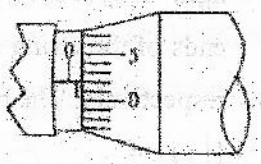
2016 Nov

De Mazenod College – Kandana

Physics Ist Paper

Grade 13

1) The figure shows part of micro meter screw guage. The circular scale is divided into 50 parts and it travels a distance of 1 mm in two complete rotation. The position of the scales when the spindle touches the anvil are shown in the figure.



The true statement is

1. The zero error is 0.002 cm, and it should be added to the reading
2. The zero error is 0.002 cm, and it should be subtracted from the reading
3. The zero error is 0.052 cm, and it should be added to the reading
4. The zero error is 0.052 cm, and it should be subtracted from the reading
5. The zero error is 0.051 cm, and it should be subtracted from the reading

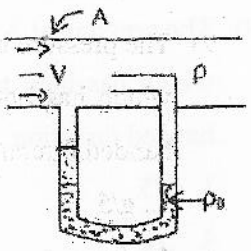
2) A body describes simple harmonic oscillations. Its displacement x varies with time t according to the equation. $x = 6.0\sin(2\pi t)$ The period of the motion is

1. 6 2. 2π 3. 2 4. 1 5. $\frac{3}{\pi}$

3) A block of mass 10 kg kept on a stand is connected to a light inextensible string which goes round a light smooth pulley as shown in the diagram. The limiting coefficient of friction between the stand and the block is 0.4. The mass of the stand is 10 kg and it is kept on a smooth surface. The acceleration of the system when the string is pulled by the maximum force which does not exceed the limiting frictional force between the stand and the 10 kg mass would be.

1. $\frac{8}{3}\ ms^{-2}$ 2. $6\ ms^{-2}$ 3. $\frac{4}{3}\ ms^{-2}$ 4. $2\ ms^{-2}$ 5. $\frac{1}{3}\ ms^{-2}$

4) The figure shows a pitot tube which is used to determine the velocity of an aero plane. The air having density ρ flows through the tube 'A' with a speed 'V' as shown in figure. The difference of the liquid levels in the manometer is (density of the liquid in the manometer is ρ_o)



1. $\frac{1}{2}\frac{\rho_o V^2}{\rho g}$ 2. $\frac{1}{2}\frac{\rho V^2}{\rho_o g}$ 3. $\frac{1}{2}\frac{\rho^2 V^2}{\rho_0^2 g}$ 4. $\frac{1}{2}\frac{\rho_0^2 V^2}{\rho^2 g}$

5. $\frac{1}{2}\frac{\rho V}{\rho_o g}$

5) The figure shows two strings AB and BC, tied together at B. The string is kept under tension 320 N The linear densities of AB and BC are 2×10^{-3} kgm^{-1} and 0.5×10^{-3} kgm^{-1} respectively. Their length is 4 m and 2 m respectively. Two pulses are sent from two ends of the string simultaneously. The time taken for each pulse to reach B are t_A and t_B respectively. The ratio $t_A : t_B$ is

1. 1 : 4 2. 4 : 1 3. 2 : 1 4. 1 : 2 5. 1 : 1

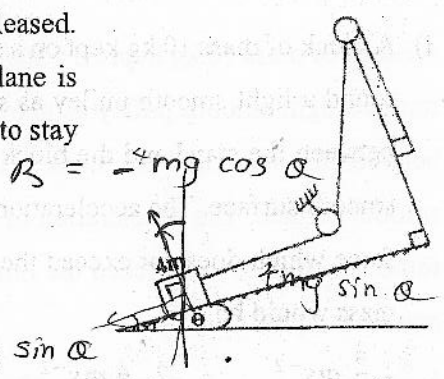
6) In the equation $X = B\left[\frac{BLV}{R}\right]L$ L, B, L, R, V denote magnetic flux density, length, resistance & velocity What is denoted by X?

1. Potential difference 2. Electric Current 3. Force
4. Power 5. Energy

7) A particle which is in a simple harmonic motion has an amplitude of 20cm & a period of 0.01 s. The velocity it passes the oscillating center is;

1. 20 ms^{-1} 2. 20 πms^{-1} 3. 100 ms^{-1}
4. 40 πms^{-1} 5. 100 πms^{-1}

8) A system has kept as in the figure & then slowly released. There is a friction between m & the plane, but the plane is smooth for 4m. Find the limiting coefficient of friction to stay the system in a limiting equilibrium.



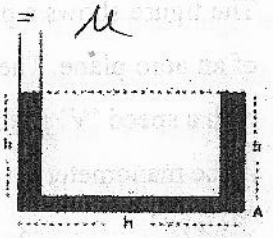
1. $\frac{4}{\sin\theta}$ 2. $\frac{4\tan\theta - 1}{\tan\theta}$
3. $\frac{\sin\theta}{4\cos\theta - 2g}$ 4. $\frac{2mg}{\sin\theta}$
5. $\frac{2\cos\theta - 1}{\tan\theta}$

$\frac{\sin\alpha}{\cos\alpha}$

$\frac{4mg\sin\alpha}{-4mg\sin\alpha} = \frac{\mu - 4mg\cos\alpha}{-\mu}$

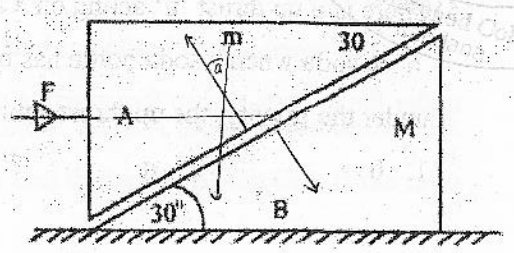
$= \mu$

9) The pressure at A equals to the atmospheric pressure in a U tube which has both terminals opened when it moves in the right handed direction. At which acceleration the tube is moving?



1. g/5 2. g/2 3. 2g/5
4. 2g 5. 2g/3

10) Find the reaction between A & B, when a F horizontal force is applied after putting two wooden masses in a smooth horizontal surface, as in the figure.

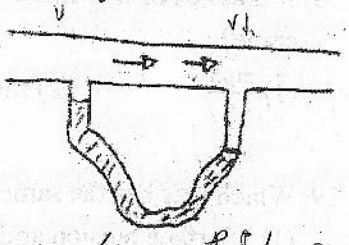


1. $\frac{2mf}{m+M}$
2. $\frac{mf}{m+M}$
3. $\frac{2f}{m+M}$
4. $\frac{2mf}{m+m}$
5. $\frac{(M-m)F}{m+M}$

11) What is the displacement of height of the water surface, when a cylindrical wooden object with a height of 10 cm & a radius r, iskgn-3 & kept in a cylindrical water container with radius of 2r. The densities of wood & water are 800kgm^{-3} & 1000kgm^{-3}

1. 1 cm
2. 2 cm
3. 3 cm
4. 4 cm
5. 5cm

12) Figure shows a venturimeter that has been used to determine the velocity of a liquid current. Which of the following changes does not change the gap of the mercury levels of it?

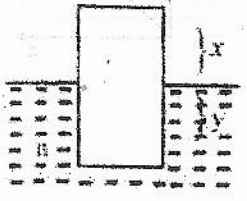


1. Changing the rate of flowing of the liquid through the tube.
2. Changing the fixing gap of the venturimeter to the tube.
3. Changing the density of the flowing liquid.
4. Using another liquid substitute to mercury.
5. Changing the cross sectional area of the tube of the venturimeter.

13) The period of a mass m which is hanging in a light string is To when it is set to be in a simple harmonic oscillating motion. When the mass is changed to 2m, the period of the simple harmonic motion is;

1. T_0
2. $2\,T_0$
3. $\sqrt{2}\,T_0$
4. $T_0/2\sqrt{2}$
5. $T_0/2^2$

14) A rectangular wooden object is floating in a liquid which is having a refractive index 'n'. The drowned height of the wooden object is y. What is the height it can be seen when looking from above the wooden object?



1. $\left(x+\frac{y}{n}\right)$
2. $\left(\frac{x-y}{n}\right)$
3. $\left(\frac{2n-y}{n}\right)$
4. $\left(\frac{x+2y}{n+1}\right)$
5. $\left(\frac{xyn}{x+y}\right)$

15) There is a up thrust 'u' acting on a air bubble which is traveling upwards in a acceleration 'a' in soda when a soda bottle has been opened. When soda bottle is dropping downwards under the gravity, the up thrust acting on the air bubble is;

1. 0 2. u 3. ua/g 4. ug/a 5. u(a + g)/a

16) A mass connected to the end of a spring is in a simple harmonic with a frequency of 0.5Hz. If the mass is reduced $1/4^{th}$ of its previous mass, the new frequency of it is;

1. 0.25 Hz 2. 10.0 Hz 3. 2.0 Hz 4. 4.5 Hz 5. 5.0 Hz

17) A mass of 4kg was projected upwards with velocity of 10ms-1 at an angle of 600 from the horizontal direction. What is the kinetic energy gained by the mass at its maximum height of the trajectory?

(1) 15J (2) 25J (3) 50J (4) 60J (5) 100J

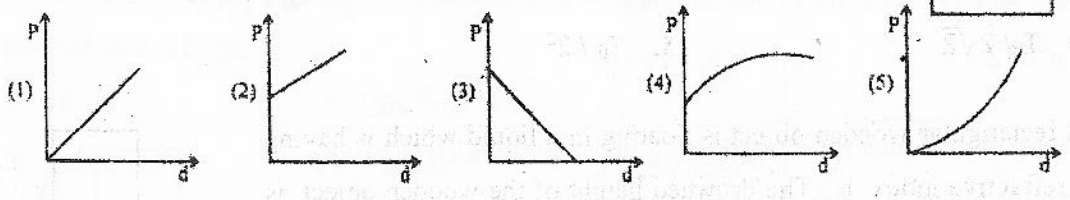
18) A mass of m was lifted to a height 'h' from time 't' by a crane. What is the power of the crane?

(1) $\frac{mgh}{t}$ (2) mght (3) h/t (4) ht (5) $\frac{mg}{ht}$

19) Which pair has the same dimensions?

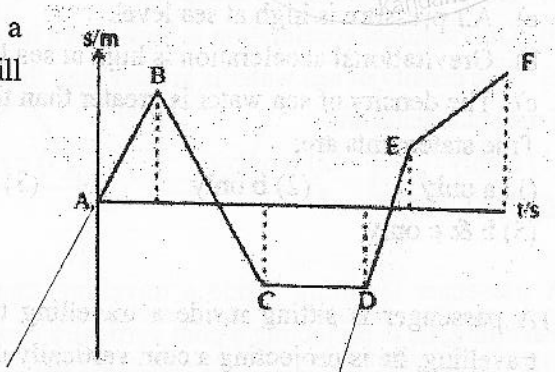
(1) Surface tension and pressure.
(2) Relative density and relative velocity.
(3) Work done and torque
(4) Change of momentum and force
(5) Power and efficiency

20) What is the correct graph which indicates the variance between total pressure (p) at point A and the depth (d) in fluid?

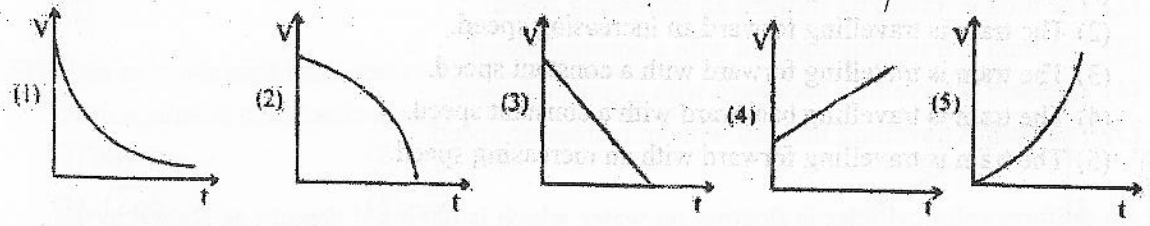


21) Following is a distance time curve of a particle measured along x axis. Particle will be having the maximum velocity at;

(1) A to B
(2) B to C
(3) C to D
(4) D to E
(5) E to F



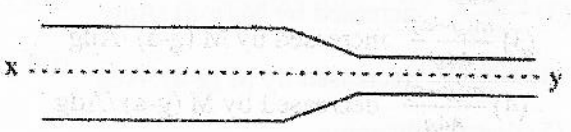
22) What is the velocity – time curve of an object which brings to the rest by a constant resultant force?

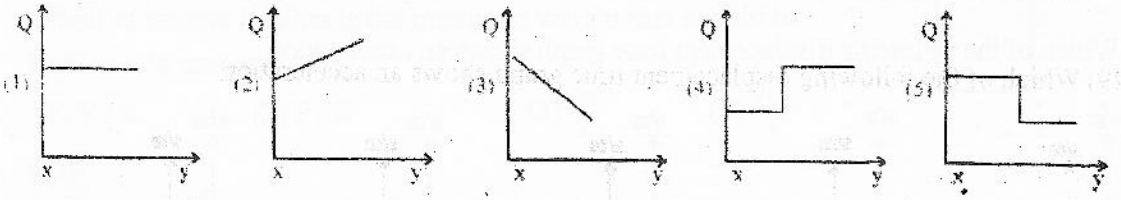


23) The fundamental frequency of a stretched cable is 300 Hx – and tension is T. When the tension is increased from 10% what is the new fundamental frequency?

(1) $\frac{300}{\sqrt{2}}$ (2) $30\sqrt{11}$ (3) $\frac{30}{\sqrt{11}}$ (4) $300\sqrt{11}$ (5) $\frac{\sqrt{11}}{300}$

24) An incompressible horizontal liquid streamline flow is flowing point to point at a rate Q from x to y along xy direction. The rough shape of the variance of Q is;





25) What following statements are true for a dumped oscillation?

A. Periodic time is gradually decreasing
B. Vibrational amplitude is gradually decreasing
C. Vibrational frequency is gradually decreasing

(1) Only A,B are true
(2) Only C,D are true
(3) Only A,B & C are true
(4) Only B,C & D are true
(5) All are true

26) Swimming in sea water is easier than swimming in fresh water because of;

a) Air pressure is high at sea level.
b) Gravitational acceleration is high at sea level.
c) The density of sea water is greater than that of fresh water.

True statements are;

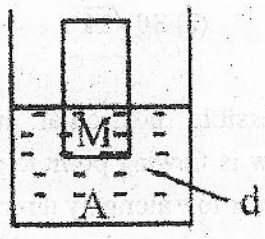
(1) a only (2) b only (3) c only (4) a & b only
(5) b & c only

27) A passenger is sitting inside a travelling train facing to its engine. When the train is travelling, he is projecting a coin vertically upwards. If the coin is dropping at the back of him, what following statement is true for the motion of the train.

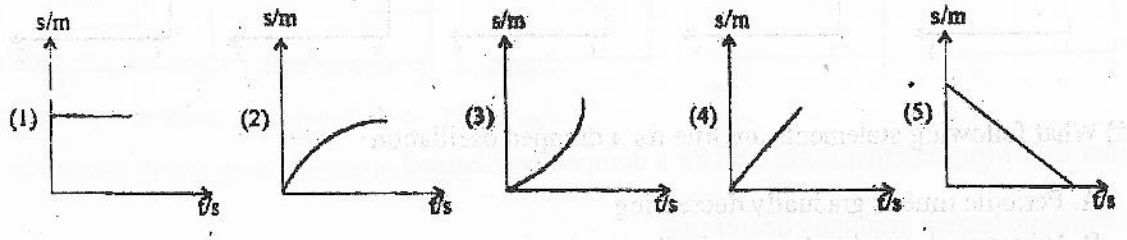
(1) The train is travelling forward with a decreasing speed.
(2) The train is travelling forward an increasing speed.
(3) The train is travelling forward with a constant speed.
(4) The train is travelling backward with a constant speed.
(5) The train is travelling forward with an increasing speed.

28) An uniform solid cylinder is floating on water which is having d density as shown in the figure. The cross sectional area of the cylinder is A & mass of it is m. The height of the cylinder that drowned in the water a constant acceleration a is;

(1) $\frac{ma}{Adg}$ increased by ma/adg
(2) $\frac{ma}{Adg}$ Decreased by ma/Adg
(3) $\frac{m(g-a)}{Adg}$ increased by M (g-a) /Adg
(4) $\frac{m(g-a)}{Adg}$ decreased by M (g-a) /Adg
(5) doesn't changing



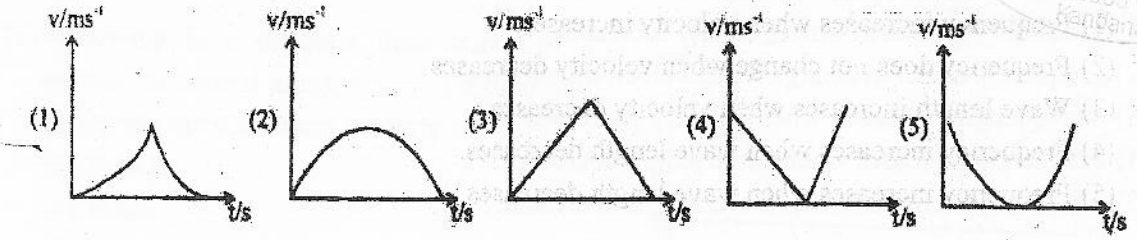
29) Which of the following displacement time graph shows an acceleration



30) Periodic time of a simple pendulum is T. what is the change in length that should be done to make the periodic time 2 T.

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

31) Object starts from rest, accelevrates and retardates to rest. What is the velocity time curve?



32) The mass ratio of two objects A and B is 1:2 Apparent weight of the both objects are equal when fully immersed in water. If the relative density of A is 2 What is the relative density of B

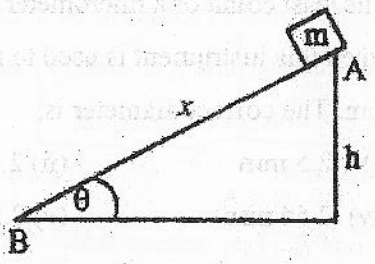
(1) 5/2 (2) 3/2 (3) 4/3 (4) 6/5 (5) 5/3

33) Mass m is released from rest at point A. If there is no friction what is the kinetic energy when it reaches B?

(1) mgh (2) mgn con

(3) $\sqrt{2gh}$ (4) $\frac{m}{\sqrt{2gh}}$

(5) $\frac{mgn}{h}$

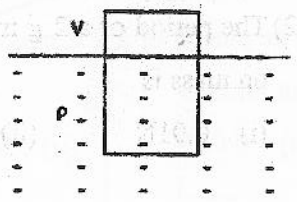


34) Masses m_1, m_2 , m_3 are placed respectively on vertices of a equilateral triangle ABC of side 1. What is the moment of Inertia around the line drawn from A to the mid point of BC.

(1) $\frac{m_1 l^2}{4}$ (2) $\frac{l^2}{4}(m_2 + m_3)$ (3) l^2 $(m_1 + m_2 + m_3)$

(4) $\frac{3l^2}{2}(m_1 + m_2)$ (5) $\frac{l^2}{2}(m_2 + m_3)$

35) Volume of a rectangular wooden block is V. If ¾ of it. floats on a fluid of density P What is the minimum weight that should be kept on it to immerse fully.



(1) V / 4 (2) P / 2 (3) $\frac{Vp}{4}$ (4) $\frac{3Vp}{4}$

(5) $\frac{V}{2p}$

36) What should be the projecting velocity of a ball to reach a height n times as it reaches when projected vertically up with a velocity of u

(1) u $\sqrt{n}$ (2) $\frac{u}{\sqrt{n}}$ (3) $\frac{\sqrt{n}}{u}$ (4) nu (5) nu^2

37) Two objects of masses m and nm moves with equal kinetic energy. What is the ratio between linear momentum of the objects.

(1) $\sqrt{n}$ (2) $\frac{1}{\sqrt{n}}$ (3) nm (4) $\frac{m}{\sqrt{n}}$ (5) $\frac{n}{\sqrt{m}}$

38) In a wave of constant periodic time

(1) Frequency increases when velocity increases.

(2) Frequency does not change when velocity decreases.

(3) Wave length increases when velocity decreases

(4) Frequency increases when wave length decreases.

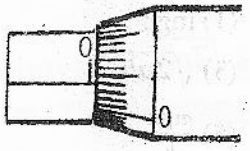
(5) Frequency increases when wave length decreases.

39) The dimension of the strain energy per unit volume stored in a stretched wire is the same as the dimension of

(i) energy (ii) momentum (iii) pressure

(iv) power (v) force

40) The least count of a micrometer screw gauge is 0.01 mm. The diagram shows the zero error when this instrument is used to measure the diameter of a wire the reading obtained is 2.54 mm. The correct diameter is,



(i) 2.5 mm (ii) 2.56 mm (iii) 2.50 mm

(iv) 2.54 mm (v) 2.53 mm

41) The velocity of a swimmer in still water is $3ms^{-1}$. If the river is flowing at $1ms^{-1}$, the time taken for the swimmer to swim a distances of 30 m upstream along the bank is

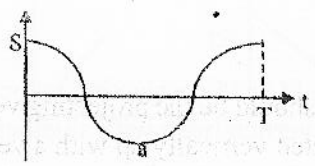
(i) 30 s (ii) 15 s (iii) 10 s

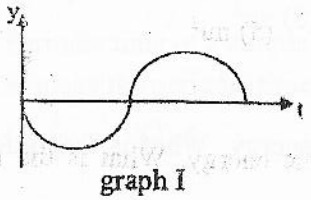
(iv) 5 s (v) swimmer will not be able to swim upstreams

42) The period of a 2 g mass rotating in a horizontal circle radius 2 m is 2s. The force acting on mass is

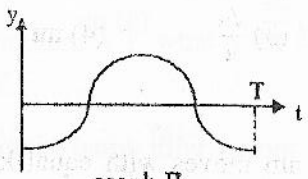
(i) 0.01N (ii) 0.02 N (iii) 0.03 N (iv) 0.04 N (v) 0.05 N

43) The displacement time graph of a simple harmonic motion is shown below. The y axis in the two graph given below indicate.





graph I



graph II

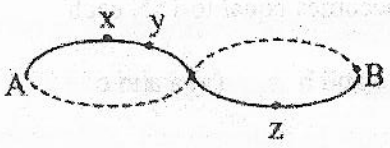
(i) velocity, kinetic energy (ii) acceleration, velocity

(iii) acceleration, potential energy (iv) velocity, force

(v) velocity, potential energy

44) The CD inside a CD player is rotating at 80rev. per minute. Point A is on the circumference of the CD and B is the mid point which is between A and the centre of the CD. If the ratio at A and B aer a_1 and a_2 then $a_1 : a_2$

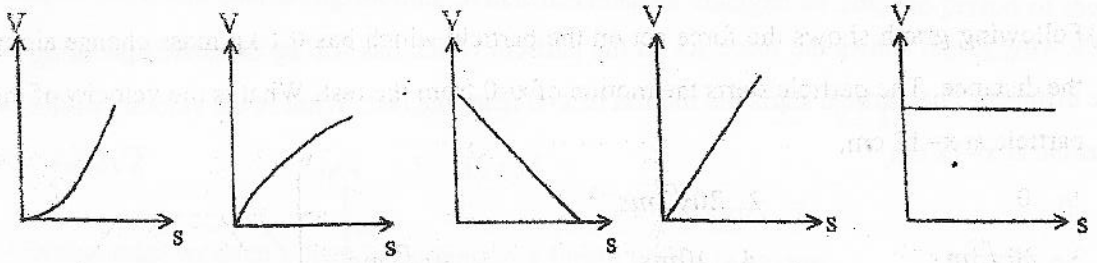
(i) 1 : 1 (ii) 1 : 2 (iii) 2 : 1 (iv) 1 : 4 (v) 4 : 1

45) 

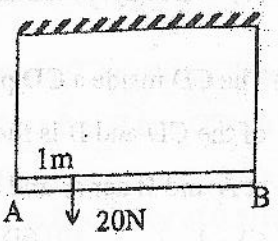
A stationary wave along a stretched wire is shown. The points showing the same amplitude, same phase and same frequency

	same amplitude	same phase	same frequency
(i)	x and y	x and z	y and z
(ii)	x and z	y and z	x and z
(iii)	x y and z	x and y	x y and z
(iv)	x and z	x and y	x y and z
(v)	x and z	x and y	no equal point

46) The variation of the velocity of an object with time is given by V = Kt where K is a constant and K > 0 The graph showing the variation of charge in velocity with displacement is



47) A rod AB lenhth 5m is kept horizontal by two vertical strings as shown in the diagram. A weight 20 N is hunged from a point 1m from A. Then two tensions of the strings becomes equal to 25N each.



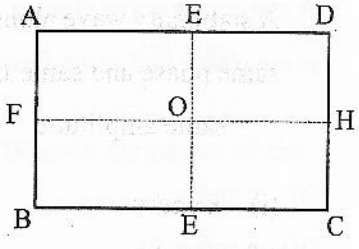
a) the mass of the rod is 3 kg

b) the centre of gravity of the rod is closer to A

c) then the weight 20N is remove the two tension becomes equal to 15N each

(i) a (ii) b (iii) c (iv) a and b (v) a and c

48) The following ABCD rectangular blade of try square's minimum moment of inertia can be seen around which line? $(AB = \frac{BC}{2})$



1. BC 2. AB 3. HF

4. EG 5. Moment of inertia is equal around all lines.

49) A uniform metal bar which has m mass and l length is alterated from one edge. When that bar lifts from its free edge with the angle of θ along the horizontal plane the increase of potential energy of the bar will be.

1. $\frac{1}{2}mgl\cos\theta$ 2. $\frac{1}{2}mgl\sin\theta$ 3. $mgl\cos\theta$ 4. $mgl\sin\theta$ 5. $\frac{1}{2}$mg

50) Following graph shows the force act on the particle which has 0.1 kg mass change along the distance. The particle starts the motion of x=0 from the rest. What is the velocity of the particle at x=12 cm,

1. 0 2. $20\sqrt{2}ms^{-1}$

3. $20\sqrt{3}ms^{-1}$ 4. $40ms^{-1}$ 5. $40\sqrt{3}ms^{-1}$