RB IIT Academy SR MAINSTEST 3

1) A salt 'X' on heating liberate one coloured gas and another coloureless gas. Both the gases are paramagnetic.The salt 'X'may be

A) $NaNO_3$ B) KNO_3 C) Na_2CO_3 D) $LiNO_3$

Correct Answer: A
Solution: $4LiNO_3 \rightarrow 2Li_2O + 4NO_2 + O_2$

Nitrogen dioxide NO_2, which is a reddish-brown gas with a pungent odour. Paramagnetism is due to the presence of at least one unpaired electron in the molecule. Total numbers of electrons in their molecules are odd i.e $NO_2 - 23$

The only monoxide obtained by direct combination of the metal with oxygen is that of lithium , Li_2O. Monic oxides are ionic and colurless compunds which contain the oxide ionO^{2-}

O_2 is paramagnetic and colourless

2) In the castner-kellner process, the gases that are liberated in the middle and outer compartments are

A) $H_2 \& Cl_2$ B) $Cl_2 \& H_2$ C) $Cl_2 \& O_2$ D) $O_2 \& Cl_2$

Correct Answer: A
Solution: In Castner- Kellner cell, aqueous sodium chloride is hydrolyzed. The sodium amalgam formed is decomposed with water to form sodium hydroxide. The by products obtained in the process are H_2 and Cl_2 respectively.

Middle compartment =$2H_2O + 2e^- \rightarrow H_2 + 2OH^-$

Outer compartment = $2Cl^- - 2e^- \rightarrow Cl_2$

3) The solubilites of carbonates decrease down the magnesium group. This is due to a decrease in

A) Hydration energies of cations B) inter-ionic attraction C) entropy of solution formation

D) Lattice energies of solids

Correct Answer: A
Solution: Solubility is directly proportional to hydration energy

Hydration enrgy is more more solube, if it is less then it is less soluble.

If lattice energy is more than hydration energy then they are insoluble.

Hydration energy is directly proportional to charge and inversly proportional to size.

Size of magensium group carbonnates from top to botton increases, where as charge remains same.

Hnece from top to bottom hydration energy decrease.

Hence solubility decreases.

4) A certain compound (X) gives a brick red flame test. When KI solution is added to a solution of (X) in presence of acetic acid, Iodine is liberated which can be estimated by titration with Hypo. When a paste of (X) is heated with ethyl alcohol or acetone, a sweet smelling liquid is obtained, which is used as an anaesthetic. Identify (X)

A) $CaCO_3$ B) $Ca(OH)_2$ C) $Ba(OH)_2$ D) $CaOCl_2$

Correct Answer: D
Solution: Ca gives bricked flame test

$CaOCl_2$ when reacts with KI it liberates I_2

$CaOCl_2 + C_2H_5OH \ or \ CH_3\overset{O}{\overset{||}{C}}CH_3 \xrightarrow{\Delta} CHCl_3$

5) The reaction of ammonium chloride with BCl_3 at 140^0C followed $NaBH_4$ gives product X.Which of the following statements is/are true for X is

(i) X is not isoelectronic with benzene

(ii) X undergoes addition reactionwith HCl

(iii) Electrophilic substitution rection on X is much faster than that of benzene.

(iv) X undergoes polymerization at 90^0C.

A) (i) and (ii) B) (ii) only C) (ii) and (iii) D) (i) and (iv)

Correct Answer: B
Solution: X is borazine.it is iso electronic with benzene.it reacts with hydrogen chloride to give an addition product.$B_3N_3H_6 + 3HCl \rightarrow B_3N_3H_9Cl_3$

6) A mixture of boron trichloride and hydrogen is subjected to silent electric discharge to form A and HCl.

A is mixed with NH_3 and heated to $200\,^0C$ to form B. The formula of B is

A) B_2H_6 B) B_2O_3 C) H_3BO_3 D) $B_3N_3H_6$

Correct Answer: D
Solution: $2BCl_3 + 6H_2 \rightarrow B_2H_6 + 6HCl$

$B_2H_6 + NH_3 \overset{110^0C}{\rightarrow} B_2H_62NH_3 \overset{200^0C}{\rightarrow} B_3N_3H_6 + H_2$

7) Which of the following statements is not correct about potash alum?

A) Its empirical formula is $KAl(SO_4)_2.12H_2O$ B) Its aqeous solutions is basic in nature

C) It is used in dyeing industries

D) Its aqueous solutions is acidic in nature

Correct Answer: B
Solution: Emprical formula of Potash alum =$K_2SO_4,\ Al_2(SO_4)_324\,H_2O$ is true.

Aqueous solution of Potash alum is acidic in nature because it is a double salt of strong acid $H_2SO_4)$ and weak base $Al(OH)_3$

Potash alum is used for purification of impure water, stops bleeding, as mordant for dyeing industry, leather tanning, fireproof textiles, and baking powder.

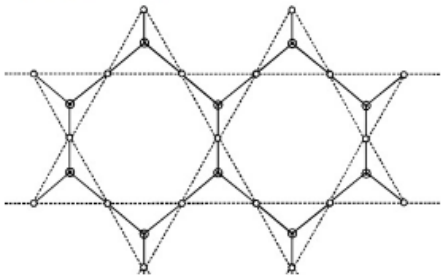
Hence wrong option is it is basic in nature

8) Name the structure of silicate in which three oxygen atoms of $[SiO_4]^{4-}$ are shared:

A) Pyrosilicate B) Sheet silicate C) Linear chain silicate D) Three dimensional sheet silicate

Correct Answer: B

Solution:



Two dimensioanl sheet silicates: In such silicates, three oxygen atoms of each tetrahedral are shared with adjacent SiO_4^{4-} tetrahedral, such sharing forms two dimensional sheet strtucre with general formula $(Si_2O_5)_n^{2n-}$

Ex. Talc $Mg(Si_2O_5)_2Mg(OH)_2, Mg(OH)_2$

9) Which is incorrect statement

A) Sn^{2+} and Fe^{3+} cannot co exist in same solution

B) The sum of oxidation states of carbon in carbon sub oxide is +4 C) PbI_4 does not exist

D) Hydrocarbons are good reducing agents but not silanes

Correct Answer: D

Solution: Sn^{2+} and Fe^{3+} cannot co exist in same solution because redox reaction will occur.

$Sn^{2+} + 2Fe^{3+} \rightarrow Sn^{4+} + 2Fe^{2+}$

Structure of carbon suboxide.

$O = C = C = C = O$

$-2 + 2 + 0 + 2 - 2$

Hence the central carbon has 'O' oxidation number and other 2 carbon atoms has +2 oxidation number.

Sum of oxidation states of carbon $= +2 + 0 + 2 = 4$

Pb^{4+} is less stable than Pb^{2+} so it is strong oxidising agent whereas I^- is a strong reducing agent.

In Si-H bond,hydrogen with draws electrons and Si-Si bond is weakened C-H bond Is almost non polar

Hydrogen cannot-withdraw electrons C-C bond is strong so silanes are good reducing agents and not hydrocarbon

10) The polymeric silicate of the following in which three oxygens of each SiO_4^{4-} unit cell are shared by other SiO_4^{4-} unit cells is

A) chain silicates B) frame work silicates C) sheet silicates D) all the above three

Correct Answer: B

Solution: In chain silicate only two oxygen atoms arre shown.

In frame silicate 4 oxygen atoms are shown.

In sheet silicates 3 oxygen atoms are shown.

11) $\begin{pmatrix} 2 & 3 & 5 \\ 4 & 1 & 2 \\ 1 & 2 & 1 \end{pmatrix} = P + Q$ where P is a symmetric and Q is a skew-symmetric then $Q =$

A) $\begin{pmatrix} 0 & \frac{-1}{2} & 2 \\ \frac{1}{2} & 0 & 0 \\ -2 & 0 & 0 \end{pmatrix}$ B) $\begin{pmatrix} 0 & \frac{1}{2} & 1 \\ \frac{-1}{2} & 0 & 0 \\ -1 & 0 & 0 \end{pmatrix}$ C) $\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 1 \\ 0 & -1 & 0 \end{pmatrix}$ D) $\begin{pmatrix} 0 & 2 & 3 \\ -2 & 0 & 4 \\ -3 & -4 & 0 \end{pmatrix}$

Correct Answer: A

Solution: Any matrix A can be written as sum of symmetric and skew symmetric matrix.

A= $P + Q$ where P is a symmetric and Q is a skew-symmetric then

If $A = P + Q = \frac{A+A^T}{2} + \frac{A-A^T}{2}$

$Q = \frac{A-A^T}{2}$

$Q = \frac{1}{2}\left(\begin{pmatrix} 2 & 3 & 5 \\ 4 & 1 & 2 \\ 1 & 2 & 1 \end{pmatrix} - \begin{pmatrix} 2 & 4 & 1 \\ 3 & 1 & 2 \\ 5 & 2 & 1 \end{pmatrix}\right) = \begin{pmatrix} 0 & \frac{-1}{2} & 2 \\ \frac{1}{2} & 0 & 0 \\ -2 & 0 & 0 \end{pmatrix}$

12) If A, B are two matrices such that $AB = B, BA = A$ then $A^2 + B^2 =$

A) $A + B$ B) $A - B$ C) B D) $2A + B$

Correct Answer: A

Solution: $B^2 = B.B = AB.AB = A(BA)B = A(A)B = A(AB) = AB = B$

$A^2 = A.A = BA.BA = B(AB)A = B(B)A = B(BA) = BA = A$

$A^2 + B^2 = A + B$

13) A and B are two given matrices such that the order of A is 3×4 , if A'B and BA' are both defined then

A) Order of B' is 3 × 4 B) Order of B'A is 4 × 4 C) Order of B'A is 3 × 3 D) B'A is undefined

Correct Answer: B

Solution: Order of $A = 3 \times 4 \Rightarrow$ Order of $A' = 4 \times 3$. As A'B is defined $\Rightarrow$ Let order of $B = 3 \times n$.

Now BA' $= (3 \times n) \times (4 \times 3) \Rightarrow n = 4$

$\Rightarrow$ Order of B is 3 × 4 $\Rightarrow$ Order of $B'= 4 × 3

Hence order of B' A = (4×3) × (3 × 4) = 4 × 4

14) The value of a third order determinant is 11, then the value of the square of the determinant formed by the cofactors will be

A) 11 B) 121 C) 1331 D) 14641

Correct Answer: D

Solution: Matrix formed by cofactors of elements of a matrix = Adjoint of a matrix

$Det(adjA) = |A|^{n-1}$

Since order of a matrix is 3 hence $det(adjA) = |A|^2 = 121$

Square of determinant of a matrix $= (121)^2 = 14641$

15) The determinant $\begin{vmatrix} xp+y & x & y \\ yp+z & y & z \\ 0 & xp+y & yp+z \end{vmatrix} = 0$ then x, y and z are in

A) x, y, z are in A.P B) x, y, z are in G.P. C) x, y, z are in H.P. D) xy,yz, zx are in A.P.

Correct Answer: B

Solution: $\begin{vmatrix} xp+y & x & y \\ yp+z & y & z \\ 0 & xp+y & yp+z \end{vmatrix} = 0$

$C_1 \to C_1 - (pC_2 + C_3)$

$\begin{vmatrix} 0 & x & y \\ 0 & y & z \\ -(xp^2+yp+yp+z) & xp+y & yp+z \end{vmatrix} = 0$

$\Rightarrow -\left(xp^2+2yp+z\right)\left(xz-y^2\right) = 0$

$xp^2+2yp+z = 0$ or $y^2 = xz$

$\Rightarrow x, y, z$ are in G.P

16) $(x_1-x_2)^2+(y_1-y_2)^2 = a^2, (x_2-x_3)^2+(y_2-y_3)^2 = b^2$ and $(x_3-x_1)^2+(y_3-y_1)^2 = c^2$ then

$4\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}^2 =$

A) $abc(a+b+c)$ B) $(a+b+c)^4$ C) $(a+b+c)(a+b-c)(b+c-a)(c+a-b)$ D) $(a+b+c)(a^2+b^2+c^2)$

Correct Answer: C

Solution: Area of triangle whose vertices are $(x_1, y_1), (x_2, y_2), (x_3, y_3)$ is $\frac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$

$4\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}^2 = 16A^2$

$(x_1-x_2)^2+(y_1-y_2)^2 = a^2, (x_2-x_3)^2+(y_2-y_3)^2 = b^2$ and $(x_3-x_1)^2+(y_3-y_1)^2 = c^2 \Rightarrow a, b, c$ are lengths of sides of triangle.

Area of triangle

$= \sqrt{s(s-a)(s-b)(s-c)} \Rightarrow A^2 = \frac{(a+b+c)}{2}(\frac{a+b+c}{2}-a)(\frac{a+b+c}{2}-b)(\frac{a+b+c}{2}-c) = \frac{(a+b+c)}{2}(\frac{b+c-a}{2})(\frac{a-b+c}{2})(\frac{a+b-c}{2})$

$= \frac{1}{16}(a+b+c)(b+c-a)(c+a-b)(a+b-c)$

$16A^2 = (a+b+c)(b+c-a)(c+a-b)(a+b-c)$

17) If $\begin{vmatrix} a & b & 1 \\ b & c & 1 \\ c & a & 1 \end{vmatrix} = 2010$ then $\begin{vmatrix} c-a & c-b & ab \\ a-b & a-c & bc \\ b-c & b-a & ca \end{vmatrix} - \begin{vmatrix} c-a & c-b & c^2 \\ a-b & a-c & a^2 \\ b-c & b-a & b^2 \end{vmatrix} = p$ then number rof positive integral diviors of p.

A) 36 B) 49 C) 64 D) 81

Correct Answer: D

Solution:

$$P = \begin{vmatrix} c-a & c-b & ab-c^2 \\ a-b & a-c & bc-a^2 \\ b-c & b-a & ca-b^2 \end{vmatrix} = \begin{vmatrix} a & b & 1 \\ b & c & 1 \\ c & a & 1 \end{vmatrix}^2 = (2010)^2 = (2 \times 3 \times 5 \times 67)^2 = 2^2 3^2 5^2 (67)^2$$

No of divisors of p = $(2+1)(2+1)(2+1)(2+1) = 81$

18) The number of 3 x 3 non-singular matrices with four entries as 1 and all other entries 0, is

A) 6 B) at least 7 C) less then 4 D) 5

Correct Answer: B

Solution: There are exactly 36 non -singular matrices .First consider the number of non-singular matrices with 3 entries being 1 and the rest 0.

They must have one 1 in each of the rows and columns , so th only possibilities are

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}, \begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}, \begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix},$$

$$\begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}, \begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$$

For each of these 6 possibilities we can make any of the remaining six 0's into a 1.These are distinguishble.So there are a total of $6 \times 6 = 36$ non singular 3×3 matrices with four entries being 1 and th remaining 5 entries 0.

19) If the system of equations$x - cy - bz = 0, cx - y - az = 0, bx - ay - z = 0$ has a non-zero solution then $a^2 + b^2 + c^2 - 2abc =$

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

Correct Answer: A

Solution: If the system of equations$x - cy - bz = 0, cx - y - az = 0, bx - ay - z = 0$ has a non-zero solution then

$$\begin{vmatrix} 1 & -c & -b \\ c & -1 & -a \\ b & -a & -1 \end{vmatrix} = 0$$

Evaluating determinant we get

$1 - a^2 + c(-c + ab) - b(-ca + b) = 0$

$\Rightarrow a^2 + b^2 + c^2 - 2abc = 1$

20) $A=\begin{bmatrix}1 & 0 & 0\\ 0 & 1 & 1\\ 0 & -2 & 4\end{bmatrix}, 6A^{-1}=A^2+cA+dI, then\ (c,d)$

A) $(-6,11)$ B) $(-11,6)$ C) $(11,6)$ D) $(6,11)$

Correct Answer: A

Solution: Every matrix satisfy satisfy its charachterstic equation $|A-\lambda I|=0$

$$\begin{vmatrix}1-\lambda & 0 & 0\\ 0 & 1-\lambda & 1\\ 0 & -2 & 4-\lambda\end{vmatrix}=0$$

$\Rightarrow (1-\lambda)\left((1-\lambda)(4-\lambda)+2\right)=0 \Rightarrow (1-\lambda)(\lambda^2-5\lambda+6)=0$

$\Rightarrow \lambda^3-6\lambda^2+11\lambda-6=0$

By caley -Hamilton theorem matrix satisfy its charachterstic equation.

i.e$A^3-6A^2+11A-6=0$

$\Rightarrow A^2-6A+11I-6A^{-1}=0 \Rightarrow 6A^{-1}=A^2-6A+11I \Rightarrow (c,d)=(-6,11)$

21) A ball of mass 0.2 kg is thrown vertically upwards by applying a force by hand. If the hand moves 0.2m while applying the force and the ball goes upto 2m height further, find the magnitude of the force. $(g=10ms^{-2})$

A) 20N B) 22N C) 4N D) 16N

Correct Answer: B

Solution: Mass m=0.2kg

Total height, h= 0.2+2 = 2.2m

Work done =Difference in potential energy.

F.S = mgh where S is the distance for ehich the force is applied by hand,

S = 0.2m

$F=\frac{mgh}{S}=\frac{0.2\times10\times2.2}{0.2}$

F = 22N

22) A ball of mass 10 gm dropped from a height of 5m hits the floor and rebounds to a height of 1.25m. If the ball is in contact with the ground for 0.1s, the force exerted by the ground on the ball is $(g=10\,m/s^2)$

A) 0.5 N B) 1.5 N C) 0.15N D) 2.5N

Correct Answer: B

Solution: Mass of theball = 10gm = 0.01Kg.

Height from which the ball is dropped, $h_1=5m$

The height to which the ball rebounds, $h_2=1.25m$

Time of contact of the ball with floor, $\Delta t=0.1sec$

Let v_1 be the velocity of the ball when dropped before striking the floor,

v_2 be the velocity of ball upwards after striking the floor during rebounding

Ball is dropped, initial velocity = 0

$v_1^2 = 0 + 2gh_1$

$v_1 =$ velocity just before contact

$= \sqrt{2gh_1} = \sqrt{2 \times 10 \times 5} = 10m/sec$

Let velocity of the ball after striking the floor v_2

Equation of motion after striking,

It reachs height h_2

$0 = v_2^2 - 2gh_2 \Rightarrow v_2 = \sqrt{2gh_2} = \sqrt{1.25 \times 10} = 5m/s$

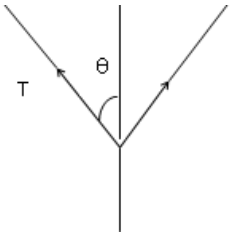
$F = \frac{dp}{dt} = \frac{m(v_2 - v_1)}{t}$ where $v = \sqrt{2gh_2}, u = \sqrt{2gh_1} = \frac{0.01 \times (5 - (-10))}{0.1} = 1.5N$

23) Two persons are holding a rope of negligible weight tightly at its ends so that it is horizontal. A 15 kg weAight is attached to rope at the midpoint which now no more remains horizontal. The minimum tension required to completely straighten the rope is

A) 150N B) 75N C) 50N D) Infinitely large

Correct Answer: D

Solution:



For string to be equilibrium $2T\cos\theta = mg$

To make rope straight, $\theta = 90^0$

$\Rightarrow$ tension is infinte

24) Three forces $20\sqrt{2}\,N$, $20\sqrt{2}\,N$ and 40N are acting along x, y and $z-axes$ respectively on a $5\sqrt{2}\,kg$ mass at rest at the origin. The magnitude of its displacement after 5s is, ℓ meters then $\ell =$

A) 50 B) 25 C) 60 D) 100

Correct Answer: D

Solution: Let i, j, k be unit vectors along x, y and z -axis respectively.

Let $\bar{F} = F_1 i + F_2 j + F_3 k$

Resultant force acting on the mass = $\bar{F} = 20\sqrt{2}i + 20\sqrt{2}j + 40k$

$|\bar{F}| = \sqrt{F_1^2 + F_2^2 + F_3^2}$ since they are mutually perpendicular

$F = \sqrt{(20\sqrt{2})^2 + (20\sqrt{2})^2 + 40^2}$

$= \sqrt{800 + 800 + 1600} = \sqrt{3200} = 40\sqrt{2}$

$a = \frac{F}{m} = \frac{40\sqrt{2}}{5\sqrt{2}} = 8m/s^2$

Displacement after 5 seconds S = $\frac{1}{2} \times 8 \times 5^2 = 100m$

25) A body of mass 5kg starts from the origin with an initial velocity $\vec{u} = 30\hat{i} + 40\hat{j} ms^{-1}$ .If a constant force $\vec{F} = -\left(\hat{i} + 5\hat{j}\right) N$ acts on the body, the time in which the $y-$ component of the velocity becomes zero is ℓ seconds then $\ell =$

A) 5 B) 20 C) 40 D) 80

Correct Answer: C
Solution: Mass of the body = 5kg

Initial velocity $\bar{u} = 30i + 40j$

$\Rightarrow u_x m = 30m/s, u_y = 40m/s$

Force applied F =-(i + 5j) = F_x i + F_yj N

$\Rightarrow F_y = -5$

$\bar{F} = M\bar{a}$

Acceleration in vertical direction $a_y = \frac{F_y}{m} = -\frac{5}{5} = -1m/s^2$

Velocity in vertical direction $v_y = u_y + a_y t$

velocity $v_y = 0 = u_y + a_y t$

$u_y = -a_y t \Rightarrow 40 = -(-1)t$

$\Rightarrow t = 40sec$

26) A horizontal jet of water coming out of a pipe of the area of cross-section $20cm^2$ hits a vertical wall with a velocity of $10ms^{-1}$ and rebounds with the same speed. The force exerted by water on the wall is k newtons then $k =$

A) 0.2 B) 10 C) 400 D) 200

Correct Answer: C
Solution: $F = \frac{dp}{dt}$ $F = 2\rho AV^2$

27) The displacement of a body moving along a straight line is given by $S = bt^n$,where 'b' is a constant and 't' is time. For what value of 'n' the body moves under the action of constant force?

A) $\frac{3}{2}$ B) 1 C) 2 D) $\frac{1}{2}$

Correct Answer: C
Solution: $S = b\,t^n$

The acceleration of the body must be constant when the body moves under action of constant force

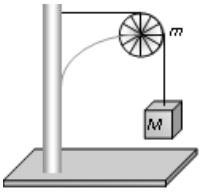
Velocity $= \frac{ds}{dt} = n\,bt^{(n-1)}$

Acceleration $= \frac{d^2s}{dt^2} = n(n-1)\,b\,t^{(n-2)}$

Aceleration is independent of t $\Rightarrow$ power of t must be equal to zero

$n - 2 = 0 \Rightarrow n = 2$

28) A string of negligible mass going over a clamped pulley of mass m supports a block of mass M as shown in the figure. The force on the pulley by the clamp is given by



A) $\sqrt{2}Mg$ B) $\sqrt{2}mg$ C) $\sqrt{(mg)^2+(M+m)g^2}$ D) $\sqrt{((M+m)g)^2+(Mg)^2}$

Correct Answer: D

Solution: According to the problem the mass of the pulley is m and a mass of M is hanged from it.

Now let the tension in the wire is T and the downward force of the pulley is Mg and of the mass M is Mg

Now we can say that the tension T is equal and opposite of mg

Now the total force in downwards is $= (m+M)g$

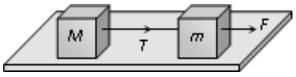
Therefore the resultant force or the force on the pulley given by clamp is

$F_{pc} = \sqrt{T^2 + [(M+m)g]^2}$

$F_{pc} = \sqrt{(Mg)^2 + [(M+m)g]^2}$

$F_{pc} = \sqrt{(Mg)^2 + ((M+m)g)^2}$

29) Two masses M and m are connected by a weightless string. They are pulled by a force F on a frictionless horizontal surface. The tension in the string will be

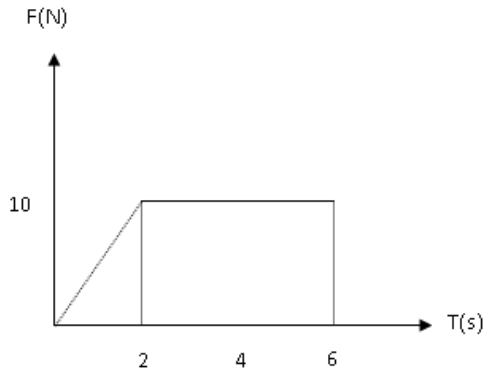


A) $\frac{FM}{m+M}$ B) $\frac{F}{M+m}$ C) $\frac{FM}{m}$ D) $\frac{Fm}{M+m}$

Correct Answer: A

Solution: $T = M \times a\ M \times \left(\frac{F}{m+M}\right)$

30)
A body of mass 3kg is acted on by a force which varies as shown in the graph below. The momentum acquired is given by



A) Zero B) 5 N-s C) 30N-s D) 50 N-s

Correct Answer: D
Solution: Momentum acquired = Area of force-time graph

= Area of triangle + Area of rectangle

$= \frac{1}{2} \times (2) \times (10) + 4 \times 10 = 10 + 40 = 50N - s$