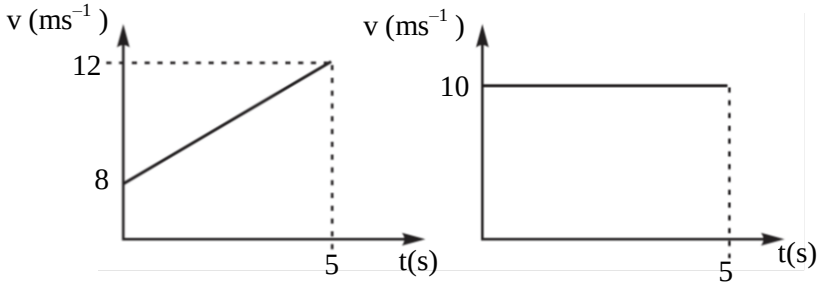
(20) All the surfaces in the figure are smooth. The mass of the spring balance is 2 kg. When the system is smoothly released, the reading of the spring balance is,



1) $6\sqrt{3}$ N 2) 12 N

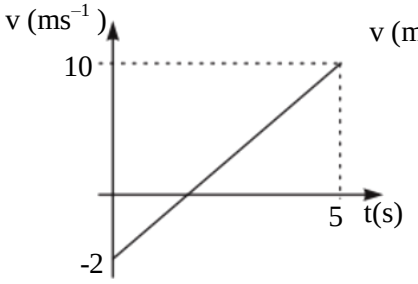
3) $9\sqrt{3}$ N 4) 18 N 5) 20 N

(21) The velocity (v) – time (t) graphs drawn for two athletes A and B, within 5 s time duration at a 100 m event are shown in below,

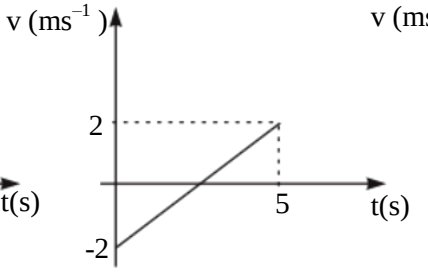


Athlete – A Athlete – B

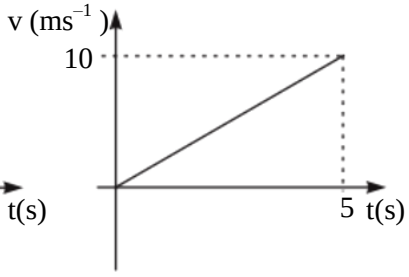
The variation of the velocity of A relative to B with time (t) is best represented by



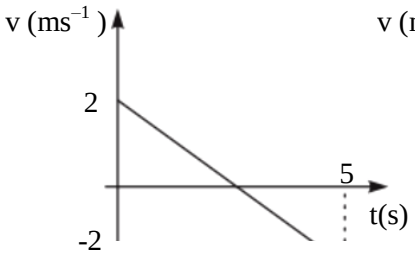
(1)



(2)



(3)



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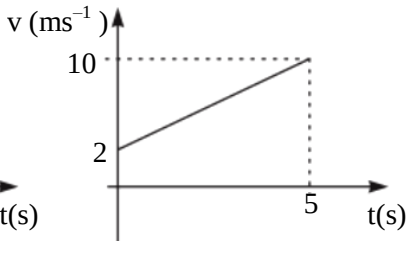
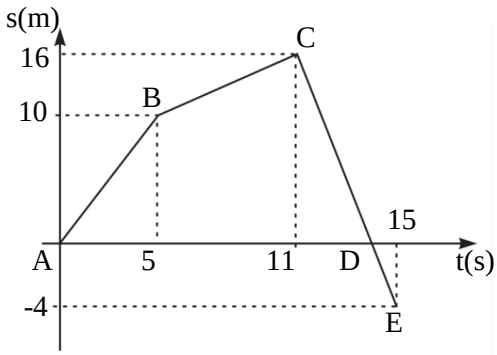
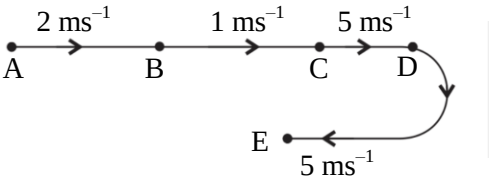


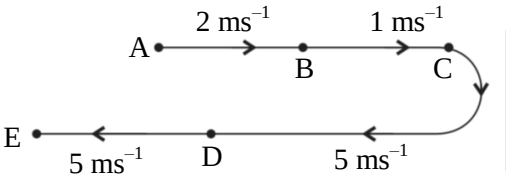
(5)

(22) A small child is walking from point A to point E. The displacement (s) time (t) graph relevent to the motion of the child is given in the figure. The correct path of the motion of the child with correct magnitudes of velocities is given by,

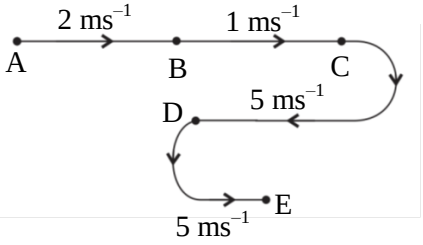




(1)



(2)



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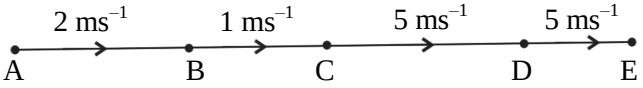
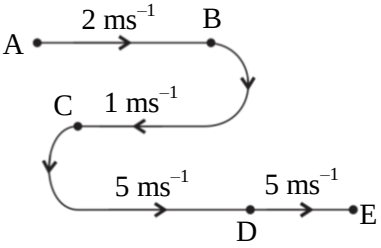


(4)



(5)

(23) A horizontal force (P) is given to an object which is kept on a rough horizontal plane. The variation of P with time (t) is given in the graph - 1. The best representation of the variation of the frictional force (F) with time (t) is given by (F_l = Limiting frictional force)

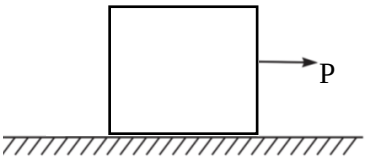
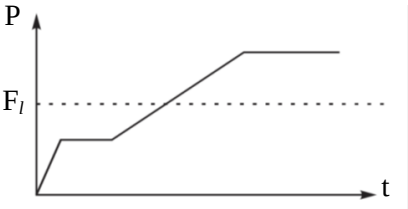
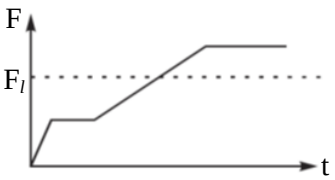


Figure (1)

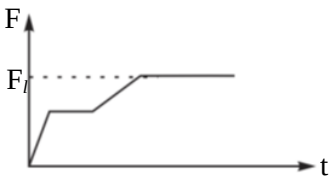


Graph (1)

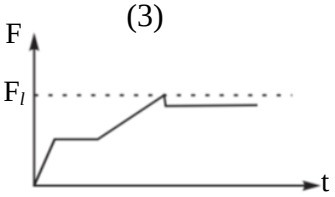
(1)



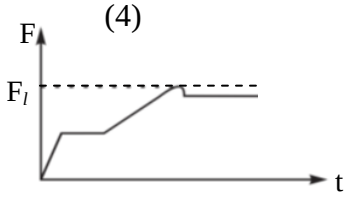
(2)



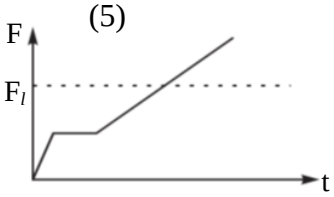
(3)



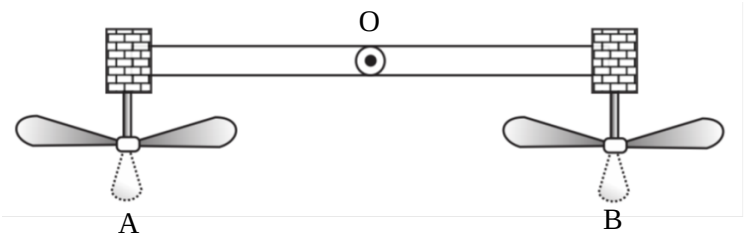
(4)



(5)

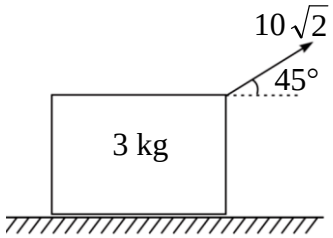


(24) Two identical fans of A and B are connected at the two ends of uniform light rod and it is horizontally balanced as shown in the figure. The system is free to rotate smoothly about the mid point (O) of the rod. The most correct statement, about this system is given by



1) The system is rotating anti-clock wise about the point O, when only the fan A is switched on.
2) The system is rotating clock wise about the point O, when only the fan B is switched on.
3) The system rotates clockwise about the point O, when both A and B are working with same speeds,
4) The system rotates anti -clock wise about the point O, when the fan B is rotating with a higher speed than the fan A.
5) The system rotates anti -clock wise about the point O, when the fan A is rotating with a higher speed than B.

(25) A mass of 3 kg is kept on a rough horizontal plane as shown in the figure. The static and dynamic co-efficient of friction between the mass and the surface are 0.3 and 0.2 respectively. An external force of $10\sqrt{2}$ N, which is 45° inclined to the horizontal is given to the object. The frictional force (F) and the normal reaction (R) are correctly given by,



	(1)	(2)	(3)	(4)	(5)
F(N)	6	6	6	4	4
R(N)	20	30	40	20	30