

01      E      I

### First Term Test - 2017 November

**Grade 12**  
*Enu*

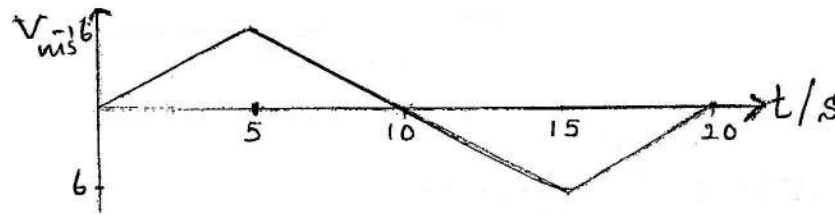
## Physics I

Time : 01 Hour

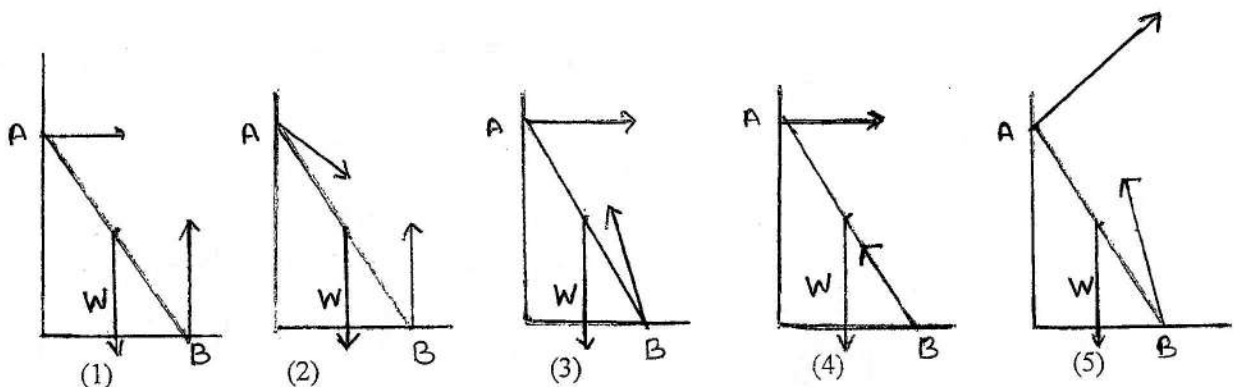
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1. What is the physical quantity that contains the dimension  $MLT^{-1}$ ?  
(1)Power      (2)Force      (3).Momentum      (4) Couple of force      (5)Pressure
  
2. Capillary rise of a capillary tube is given by the formula  $h = \frac{KT}{r\rho g}$  when  
 $\rho$  –density of the liquid       $r$  –Radius of the capillary tube  
 $T$  – Surface tension       $g$  – Gravitational acceleration  
 $K$  – Dimension less constant.       $h$ - Height of the water column.  
What is the dimension of “T”?  
(1) $MLT^{-2}$       (2)  $MT^{-2}$       (3) $ML^2 T^{-2}$       (4) $ML^{-1}$       (5) $M^0LT^{-2}$
  
3. The unit for measuring house hold electricity consumption is kilo Watt hours (kWh). The physical quantity that measured by the kWh is,  
(1)Power      (2) Voltage      (3) Current      (4) Energy      (5) Efficiency
  
4. What is the value of gravitational acceleration in  $km\ min^{-2}$  since it’s value in  $ms^{-2}$  is 9.8 ?  
(1)35.3      (2) 5.9      (3)58.8      (4)17.6<sup>1</sup>      (5)27.2
  
5. Value of a main scale division of a vernier caliper is  $x\ cm$ . ‘ $n$ ’ number of vernier divisions are coincided with  $(n-1)$  number of main scale divisions. What would be the least count of the instrument?  
(1) $(\frac{n-1}{n})x$       (2)  $\frac{nx}{n-1}$       (3) $\frac{x}{n-1}$       (4) $\frac{x}{n}$       (5) $\frac{nx}{2n-1}$
  
6. Displacement of an object is given by the formula  $x = 2t - 3t^2 + t^3$ . What is the displacement when  $t = 2s$ . ( $t$  stands for time in seconds)  
(1)0      (2) 2m      (3)3m      (4)4m      (5)6m

7. The velocity time graph of an object in linear motion is given below. The displacement of the object when the time is 20 s is.

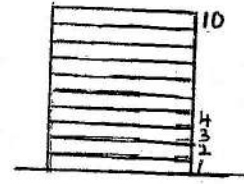


- (1) 30m      (2) 0      (3) 24m      (4) 60m      (5) 120m
8. An object is projected from the edge of a 40 m height building with velocity  $20 \text{ ms}^{-1}$  and  $30^\circ$  ascending angle to the horizontal. What is the time taken by the object to reaches the ground?
- (1) 2s      (2) 4s      (3) 6s      (4) 2.5s      (5) 3s
- 9.) An object which is following linear motion is moving 14m distance within the 5<sup>th</sup> second and 20m distance within the 8<sup>th</sup> second. What is the distance moved by the object within 15<sup>th</sup> second?
- (1) 29 m      (2) 34m      (3) 35m      (4) 300m      (5) 225m
10. A 150 m long train entered into 300 m long railway platform with  $40 \text{ ms}^{-1}$  velocity. The train passed the platform with  $50 \text{ ms}^{-1}$  velocity. The acceleration of the train would be,
- (1)  $0.6 \text{ ms}^{-2}$       (2)  $0.8 \text{ ms}^{-2}$       (3)  $1.0 \text{ ms}^{-2}$       (4)  $1.2 \text{ ms}^{-2}$       (5)  $1.5 \text{ ms}^{-2}$
- 11 Weight of a AB uniform ladder is 'W'. It is in equilibrium state by tangent with a smooth vertical wall and rough horizontal floor. What is the correct force diagram?



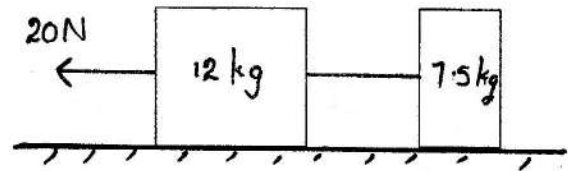
12. 10 identical coins are placed on a horizontal table as shown in the diagram. Mass of each coin is 'm'. The correct statement is,

- 1) The force exerted on 7<sup>th</sup> coin from the upper coins is  $2mg$ .
- 2) The force exerted on the 7<sup>th</sup> coin from the 8<sup>th</sup> coin is  $3mg$ .
- 3) The force exerted on the 7<sup>th</sup> coin from the 8<sup>th</sup> coin is  $2mg$ .
- 4) The force exerted on the 7<sup>th</sup> coin from the 6<sup>th</sup> coin is  $4mg$  towards vertically upward.
- 5) The force exerted on the 7<sup>th</sup> coin from the 6<sup>th</sup> coin is  $5mg$  towards vertically upward.



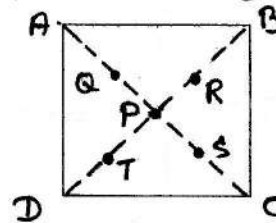
13. Two boxes with masses of 12 kg and 7.5 kg are placed on a smooth horizontal plane and they are combined with an unstretched string with mass of 0.5 kg. The tensions of two terminals of the string are since 20 N force is applying on the 12 kg box.

- A. 8.0 N for each terminal
- B. 7.5 N for each terminal
- C. 8.0 N and 7.5 N
- D. 7.69 N for each terminal
- E. 7.69 N and 8.20 N



14. The shown ABCD frame is prepared with AB, BC, CD, DA rods with same lengths. Masses of them are m, 2m, 3m and 4m respectively. The center of gravity of the frame would be,

- (1) P
- (2) Q
- (3) R
- (4) S
- (5) T



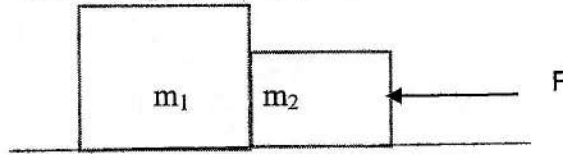
15. Ball A is moving with velocity of  $5 \text{ ms}^{-1}$  to collide with ball B in rest. Masses of A and B are 10 kg and 5 kg respectively. What would **not be** the velocities of A and B after the collision?

- (1)  $\frac{10}{3}, \frac{10}{3} \text{ ms}^{-1}$
- (2)  $3 \text{ ms}^{-1}, 4 \text{ ms}^{-1}$
- (3)  $2 \text{ ms}^{-1}, 6 \text{ ms}^{-1}$
- (4)  $\frac{5}{3} \text{ ms}^{-1}, \frac{20}{3} \text{ ms}^{-1}$
- (5)  $0, 10 \text{ ms}^{-1}$

16. A uniform 'L' length straight rope is placed on a smooth horizontal table. Force 'F' is applied to one terminal of the rope. The tension at a point which 'x' distance from the other terminal is,

- (1)  $\frac{FL}{x}$
- (2)  $\frac{F(L-x)}{L}$
- (3)  $\frac{Fx}{L}$
- (4)  $\frac{F(L-x)}{L+x}$
- (5)  $\frac{F(L+x)}{L-x}$

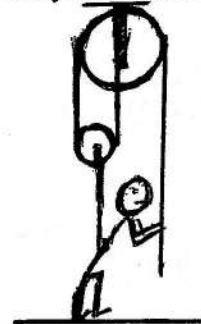
17 Two  $m_1$  and  $m_2$  masses of cubes are placed on a smooth horizontal table as shown in the diagram. Horizontal 'F' force is applying on mass  $m_2$ . The reaction force between two masses is,



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

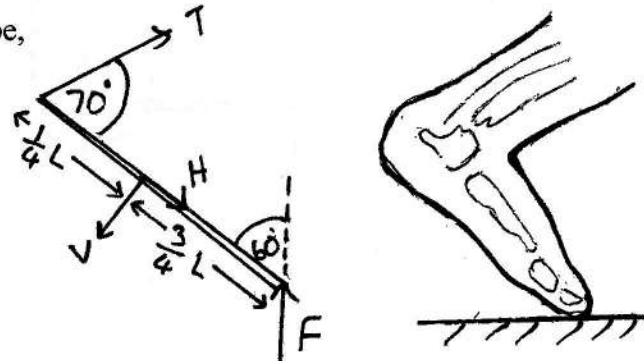
18 A man with mass of 60 kg is connected with a system of pulleys as shown. The force must be applied on the string to lift up him from the floor.

- (1) 300N  
 (2) 200N  
 (3) 600N  
 (4) 150N  
 (5) 400 N



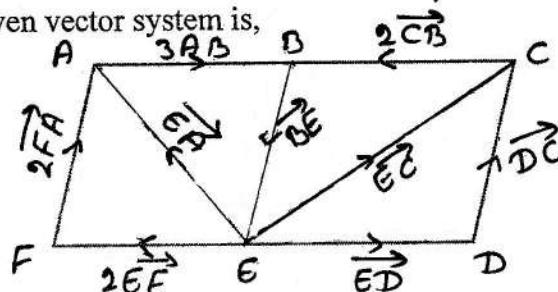
19. The forces acting on a leg is shown blow. If the trust force acting on the toes by the floor is 'F', then the tension 'T' would be,

- (1) 2.77F  
 (2) 3.47F  
 (3) 0.45F  
 (4) 1.07F  
 (5) 0.87F

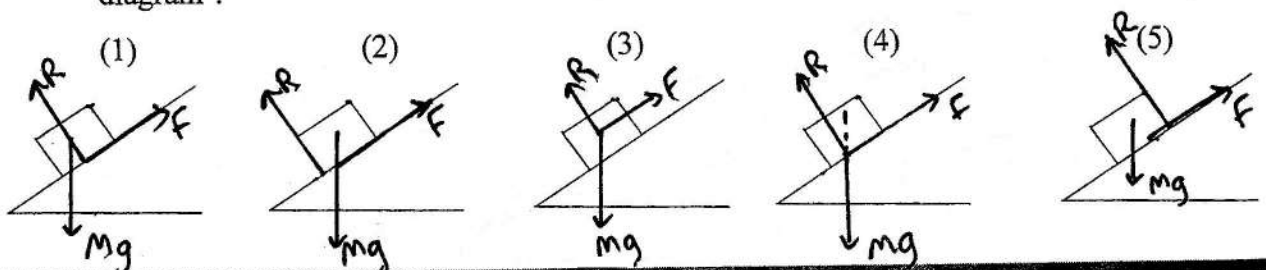


20. The resultant of the given vector system is,

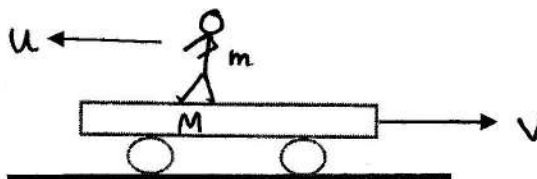
- (1)  $4\vec{BE}$   
 (2)  $4\vec{EB}$   
 (3)  $3\vec{BE}$   
 (4)  $3\vec{EB}$   
 (5)  $2\vec{BE}$



21. An object is in equilibrium on a rough inclined plane. What is the most correct force diagram ?



22. A trolley with mass  $M$  is moving along a smooth horizontal plane. A man with mass ' $m$ ' is walking on it to opposite direction with ' $u$ ' velocity relative to the trolley. Change of velocity of the trolley is,



- (1)  $\frac{MV}{(m-M)}$       (2)  $\frac{MV+mu}{(m+M)}$       (3)  $\frac{Mu}{(m+M)}$       (4)  $\frac{(M+m)V+mu}{m+M}$       (5)  $\frac{mu}{(M+m)}$

23. Consider the given statement about an object in equilibrium under a system of coplanar forces.

- A. The algebraic summation of moments of forces must be zero at least one point on the plane.
- B. It must be complete at least one of following conditions.
- The algebraic summation of moments of forces must be zero about all the points of the plane.
  - The resultant must be zero.
- C. The moment of the resultant must be zero around all the points of the plane.

The correct statement/s is/are

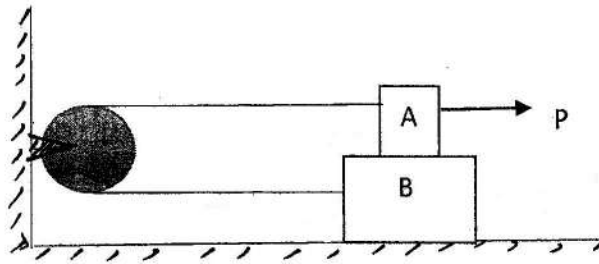
- (1) A only      (2) B only      (3) C only      (4) A and B only  
 (5) B and C only

24. The measurement would not be obtained from spherometer is,

- 1) The measurement that need to find the internal radius of a spherical surface.
- 2) The measurement that need to find the external radius of a spherical surface.
- 3) To measure the linear expansion of a long rod.
- 4) Internal diameter of a cylindrical tube.
- 5) Thickness of a glass slide.

25. Two A and B wooden blocks are connected with a pulley as shown in the diagram. The floor is rough and the pulley is light and smooth. The force P is enough to slightly move the two blocks. The frictional force between A and B is 5 N and it is between B and floor is 10 N. The tension of the string is,

- (1) 0
- (2) 4.5N
- (3) 10N
- (4) 15N
- (5) 20N



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<b>01</b>	<b>E</b>	<b>II</b>
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Physics II

Time : 01  $\frac{1}{2}$  Hours

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Class :- .....

Index No :- .....

**Important :**

- ❖ This question paper consists of **5 pages**
- ❖ This question paper comprises **Part A and Part B**. The time allotted for **both parts** is  $1\frac{1}{2}$  hours

**Part A – Structured Essay:**

**(02 pages)**

Answer all the questions on this paper itself. Write your answers in the space provided for each question. Please note that **the space provided is sufficient for your answers and that extensive answers are not expected**

**Part B – Essay:**

**(Page 2)**

This part contains 2 questions of which **all are to be answered**. Use your papers for this purpose. At the end of the time allotted for this paper, **tie the two parts together so that Part A is on top of Part B** before handing them over to the supervisor.

You are permitted to **remove only Part B** of the question paper from the examination hall.

**For Examiner's use only**

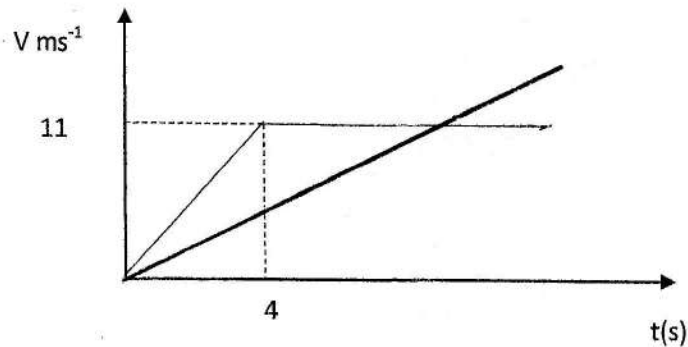
	Q.No	Marks
A	1	
	2	
B	3	
	4	

**Final Marks**

<b>In number</b>	
<b>In words</b>	

**Part A – Structured Essay**

1). The velocity-time graph of the player 'A' who is running 100m event is shown below.

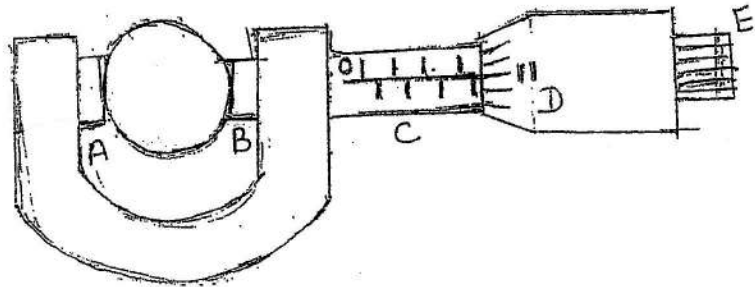


- i. What is the acceleration of the player?  
.....  
.....
- ii. What is the displacement of him at the end of first 4 seconds?  
.....  
.....
- iii. What is the total time taken by the player to finish the game?  
.....  
.....
- iv. Player 'B' is running with uniform acceleration. At the end of 7<sup>th</sup> second the player 'A' was passed by the player 'B'. Draw the velocity- time graph of player 'B' on the above given axis.  
.....  
.....
- v. What is the displacement of players at the end of the 7<sup>th</sup> second?  
.....  
.....
- vi. Find the velocity and acceleration of the player 'B' at that moment.  
.....  
.....
- vii. What is the difference between finished times of two players?  
.....  
.....

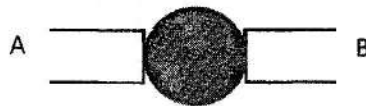


2). Mass of a small sphere is 10g. That is placed between A and B of a micrometer screw gauge. Name the parts that indicated by the letters.

- A-.....
- B-.....
- C-.....
- D-.....
- E-.....



i. Denote the forces acting on the sphere when it is tight between 'A and B on the shown diagram.



ii How do you verify that the sphere was tight as enough?

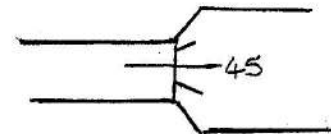
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iii. The circular scale is consisting with 50 divisions and the 'B' can move for 1mm distance along the linear scale when the circular scale is rotating for 2 circles. What is the reading shown by the figure (1)

.....  
 .....

iv The scales of the above micrometer screw gauge is shown below when 'A' and 'B' are touched each other. Find the correct radius of the sphere.

.....  
 .....




v. Find the density of the sphere.

.....  
 .....

vi. Is that suitable to use the above micrometer screw gauge to obtain the value of above (iv). Give reasons for your answer.

.....  
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	<b>රත්නවලී බාලිකා විද්‍යාලය</b> <b>Rathnavali Balika Vidyalaya - Gampaha</b>	<b>01</b>	<b>E</b>	<b>II</b>
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## First Term Test - 2017 November

Grade 12

### Physics II

#### Part B- Essay

Answer all the questions

3).A) A balloon is moving upward with  $15 \text{ ms}^{-1}$  uniform vertical velocity. A stone is freely released from the balloon at a point 200 m above from the ground. At the same moment a separate stone is thrown vertically upward with  $15 \text{ ms}^{-1}$  vertical velocity.

- i. As seen by a man on the ground
  - a) What is the velocity of the 1<sup>st</sup> stone?
  - b) What is the velocity of the 2<sup>nd</sup> stone?
- ii. What is the time taken by the 1<sup>st</sup> stone to reaches the ground?
- iii. What is the time taken by the 2<sup>nd</sup> stone to reaches the ground?
- iv. What is the time difference between above (ii) and (iii)?

B) A battle air craft is flying at a velocity  $72 \text{ ms}^{-1}$  at an elevation of  $h = 128 \text{ m}$ , to attack an array of identical trucks moving, along a straight road with different constant speeds. The dimensions of a truck is 10m in length and 3m in height. At the instant a bomb is released freely from the battle air craft as make 125 m horizontal displacement with the rear edge (back edge) of the truck.

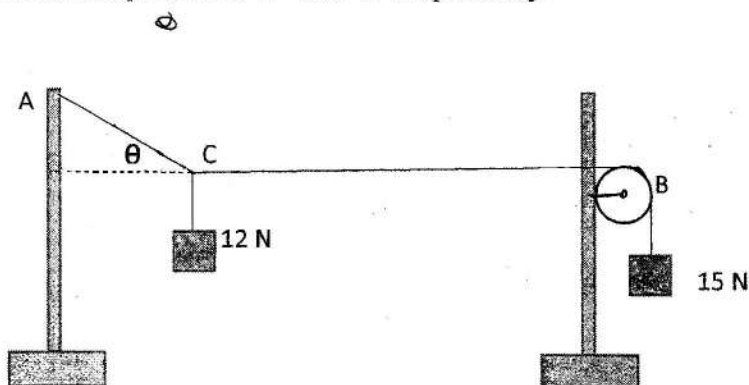
- a) Find the velocity of the truck if it was completely destroyed.
- b) After few seconds another bomb was, released freely targeting another truck of uniform velocity  $45 \text{ ms}^{-1}$ . At the instant the bomb is released the rear edge of the truck also at a horizontal distance as above case. **Will it be destroyed or not.** Give reasons for your answer.

4) (A) Write the principle of conservation of linear momentum.

(B) 'A' and 'B' two balls are at rest on a smooth horizontal table. Ball 'A' starts to move with  $30 \text{ ms}^{-1}$  uniform velocity towards ball 'B' and finally collide with ball 'B'. After the collision the ball 'A' moves  $30^\circ$  inclination to its initial direction and ball 'B' moves  $45^\circ$  inclination with 'A' s initial direction.

- i. Apply the principle of conservation of linear momentum towards the initial direction of 'A'.
- ii. Apply the principle of conservation of linear momentum towards the perpendicular direction of initial direction of 'A'.
- iii. Calculate the velocities of each balls after the collision.

(B) The 'AB' string is fixed on a vertical stand and a pulley as shown in the diagram. A 15 N and 12 N weights are suspended at 'B' and 'C' respectively.



Calculate the tension of the string of AC segment and inclination ( $\theta$ ) to the horizontal.

(C) A 70 kg mass of man stands on a balance which is fixed in an elevator that is moving vertically upward direction. The elevator starts its motion with rest and 3 s time period with  $4 \text{ ms}^{-2}$  acceleration. Finally it becomes rest with uniform retardation. Weight of the man was indicated as 490 N when it is moving with retardation.

- i. Calculate the apparent weight of the man when the elevator is moving with acceleration.
- ii. Find the displacement moving with acceleration.
- iii. Find the maximum velocity obtained by the elevator.
- iv. Find the value of the retardation of the elevator.
- v. Find the displacement moved with uniform retardation.