NTA JEE Mains Jan 2026

Application No	
Candidate Name	
Roll No.	
Test Date	21/01/2026
Test Time	9:00 AM - 12:00 PM
Subject	B. Tech

Section : **Mathematics Section A**

Q.1 If the coefficient of x in the expansion of $(ax^2+bx+c)(1-2x)^{26}$ is -56 and the coefficients of x^2 and x^3 are both zero, then $a+b+c$ is equal to :

Options

1. 1300
2. 1500
3. 1403
4. 1483

Question Type : **MCQ**
Question ID : **8606541132**
Option 1 ID : **8606543850**
Option 2 ID : **8606543853**
Option 3 ID : **8606543851**
Option 4 ID : **8606543852**
Status : **Not Answered**
Chosen Option : **--**

Q.2 If $x^2+x+1=0$, then the value of $\left(x+\frac{1}{x}\right)^4+\left(x^2+\frac{1}{x^2}\right)^4+\left(x^3+\frac{1}{x^3}\right)^4+\ldots+\left(x^{25}+\frac{1}{x^{25}}\right)^4$ is :

Options

1. 128
2. 175
3. 145
4. 162

Question Type : **MCQ**
Question ID : **8606541129**
Option 1 ID : **8606543838**
Option 2 ID : **8606543841**
Option 3 ID : **8606543839**
Option 4 ID : **8606543840**
Status : **Answered**
Chosen Option : **3**

Q.3 Let $f : \mathbf{R} \to (0, \infty)$ be a twice differentiable function such that $f(3) = 18, f'(3) = 0$ and $f''(3) = 4$. Then $\lim\limits_{x \to 1} \left(\log_e \left(\frac{f(2+x)}{f(3)} \right)^{\frac{18}{(x-1)^2}} \right)$ is equal to :

Options

1. 2
2. 1
3. 18
4. 9

Question Type : **MCQ**
Question ID : **8606541145**
Option 1 ID : **8606543903**
Option 2 ID : **8606543902**
Option 3 ID : **8606543905**
Option 4 ID : **8606543904**
Status : **Answered**
Chosen Option : **1**

Q.4 Let O be the vertex of the parabola $x^2 = 4y$ and Q be any point on it. Let the locus of the point P, which divides the line segment OQ internally in the ratio 2 : 3 be the conic C. Then the equation of the chord of C, which is bisected at the point (1, 2), is :

Options

1. $5x - 4y + 3 = 0$
2. $x - 2y + 3 = 0$
3. $5x - y - 3 = 0$
4. $4x - 5y + 6 = 0$

Question Type : **MCQ**
Question ID : **8606541137**
Option 1 ID : **8606543872**
Option 2 ID : **8606543873**
Option 3 ID : **8606543871**
Option 4 ID : **8606543870**
Status : **Not Answered**
Chosen Option : **--**

Q.5

The value of $\int_{-\pi/6}^{\pi/6}\left(\frac{\pi+4x^{11}}{1-\sin\left(|x|+\pi/6\right)}\right)dx$ is equal to :

Options

1. 8π
2. 2π
3. 6π
4. 4π

Question Type : **MCQ**
Question ID : **8606541142**
Option 1 ID : **8606543893**
Option 2 ID : **8606543890**
Option 3 ID : **8606543892**
Option 4 ID : **8606543891**
Status : **Not Answered**
Chosen Option : **--**

Q.6 The number of relations, defined on the set {a, b, c, d}, which are both reflexive and symmetric, is equal to :

Options

1. 1024
2. 64
3. 16
4. 256

Question Type : **MCQ**
Question ID : **8606541126**
Option 1 ID : **8606543829**
Option 2 ID : **8606543827**
Option 3 ID : **8606543826**
Option 4 ID : **8606543828**
Status : **Answered**
Chosen Option : **2**

Q.7 Let $a_1, a_2, a_3, \ldots$ be a G.P. of increasing positive terms such that $a_2 \cdot a_3 \cdot a_4 = 64$ and $a_1 + a_3 + a_5 = \frac{813}{7}$.

Then $a_3 + a_5 + a_7$ is equal to :

Options

1. 3256
2. 3248
3. 3244
4. 3252

Question Type : **MCQ**
Question ID : **8606541130**
Option 1 ID : **8606543845**
Option 2 ID : **8606543843**
Option 3 ID : **8606543842**
Option 4 ID : **8606543844**
Status : **Not Answered**
Chosen Option : **--**

Q.8 The number of strictly increasing functions f from the set $\{1, 2, 3, 4, 5, 6\}$ to the set $\{1, 2, 3, \ldots, 9\}$ such that $f(i) \neq i$ for $1 \leq i \leq 6$, is equal to :

Options

1. 22
2. 27
3. 21
4. 28

Question Type : **MCQ**
Question ID : **8606541131**
Option 1 ID : **8606543847**
Option 2 ID : **8606543848**
Option 3 ID : **8606543846**
Option 4 ID : **8606543849**
Status : **Not Answered**
Chosen Option : **--**

Q.9 Let $\vec{a} = -\hat{i} + 2\hat{j} + 2\hat{k}$, $\vec{b} = 8\hat{i} + 7\hat{j} - 3\hat{k}$ and $\vec{c}$ be a vector such that $\vec{a} \times \vec{c} = \vec{b}$.

If $\vec{c} \cdot \left(\hat{i} + \hat{j} + \hat{k}\right) = 4$, then $|\vec{a} + \vec{c}|^2$ is equal to :

Options

1. 33
2. 35
3. 27
4. 30

Question Type : **MCQ**
Question ID : **8606541141**
Option 1 ID : **8606543888**
Option 2 ID : **8606543889**
Option 3 ID : **8606543886**
Option 4 ID : **8606543887**
Status : **Answered**
Chosen Option : **3**

Q.10 Let PQ and MN be two straight lines touching the circle $x^2 + y^2 - 4x - 6y - 3 = 0$ at the points A and B respectively. Let O be the centre of the circle and $\angle AOB = \pi/3$. Then the locus of the point of intersection of the lines PQ and MN is :

Options

1. $x^2 + y^2 - 18x - 12y - 25 = 0$
2. $3(x^2 + y^2) - 18x - 12y + 25 = 0$
3. $3(x^2 + y^2) - 12x - 18y - 25 = 0$
4. $x^2 + y^2 - 12x - 18y - 25 = 0$

Question Type : **MCQ**
Question ID : **8606541136**
Option 1 ID : **8606543869**
Option 2 ID : **8606543868**
Option 3 ID : **8606543867**
Option 4 ID : **8606543866**
Status : **Not Answered**
Chosen Option : **--**

Q.11 The area of the region, inside the ellipse $x^2+4y^2=4$ and outside the region bounded by the curves $y=|x|-1$ and $y=1-|x|$, is :

Options

1. $2\pi-1$
2. $3(\pi-1)$
3. $2(\pi-1)$
4. $2\pi-\frac{1}{2}$

Question Type : **MCQ**
Question ID : **8606541143**
Option 1 ID : **8606543894**
Option 2 ID : **8606543897**
Option 3 ID : **8606543895**
Option 4 ID : **8606543896**
Status : **Answered**
Chosen Option : **3**

Q.12 Let the foci of a hyperbola coincide with the foci of the ellipse $\frac{x^2}{36}+\frac{y^2}{16}=1$. If the eccentricity of the hyperbola is 5, then the length of its latus rectum is :

Options

1. $24\sqrt{5}$
2. 12
3. 16
4. $\frac{96}{\sqrt{5}}$

Question Type : **MCQ**
Question ID : **8606541134**
Option 1 ID : **8606543860**
Option 2 ID : **8606543858**
Option 3 ID : **8606543859**
Option 4 ID : **8606543861**
Status : **Answered**
Chosen Option : **4**

Q.13 The sum of all the roots of the equation $(x-1)^2-5|x-1|+6=0$, is :

Options

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

Question Type : **MCQ**
Question ID : **8606541128**
Option 1 ID : **8606543836**
Option 2 ID : **8606543835**
Option 3 ID : **8606543834**
Option 4 ID : **8606543837**
Status : **Answered**
Chosen Option : **3**

Q.14 Let (α, β, γ) be the co-ordinates of the foot of the perpendicular drawn from the point (5, 4, 2) on the line $\vec{r}=\left(-\hat{i}+3\hat{j}+\hat{k}\right)+\lambda\left(2\hat{i}+3\hat{j}-\hat{k}\right)$.

Then the length of the projection of the vector $\alpha\hat{i}+\beta\hat{j}+\gamma\hat{k}$ on the vector $6\hat{i}+2\hat{j}+3\hat{k}$ is :

Options

1. 3
2. $\frac{15}{7}$
3. $\frac{18}{7}$
4. 4

Question Type : **MCQ**
Question ID : **8606541139**
Option 1 ID : **8606543879**
Option 2 ID : **8606543881**
Option 3 ID : **8606543880**
Option 4 ID : **8606543878**
Status : **Answered**
Chosen Option : **3**

Q.15 Let a point A lie between the parallel lines L_1 and L_2 such that its distances from L_1 and L_2 are 6 and 3 units, respectively. Then the area (in sq. units) of the equilateral triangle ABC, where the points B and C lie on the lines L_1 and L_2, respectively, is :

Options

1. $21\sqrt{3}$
2. $15\sqrt{6}$
3. 27
4. $12\sqrt{2}$

Question Type : **MCQ**
Question ID : **8606541135**
Option 1 ID : **8606543864**
Option 2 ID : **8606543863**
Option 3 ID : **8606543865**
Option 4 ID : **8606543862**
Status : **Not Answered**
Chosen Option : **--**

Q.16 The value of $\text{cosec}10^\circ - \sqrt{3}\sec 10^\circ$ is equal to :

Options

1. 8
2. 2
3. 6
4. 4

Question Type : **MCQ**
Question ID : **8606541138**
Option 1 ID : **8606543877**
Option 2 ID : **8606543874**
Option 3 ID : **8606543876**
Option 4 ID : **8606543875**
Status : **Answered**
Chosen Option : **4**

Q.17 If the domain of the function $f(x)=\cos^{-1}\left(\frac{2x-5}{11-3x}\right)+\sin^{-1}\left(2x^2-3x+1\right)$ is the interval $[\alpha, \beta]$, then $\alpha+2\beta$ is equal to :

Options

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

Question Type : **MCQ**
Question ID : **8606541127**
Option 1 ID : **8606543832**
Option 2 ID : **8606543833**
Option 3 ID : **8606543830**
Option 4 ID : **8606543831**
Status : **Not Answered**
Chosen Option : **--**

Q.18 Let $y=y(x)$ be the solution curve of the differential equation $(1+x^2)dy+(y-\tan^{-1}x)\,dx=0$, $y(0)=1$. Then the value of y (1) is :

Options

1. $\frac{4}{e^{\pi/4}}-\frac{\pi}{2}-1$
2. $\frac{2}{e^{\pi/4}}+\frac{\pi}{4}-1$
3. $\frac{2}{e^{\pi/4}}-\frac{\pi}{4}-1$
4. $\frac{4}{e^{\pi/4}}+\frac{\pi}{2}-1$

Question Type : **MCQ**
Question ID : **8606541144**
Option 1 ID : **8606543900**
Option 2 ID : **8606543899**
Option 3 ID : **8606543898**
Option 4 ID : **8606543901**
Status : **Answered**
Chosen Option : **2**

Q.19 Let $\vec{c}$ and $\vec{d}$ be vectors such that $|\vec{c}+\vec{d}| = \sqrt{29}$ and $\vec{c}\times\left(2\hat{i}+3\hat{j}+4\hat{k}\right) = \left(2\hat{i}+3\hat{j}+4\hat{k}\right)\times\vec{d}$. If λ_1, λ_2 ($\lambda_1 > \lambda_2$) are the possible values of $\left(\vec{c}+\vec{d}\right).\left(-7\hat{i}+2\hat{j}+3\hat{k}\right)$, then the equation $K^2x^2+\left(K^2-5K+\lambda_1\right)xy+\left(3K+\frac{\lambda_2}{2}\right)y^2-8x+12y+\lambda_2 = 0$ represents a circle, for K equal to :

Options

1. 2
2. -1
3. 1
4. 4

Question Type : **MCQ**
Question ID : **8606541140**
Option 1 ID : **8606543884**
Option 2 ID : **8606543882**
Option 3 ID : **8606543883**
Option 4 ID : **8606543885**
Status : **Answered**
Chosen Option : **3**

Q.20 Let the mean and variance of 7 observations 2, 4, 10, x, 12, 14, y, $x > y$, be 8 and 16 respectively. Two numbers are chosen from $\{1, 2, 3, x-4, y, 5\}$ one after another without replacement, then the probability, that the smaller number among the two chosen numbers is less than 4, is :

Options

1. $\frac{4}{5}$
2. $\frac{3}{5}$
3. $\frac{2}{5}$
4. $\frac{1}{3}$

Question Type : **MCQ**
Question ID : **8606541133**
Option 1 ID : **8606543854**
Option 2 ID : **8606543855**
Option 3 ID : **8606543856**
Option 4 ID : **8606543857**
Status : **Answered**
Chosen Option : **1**

Section : **Mathematics Section B**

Q.21 Let $f: \mathbf{R} \to \mathbf{R}$ be a twice differentiable function such that the quadratic equation $f(x)m^2 - 2f'(x)m + f''(x) = 0$ in m, has two equal roots for every $x \in \mathbf{R}$. If $f(0) = 1$, $f'(0) = 2$, and (α, β) is the largest interval in which the function $f(\log_e x - x)$ is increasing, then $\alpha + \beta$ is equal to _____.

Given --
Answer :

Question Type : **SA**
Question ID : **8606541149**
Status : **Not Answered**

Q.22 Let $S = \{(m, n) : m, n \in \{1, 2, 3, \ldots, 50\}\}$. If the number of elements (m, n) in S such that $6^m + 9^n$ is a multiple of 5 is p and the number of elements (m, n) in S such that $m + n$ is a square of a prime number is q, then $p + q$ is equal to _____.

Given --
Answer :

Question Type : **SA**
Question ID : **8606541148**
Status : **Not Answered**

Q.23 For some $\alpha, \beta \in \mathbf{R}$, let $A = \begin{bmatrix} \alpha & 2 \\ 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 1 \\ 1 & \beta \end{bmatrix}$ be such that $A^2 - 4A + 2I = B^2 - 3B + I = O$. Then $(\det(\text{adj}(A^3 - B^3)))^2$ is equal to _____.

Given **50625**
Answer :

Question Type : **SA**
Question ID : **8606541146**
Status : **Answered**

Q.24 Let $a_1 = 1$ and for $n \geq 1$, $a_{n+1} = \frac{1}{2} a_n + \frac{n^2 - 2n - 1}{n^2 (n+1)^2}$. Then $\left| \sum_{n=1}^{\infty} \left(a_n - \frac{2}{n^2} \right) \right|$ is equal to _____.

Given --
Answer :

Question Type : **SA**
Question ID : **8606541147**
Status : **Not Answered**

Q.25 $6 \int_0^{\pi} |(\sin 3x + \sin 2x + \sin x)| \, dx$ is equal to _____.

Given --
Answer :

Question Type : **SA**
Question ID : **8606541150**
Status : **Not Answered**

Section : **Physics Section A**

Q.26 A point charge of 10^{-8} C is placed at origin. The work done in moving a point charge 2 μC from point $A(4, 4, 2)$ m to $B(2, 2, 1)$ m is _____ J. ($\frac{1}{4\pi\epsilon_o} = 9 \times 10^9$ in SI units)

Options

1. 45×10^{-6}
2. 0
3. 30×10^{-6}
4. 15×10^{-6}

Question Type : **MCQ**
Question ID : **8606541169**
Option 1 ID : **8606543985**
Option 2 ID : **8606543983**
Option 3 ID : **8606543986**
Option 4 ID : **8606543984**
Status : **Answered**
Chosen Option : **3**

Q.27 An aluminium and steel rods having same lengths and cross-sections are joined to make total length of 120 cm at 30°C. The coefficient of linear expansion of aluminium and steel are 24×10^{-6}/°C and 1.2×10^{-5}/°C, respectively. The length of this composite rod when its temperature is raised to 100 °C, is _____ cm.

Options

1. 120.20
2. 120.03
3. 120.15
4. 120.06

Question Type : **MCQ**
Question ID : **8606541154**
Option 1 ID : **8606543926**
Option 2 ID : **8606543925**
Option 3 ID : **8606543923**
Option 4 ID : **8606543924**
Status : **Answered**
Chosen Option : **3**

Q.28 A light wave described by $E = 60[\sin(3\times10^{15})t + \sin(12\times10^{15})t]$ (in SI units) falls on a metal surface of work function 2.8 eV. The maximum kinetic energy of ejected photoelectron is (approximately) _____ eV. $(h = 6.6\times10^{-34}$ J.s. and $e = 1.6\times10^{-19}$ C)

Options

1. 3.8
2. 5.1
3. 6.0
4. 7.8

Question Type : **MCQ**
Question ID : **8606541165**
Option 1 ID : **8606543968**
Option 2 ID : **8606543969**
Option 3 ID : **8606543970**
Option 4 ID : **8606543967**
Status : **Not Answered**
Chosen Option : **--**

Q.29 A parallel plate capacitor has capacitance C, when there is vacuum within the parallel plates. A sheet having thickness $\left(\frac{1}{3}\right)^{rd}$ of the separation between the plates and relative permittivity K is introduced between the plates. The new capacitance of the system is :

Options

1. $\frac{3KC}{2K+1}$
2. $\frac{CK}{2+K}$
3. $\frac{3CK^2}{(2K+1)^2}$
4. $\frac{4KC}{3K-1}$

Question Type : **MCQ**
Question ID : **8606541160**
Option 1 ID : **8606543947**
Option 2 ID : **8606543949**
Option 3 ID : **8606543950**
Option 4 ID : **8606543948**
Status : **Answered**
Chosen Option : **1**

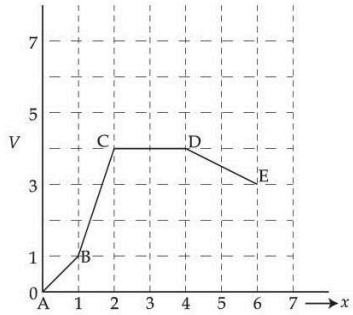
Q.30 In an experiment the values of two spring constants were measured as $k_1 = (10 \pm 0.2)$ N/m and $k_2 = (20 \pm 0.3)$ N/m. If these springs are connected in parallel, then the percentage error in equivalent spring constant is :

Options

1. 1.33%
2. 1.67%
3. 2.33%
4. 2.67%

Question Type : **MCQ**
Question ID : **8606541170**
Option 1 ID : **8606543989**
Option 2 ID : **8606543988**
Option 3 ID : **8606543987**
Option 4 ID : **8606543990**
Status : **Answered**
Chosen Option : **2**

Q.31 Potential energy *(V)* versus distance *(x)* is given by the graph. Rank various regions as per the magnitudes of the force (F) acting on a particle from high to low.



Options

1. $F_{CD} > F_{AB} > F_{BC} > F_{DE}$
2. $F_{CD} > F_{DE} > F_{AB} > F_{BC}$
3. $F_{BC} > F_{AB} > F_{DE} > F_{CD}$
4. $F_{BC} > F_{CD} > F_{DE} > F_{AB}$

Question Type : **MCQ**
Question ID : **8606541152**
Option 1 ID : **8606543915**
Option 2 ID : **8606543917**
Option 3 ID : **8606543916**
Option 4 ID : **8606543918**
Status : **Answered**
Chosen Option : **3**

Q.32 Consider a modified Bernoulli equation.

$$\left(P + \frac{A}{Bt^2}\right) + \rho g(h + Bt) + \frac{1}{2}\rho V^2 = \text{constant}$$

If t has the dimension of time then the dimensions of A and B are _____, _____ respectively.

Options

1. $[ML^0T^{-1}]$ and $[M^0LT]$
2. $[ML^0T^{-2}]$ and $[M^0LT^{-1}]$
3. $[ML^0T^{-2}]$ and $[M^0LT^{-2}]$
4. $[ML^0T^{-1}]$ and $[M^0LT^{-1}]$

Question Type : **MCQ**
Question ID : **8606541151**
Option 1 ID : **8606543911**
Option 2 ID : **8606543913**
Option 3 ID : **8606543914**
Option 4 ID : **8606543912**
Status : **Answered**
Chosen Option : **2**

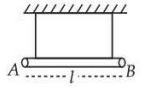
Q.33 The electric field in a plane electromagnetic wave is given by :
$E_y = 69 \sin[0.6 \times 10^3 x - 1.8 \times 10^{11} t]$ V/m.
The expression for magnetic field associated with this electromagnetic wave is _____ T.

Options

1. $B_z = 2.3 \times 10^{-7} \sin[0.6 \times 10^3 x - 1.8 \times 10^{11} t]$
2. $B_y = 69 \sin[0.6 \times 10^3 x + 1.8 \times 10^{11} t]$
3. $B_z = 2.3 \times 10^{-7} \sin[0.6 \times 10^3 x + 1.8 \times 10^{11} t]$
4. $B_y = 2.3 \times 10^{-7} \sin[0.6 \times 10^3 x - 1.8 \times 10^{11} t]$

Question Type : **MCQ**
Question ID : **8606541156**
Option 1 ID : **8606543933**
Option 2 ID : **8606543931**
Option 3 ID : **8606543934**
Option 4 ID : **8606543932**
Status : **Answered**
Chosen Option : **1**

Q.34 A uniform rod of mass m and length l suspended by means of two identical inextensible light strings as shown in figure. Tension in one string immediately after the other string is cut, is _____. (g acceleration due to gravity)



Options

1. $mg/3$
2. $mg/2$
3. $mg/4$
4. mg

Question Type : **MCQ**
Question ID : **8606541159**
Option 1 ID : **8606543945**
Option 2 ID : **8606543944**
Option 3 ID : **8606543946**
Option 4 ID : **8606543943**
Status : **Not Answered**
Chosen Option : **--**

Q.35 A gas based geyser heats water flowing at the rate of 5.0 litres per minute from 27 °C to 87 °C. The rate of consumption of the gas is _____g/s.
(Take heat of combustion of gas = 5.0×10^4 J/g) specific heat capacity of water = 4200 J/kg.°C

Options

1. 0.21
2. 2.1
3. 0.42
4. 4.2

Question Type : **MCQ**
Question ID : **8606541167**
Option 1 ID : **8606543977**
Option 2 ID : **8606543975**
Option 3 ID : **8606543978**
Option 4 ID : **8606543976**
Status : **Answered**
Chosen Option : **3**

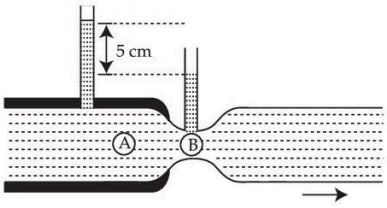
Q.36 A current carrying solenoid is placed vertically and a particle of mass m with charge Q is released from rest. The particle moves along the axis of solenoid. If g is acceleration due to gravity then the acceleration (a) of the charged particle will satisfy :

Options

1. $0 < a < g$
2. $a > g$
3. $a = 0$
4. $a = g$

Question Type : **MCQ**
Question ID : **8606541161**
Option 1 ID : **8606543954**
Option 2 ID : **8606543951**
Option 3 ID : **8606543952**
Option 4 ID : **8606543953**
Status : **Answered**
Chosen Option : **4**

Q.37 Water flows through a horizontal tube as shown in the figure. The difference in height between the water columns in vertical tubes is 5 cm and the area of cross-sections at A and B are 6 cm^2 and 3 cm^2 respectively. The rate of flow will be _____ cm^3/s. (take $g = 10\ m/s^2$)



Options

1. $200\sqrt{6}$
2. $100\sqrt{3}$
3. $\frac{200}{\sqrt{3}}$
4. $200\sqrt{3}$

Question Type : **MCQ**
Question ID : **8606541155**
Option 1 ID : **8606543929**
Option 2 ID : **8606543927**
Option 3 ID : **8606543928**
Option 4 ID : **8606543930**
Status : **Answered**
Chosen Option : **4**

Q.38

A 4 kg mass moves under the influence of a force $\vec{F} = \left(4t^3\hat{i} - 3t\hat{j}\right)$ N where t is the time in second.

If mass starts from origin at $t = 0$, the velocity and position after $t = 2$ s will be :

Options

1. $\vec{v} = 3\hat{i} + \frac{3}{2}\hat{j} \quad \vec{r} = \frac{6}{5}\hat{i} + \hat{j}$

2. $\vec{v} = 4\hat{i} - \frac{3}{2}\hat{j} \quad \vec{r} = \frac{6}{5}\hat{i} - \hat{j}$

3. $\vec{v} = 4\hat{i} + \frac{5}{2}\hat{j} \quad \vec{r} = \frac{8}{5}\hat{i} + 2\hat{j}$

4. $\vec{v} = 4\hat{i} - \frac{3}{2}\hat{j} \quad \vec{r} = \frac{8}{5}\hat{i} - \hat{j}$

Question Type : **MCQ**
Question ID : **8606541153**
Option 1 ID : **8606543920**
Option 2 ID : **8606543919**
Option 3 ID : **8606543921**
Option 4 ID : **8606543922**
Status : **Answered**
Chosen Option : **4**

Q.39

A conducting circular loop of area 1.0 m^2 is placed perpendicular to a magnetic field which varies as $B = \sin(100\,t)$ Tesla. If the resistance of the loop is 100 Ω, then the average thermal energy dissipated in the loop in one period is _____ J.

Options

1. 2π

2. π

3. π^2

4. $\frac{\pi}{2}$

Question Type : **MCQ**
Question ID : **8606541162**
Option 1 ID : **8606543956**
Option 2 ID : **8606543955**
Option 3 ID : **8606543958**
Option 4 ID : **8606543957**
Status : **Marked For Review**
Chosen Option : **2**

Q.40 Two strings (A, B) having linear densities $\mu_A = 2 \times 10^{-4}$ kg/m and, $\mu_B = 4 \times 10^{-4}$ kg/m and lengths $L_A = 2.5$ m and $L_B = 1.5$ m respectively are joined. Free ends of A and B are tied to two rigid supports C and D, respectively creating a tension of 500 N in the wire. Two identical pulses, sent from C and D ends, take time t_1 and t_2, respectively, to reach the joint. The ratio t_1/t_2 is :

Options

1. 1.08
2. 1.90
3. 1.18
4. 1.67

Question Type : **MCQ**
Question ID : **8606541157**
Option 1 ID : **8606543935**
Option 2 ID : **8606543938**
Option 3 ID : **8606543936**
Option 4 ID : **8606543937**
Status : **Answered**
Chosen Option : **3**

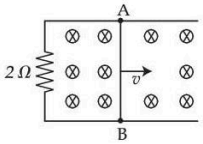
Q.41 Initially a satellite of 100 kg is in a circular orbit of radius $1.5R_E$. This satellite can be moved to a circular orbit of radius $3R_E$ by supplying $\alpha \times 10^6$ J of energy The value of α is _____. (Take Radius of Earth $R_E = 6 \times 10^6$ m and $g = 10$ m/s^2)

Options

1. 1000
2. 150
3. 100
4. 500

Question Type : **MCQ**
Question ID : **8606541158**
Option 1 ID : **8606543940**
Option 2 ID : **8606543941**
Option 3 ID : **8606543939**
Option 4 ID : **8606543942**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

Q.42 A 1 m long metal rod AB completes the circuit as shown in figure. The area of circuit is perpendicular to the magnetic field of 0.10 T. If the resistance of the total circuit is 2 Ω then the force needed to move the rod towards right with constant speed (v) of 1.5 m/s is _____N.

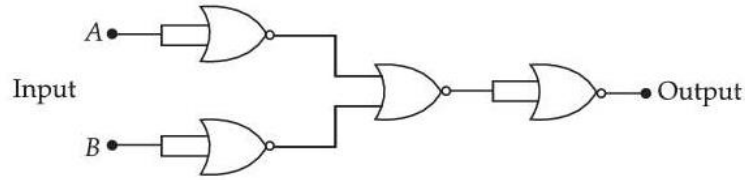


Options

1. 5.7×10^{-2}
2. 7.5×10^{-3}
3. 7.5×10^{-2}
4. 5.7×10^{-3}

Question Type : **MCQ**
Question ID : **8606541163**
Option 1 ID : **8606543962**
Option 2 ID : **8606543959**
Option 3 ID : **8606543960**
Option 4 ID : **8606543961**
Status : **Answered**
Chosen Option : **2**

Q.43 The given circuit works as :



Options

1. NOR gate
2. OR gate
3. AND gate
4. NAND gate

Question Type : **MCQ**
Question ID : **8606541168**
Option 1 ID : **8606543981**
Option 2 ID : **8606543982**
Option 3 ID : **8606543979**
Option 4 ID : **8606543980**
Status : **Answered**
Chosen Option : **4**

Q.44 In a double slit experiment the distance between the slits is 0.1 cm and the screen is placed at 50 cm from the slits plane. When one slit is covered with a transparent sheet having thickness t and refractive index $n(=1.5)$, the central fringe shifts by 0.2 cm. The value of t is _____ cm.

Options

1. 8×10^{-4}
2. 6.0×10^{-3}
3. 5.0×10^{-3}
4. 5.6×10^{-4}

Question Type : **MCQ**
Question ID : **8606541164**
Option 1 ID : **8606543966**
Option 2 ID : **8606543965**
Option 3 ID : **8606543963**
Option 4 ID : **8606543964**
Status : **Not Answered**
Chosen Option : **--**

Q.45 If an alpha particle with energy 7.7 MeV is bombarded on a thin gold foil, the closest distance from nucleus it can reach is _____m. (Atomic number of gold = 79 and $\frac{1}{4\pi\epsilon_0}=9\times10^9$ in SI units)

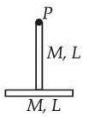
Options

1. 2.95×10^{-16}
2. 3.85×10^{-14}
3. 2.95×10^{-14}
4. 3.85×10^{-16}

Question Type : **MCQ**
Question ID : **8606541166**
Option 1 ID : **8606543972**
Option 2 ID : **8606543973**
Option 3 ID : **8606543974**
Option 4 ID : **8606543971**
Status : **Answered**
Chosen Option : **2**

Section : **Physics Section B**

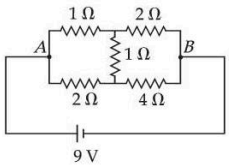
Q.46 Two identical thin rods of mass M kg and length L m are connected as shown in figure. Moment of inertia of the combined rod system about an axis passing through point P and perpendicular to the plane of the rods is $\frac{x}{12}ML^2$ kg m^2. The value of x is _____.



Given **17**
Answer :

Question Type : **SA**
Question ID : **8606541171**
Status : **Answered**

Q.47 The heat generated in 1 minute between points A and B in the given circuit, when a battery of 9 V with internal resistance of 1 Ω is connected across these points is _____ J.



Given **1620**
Answer :

Question Type : **SA**
Question ID : **8606541174**
Status : **Answered**

Q.48 In a microscope the objective is having focal length $f_o = 2$ cm and eye-piece is having focal length $f_e = 4$ cm. The tube length is 32 cm. The magnification produced by this microscope for normal adjustment is _____.

Given **--**
Answer :

Question Type : **SA**
Question ID : **8606541173**
Status : **Not Answered**

Q.49 A collimated beam of light of diameter 2 mm is propagating along x-axis. The beam is required to be expanded in a collimated beam of diameter 14 mm using a system of two convex lenses. If first lens has focal length 40 mm, then the focal length of second lens is _____ mm.

Given **--**
Answer :

Question Type : **SA**
Question ID : **8606541172**
Status : **Not Answered**

Q.50 10 mole of oxygen is heated at constant volume from 30 °C to 40 °C. The change in the internal energy of the gas is _____ cal. (The molecular specific heat of oxygen at constant pressure, $C_p = 7$ cal/mol.°C and $R = 2$ cal./mol.°C.)

Given **500**
Answer :

Question Type : **SA**
Question ID : **8606541175**
Status : **Answered**

Section : **Chemistry Section A**

Q.51 Consider the following reactions.

$PbCl_2 + K_2CrO_4 \rightarrow A + 2KCl$

(Hot solution)

$A + NaOH \rightleftharpoons B + Na_2CrO_4$

$PbSO_4 + 4CH_3COONH_4 \rightarrow (NH_4)_2SO_4 + X$

In the above reactions, A, B and X are respectively.

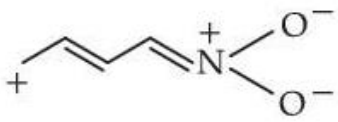
Options

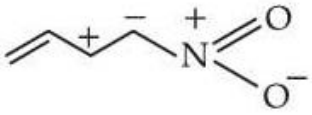
1. $Na_2[Pb(OH)_2]$, $PbCrO_4$ and $(NH_4)_2[Pb(CH_3COO)_4]$
2. $Na_2[Pb(OH)_2]$, $PbCrO_4$ and $[Pb(NH_3)_4]\,SO_4$
3. $PbCrO_4$, $Na_2[Pb(OH)_4]$ and $[Pb(NH_3)_4]\,SO_4$
4. $PbCrO_4$, $Na_2[Pb(OH)_4]$ and $(NH_4)_2[Pb(CH_3COO)_4]$

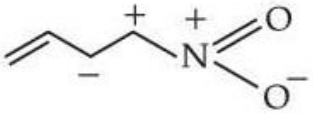
Question Type : **MCQ**
Question ID : **8606541195**
Option 1 ID : **8606544075**
Option 2 ID : **8606544074**
Option 3 ID : **8606544072**
Option 4 ID : **8606544073**
Status : **Not Answered**
Chosen Option : **--**

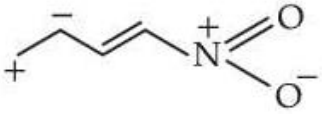
Q.52 From the following, the least stable structure is :

Options

1. 

2. 

3. 

4. 

Question Type : **MCQ**
Question ID : **8606541188**
Option 1 ID : **8606544046**
Option 2 ID : **8606544044**
Option 3 ID : **8606544047**
Option 4 ID : **8606544045**
Status : **Answered**
Chosen Option : **2**

Q.53 80 mL of a hydrocarbon on mixing with 264 mL of oxygen in a closed U-tube undergoes complete combustion. The residual gases after cooling to 273 K occupy 224 mL. When the system is treated with KOH solution, the volume decreases to 64 mL. The formula of the hydrocarbon is :

Options

1. C_2H_4

2. C_2H_6

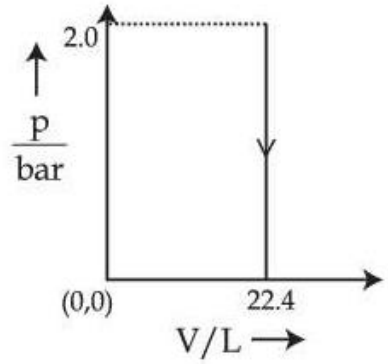
3. C_2H_2

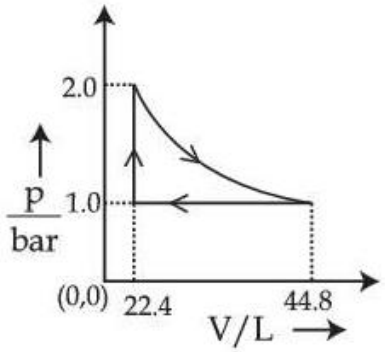
4. C_4H_{10}

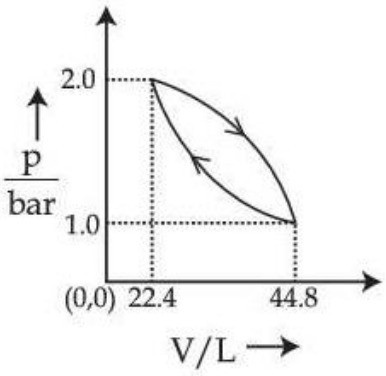
Question Type : **MCQ**
Question ID : **8606541176**
Option 1 ID : **8606543996**
Option 2 ID : **8606543999**
Option 3 ID : **8606543997**
Option 4 ID : **8606543998**
Status : **Answered**
Chosen Option : **1**

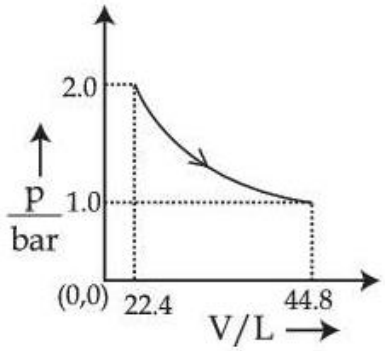
Q.54 Which of the following graphs between pressure 'p' versus volume 'V' represents the maximum work done ?

Options

1. 

2. 

3. 

4. 

Question Type : **MCQ**
Question ID : **8606541181**
Option 1 ID : **8606544019**

Option 2 ID : **8606544017**
Option 3 ID : **8606544016**
Option 4 ID : **8606544018**
Status : **Answered**
Chosen Option : **4**

Q.55 Which of the following represents the correct trend for the mentioned property ?

A. $F > P > S > B$ - First Ionization Energy
B. $Cl > F > S > P$ - Electron Affinity
C. $K > Al > Mg > B$ - Metallic character
D. $K_2O > Na_2O > MgO > Al_2O_3$ - Basic character

Choose the **correct** answer from the options given below :

Options

1. A, B and D only
2. A and B only
3. B and C only
4. A, B, C and D

Question Type : **MCQ**
Question ID : **8606541183**
Option 1 ID : **8606544026**
Option 2 ID : **8606544027**
Option 3 ID : **8606544025**
Option 4 ID : **8606544024**
Status : **Answered**
Chosen Option : **1**

Q.56 MnO_4^{2-}, in acidic medium, disproportionates to :

Options

1. Mn_2O_7 and MnO
2. Mn_2O_7 and MnO_2
3. MnO_4^- and MnO
4. MnO_4^- and MnO_2

Question Type : **MCQ**
Question ID : **8606541185**
Option 1 ID : **8606544035**
Option 2 ID : **8606544032**
Option 3 ID : **8606544033**
Option 4 ID : **8606544034**
Status : **Answered**
Chosen Option : **4**

Q.57 In Carius method, 0.75 g of an organic compound gave 1.2 g of barium sulphate, find percentage of sulphur (molar mass 32 g mol^{-1}). Molar mass of barium sulphate is 233 g mol^{-1}.

Options

1. 16.48%
2. 10.30%
3. 21.97%
4. 4.55%

Question Type : **MCQ**
Question ID : **8606541187**
Option 1 ID : **8606544043**
Option 2 ID : **8606544042**
Option 3 ID : **8606544041**
Option 4 ID : **8606544040**
Status : **Not Answered**
Chosen Option : **--**

Q.58 Identify **correct** statements from the following :

A. Propanal and propanone are functional isomers.
B. Ethoxyethane and methoxypropane are metamers.
C. But-2-ene shows optical isomerism.
D. But-1-ene and but-2-ene are functional isomers.
E. Pentane and 2, 2-dimethyl propane are chain isomers.

Choose the **correct** answer from the options given below :

Options

1. A, B and C only
2. B, C and D only
3. A, B and E only
4. C, D and E only

Question Type : **MCQ**
Question ID : **8606541189**
Option 1 ID : **8606544048**
Option 2 ID : **8606544049**
Option 3 ID : **8606544051**
Option 4 ID : **8606544050**
Status : **Answered**
Chosen Option : **3**

Q.59 Elements P and Q form two types of non-volatile, non-ionizable compounds PQ and PQ_2. When 1 g of PQ is dissolved in 50 g of solvent 'A', ΔT_b was 1.176 K while when 1 g of PQ_2 is dissolved in 50 g of solvent 'A', ΔT_b was 0.689 K. (K_b of 'A' = 5 K kg mol^{-1}). The molar masses of elements P and Q (in g mol^{-1}) respectively, are :

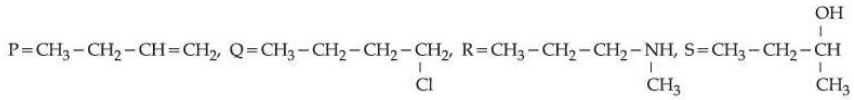
Options

1. 70, 110
2. 60, 25
3. 25, 60
4. 65, 145

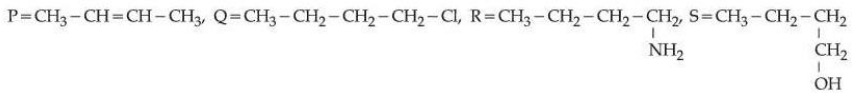
Question Type : **MCQ**
Question ID : **8606541182**
Option 1 ID : **8606544023**
Option 2 ID : **8606544021**
Option 3 ID : **8606544022**
Option 4 ID : **8606544020**
Status : **Not Answered**
Chosen Option : **--**

Q.60 A hydrocarbon 'P' (C_4H_8) on reaction with HCl gives an optically active compound 'Q' (C_4H_9Cl) which on reaction with one mole of ammonia gives compound 'R' ($C_4H_{11}N$). 'R' on diazotization followed by hydrolysis gives 'S'. Identify P, Q, R and S.

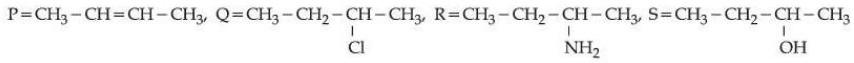
Options 1.



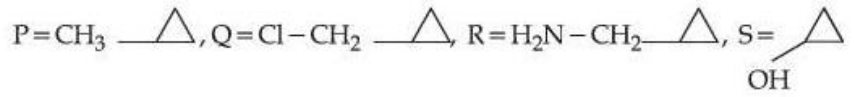
2.



3.



4.



Question Type : **MCQ**
Question ID : **8606541190**
Option 1 ID : **8606544054**
Option 2 ID : **8606544052**
Option 3 ID : **8606544053**
Option 4 ID : **8606544055**
Status : **Answered**
Chosen Option : **3**

Q.61 An organic compound (P) on treatment with aqueous ammonia under hot condition forms compound (Q) which on heating with Br_2 and KOH forms compound (R) having molecular formula C_6H_7N. Names of P, Q and R respectively are.

Options

1. Phenylethanoic acid, phenylethanamide, benzamine
2. Benzoic acid, 4-methylbenzamide, 4-methylaniline
3. Benzoic acid, benzamide, aniline
4. Toluic acid, methylbenzamide, 2-methylaniline

Question Type : **MCQ**
Question ID : **8606541193**
Option 1 ID : **8606544065**
Option 2 ID : **8606544064**
Option 3 ID : **8606544067**
Option 4 ID : **8606544066**
Status : **Answered**
Chosen Option : **3**

Q.62 Given below are two statements :

Statement I : When an electric discharge is passed through gaseous hydrogen, the hydrogen molecules dissociate and the energetically excited hydrogen atoms produce electromagnetic radiation of discrete frequencies.

Statement II : The frequency of second line of Balmer series obtained from He^+ is equal to that of first line of Lyman series obtained from hydrogen atom.

In the light of the above statements, choose the **correct** answer from the options given below :

Options

1. **Statement I** is true but **Statement II** is false
2. Both **Statement I** and **Statement II** are true
3. **Statement I** is false but **Statement II** is true
4. Both **Statement I** and **Statement II** are false

Question Type : **MCQ**
Question ID : **8606541179**
Option 1 ID : **8606544010**
Option 2 ID : **8606544008**
Option 3 ID : **8606544011**
Option 4 ID : **8606544009**
Status : **Answered**
Chosen Option : **1**

Q.63 Given below are two statements :

Statement I : Among $[Cu(NH_3)_4]^{2+}$, $[Ni(en)_3)]^{2+}$, $[Ni(NH_3)_6]^{2+}$ and $[Mn(H_2O)_6]^{2+}$, $[Mn(H_2O)_6]^{2+}$ has the maximum number of unpaired electrons.

Statement II : The number of pairs among $\{[NiCl_4]^{2-}, [Ni(CO)_4]\}$, $\{[NiCl_4]^{2-}, [Ni(CN)_4]^{2-}\}$ and $\{[Ni(CO)_4], [Ni(CN)_4]^{2-}\}$ that contain only diamagnetic species is two.

In the light of the above statements, choose the **correct** answer from the options given below :

Options

1. **Statement I** is false but **Statement II** is true
2. **Statement I** is true but **Statement II** is false
3. Both **Statement I** and **Statement II** are true
4. Both **Statement I** and **Statement II** are false

Question Type : **MCQ**
Question ID : **8606541186**
Option 1 ID : **8606544039**
Option 2 ID : **8606544038**
Option 3 ID : **8606544036**
Option 4 ID : **8606544037**
Status : **Answered**
Chosen Option : **3**

Q.64 Given below are two statements :

Statement I : The number of pairs among $[SiO_2, CO_2]$, $[SnO, SnO_2]$, $[PbO, PbO_2]$ and $[GeO, GeO_2]$, which contain oxides that are both amphoteric is 2.

Statement II : BF_3 is an electron deficient molecule, can act as a Lewis acid, forms adduct with NH_3 and has a trigonal planar geometry.

In the light of the above statements, choose the **correct** answer from the options given below :

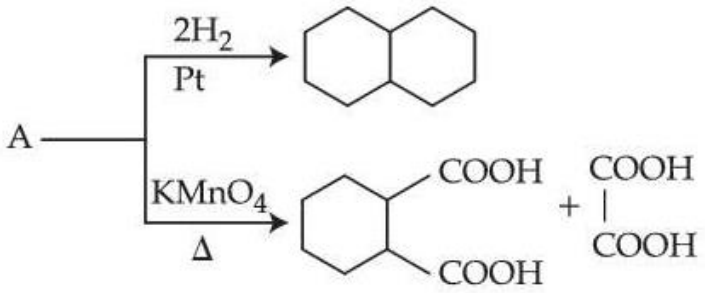
Options

1. Both **Statement I** and **Statement II** are false
2. **Statement I** is true but **Statement II** is false
3. Both **Statement I** and **Statement II** are true
4. **Statement I** is false but **Statement II** is true

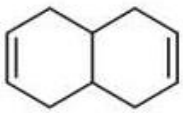
Question Type : **MCQ**
Question ID : **8606541184**
Option 1 ID : **8606544029**
Option 2 ID : **8606544030**
Option 3 ID : **8606544028**
Option 4 ID : **8606544031**
Status : **Not Answered**
Chosen Option : **--**

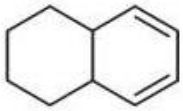
Q.65

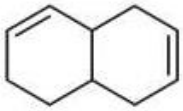
Identify A in the following reaction.

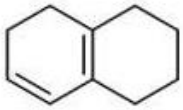


Options

1. 

2. 

3. 

4. 

Question Type :	**MCQ**
Question ID :	**8606541191**
Option 1 ID :	**8606544057**
Option 2 ID :	**8606544059**
Option 3 ID :	**8606544056**
Option 4 ID :	**8606544058**
Status :	**Answered**
Chosen Option :	**2**

Q.66 14.0 g of calcium metal is allowed to react with excess HCl at 1.0 atm pressure and 273 K.
Which of the following statements is **incorrect** ?
[Given : Molar mass in g mol^{-1} of Ca – 40, Cl – 35.5, H – 1]

Options

1. 0.35 mol of H_2 gas is evolved.
2. 7.84 L of H_2 gas is evolved.
3. The limiting reagent is calcium metal.
4. 33.3 g of $CaCl_2$ is produced.

Question Type : **MCQ**
Question ID : **8606541177**
Option 1 ID : **8606544000**
Option 2 ID : **8606544001**
Option 3 ID : **8606544003**
Option 4 ID : **8606544002**
Status : **Answered**
Chosen Option : **4**

Q.67 For the reaction, $N_2O_4 \rightleftharpoons 2NO_2$, graph is plotted as shown below. Identify **correct** statements.

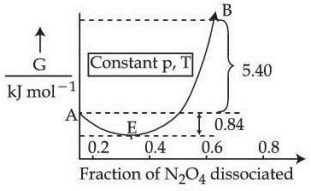
A. Standard free energy change for the reaction is -5.40 kJ mol^{-1}.

B. As $\Delta G^{\ominus}$ in graph is positive, N_2O_4 will not dissociate into NO_2 at all.

C. Reverse reaction will go to completion.

D. When 1 mole of N_2O_4 changes into equilibrium mixture, value of $\Delta G^{\ominus} = -0.84$ kJ mol^{-1}

E. When 2 mole of NO_2 changes into equilibrium mixture, $\Delta G^{\ominus}$ for equilibrium mixture is -6.24 kJ mol^{-1}.



Choose the **correct** answer from the options given below :

Options

1. B and C only

2. A and D only

3. D and E only

4. C and E only

Question Type : **MCQ**
Question ID : **8606541180**
Option 1 ID : **8606544015**
Option 2 ID : **8606544012**
Option 3 ID : **8606544014**
Option 4 ID : **8606544013**
Status : **Marked For Review**
Chosen Option : **1**

Q.68 Identify the **correct** statements.

A. Arginine and Tryptophan are essential amino acids.

B. Histidine does not contain heterocyclic ring in its structure.

C. Proline is a six membered cyclic ring amino acid.

D. Glycine does not have chiral centre.

E. Cysteine has characteristic feature of side chain as $MeS-CH_2-CH_2-$.

Choose the **correct** answer from the options given below :

Options

1. B and E Only

2. A and D Only

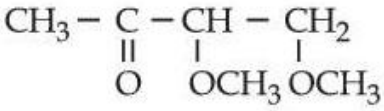
3. C and D Only

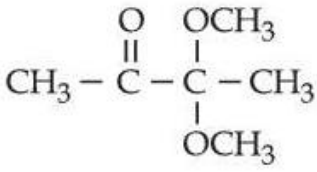
4. C and E Only

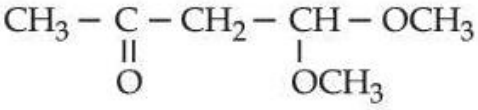
Question Type : **MCQ**
Question ID : **8606541194**
Option 1 ID : **8606544068**
Option 2 ID : **8606544069**
Option 3 ID : **8606544070**
Option 4 ID : **8606544071**
Status : **Answered**
Chosen Option : **4**

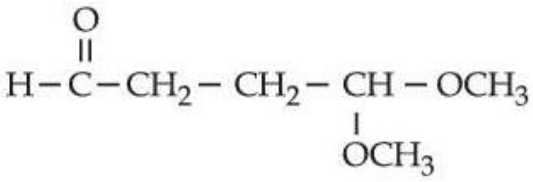
Q.69 An organic compound "P" of molecular formula $C_6H_{12}O_3$ gives positive Iodoform test but negative Tollen's test. When "P" is treated with dilute acid, it produces "Q". "Q" gives positive Tollen's test and also iodoform test. The structure of "P" is :

Options

1. 

2. 

3. 

4. 

Question Type : **MCQ**
Question ID : **8606541192**
Option 1 ID : **8606544060**
Option 2 ID : **8606544061**
Option 3 ID : **8606544062**
Option 4 ID : **8606544063**
Status : **Answered**
Chosen Option : **2**

Q.70 Given below are two statements :

Statement I :

The number of species among SF_4, NH_4^+, $[NiCl_4]^{2-}$, XeF_4, $[PtCl_4]^{2-}$, SeF_4 and $[Ni(CN)_4]^{2-}$, that have tetrahedral geometry is 3.

Statement II :

In the set [NO_2, BeH_2, BF_3, $AlCl_3$], all the molecules have incomplete octet around central atom.

In the light of the above statements, choose the **correct** answer from the options given below :

Options

1. Both **Statement I** and **Statement II** are true
2. Both **Statement I** and **Statement II** are false
3. **Statement I** is false but **Statement II** is true
4. **Statement I** is true but **Statement II** is false

Question Type : **MCQ**
Question ID : **8606541178**
Option 1 ID : **8606544004**
Option 2 ID : **8606544005**
Option 3 ID : **8606544007**
Option 4 ID : **8606544006**
Status : **Answered**
Chosen Option : **3**

Section : **Chemistry Section B**

Q.71 Pre-exponential factors of two different reactions of same order are identical. Let activation energy of first reaction exceeds the activation energy of second reaction by 20 kJ mol^{-1}. If k_1 and k_2 are the rate constants of first and second reaction respectively at 300 K, then $\ln \frac{k_2}{k_1}$ will be _____. (nearest integer) [$R = 8.3\ J\ K^{-1}\ mol^{-1}$]

Given Answer : **8**

Question Type : **SA**
Question ID : **8606541200**
Status : **Answered**

Q.72 Use the following data :

Substance	$\frac{\Delta_f H^{\ominus}(500K)}{kJ\ mol^{-1}}$	$\frac{S^{\ominus}(500K)}{J K^{-1}\ mol^{-1}}$
AB(g)	32	222
$A_2(g)$	6	146
$B_2(g)$	x	280

One mole each of $A_2(g)$ and $B_2(g)$ are taken in a 1 L closed flask and allowed to establish the equilibrium at 500K.

$A_2(g) + B_2(g) \rightleftharpoons 2AB(g)$

The value of x (in kJ mol^{-1}) is _____. (Nearest integer)

(Given : log K = 2.2 R = 8.3 J K^{-1} mol^{-1})

Given --
Answer :

Question Type : **SA**
Question ID : **8606541198**
Status : **Not Answered**

Q.73 Consider the following reactions :

$NaCl + K_2Cr_2O_7 + H_2SO_4 \rightarrow A + KHSO_4 + NaHSO_4 + H_2O$

$A + NaOH \rightarrow B + NaCl + H_2O$

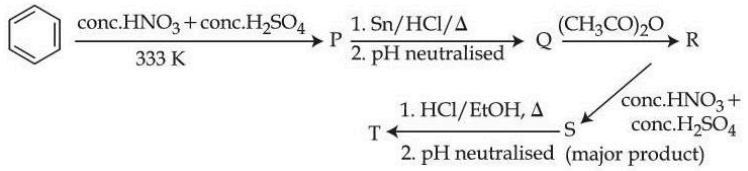
$B + H_2SO_4 + H_2O_2 \rightarrow C + Na_2SO_4 + H_2O$

In the product 'C', 'X' is the number of O_2^{2-} units, 'Y' is the total number oxygen atoms present and 'Z' is the oxidation state of Cr. The value of X + Y + Z is _____.

Given --
Answer :

Question Type : **SA**
Question ID : **8606541197**
Status : **Not Answered**

Q.74 Consider the following reaction sequence



The percentage of nitrogen in product 'T' formed is _____%. (Nearest integer)

(Given molar mass in g mol^{-1} H : 1, C : 12, N : 14, O : 16)

Given --
Answer :

Question Type : **SA**
Question ID : **8606541196**
Status : **Not Answered**

Q.75 The pH and conductance of a weak acid (HX) was found to be 5 and 4×10^{-5} S, respectively. The conductance was measured under standard condition using a cell where the electrode plates having a surface area of 1 cm^2 were at a distance of 15 cm apart. The value of the limiting molar conductivity is _____S $m^2 mol^{-1}$. (nearest integer)

(Given : degree of dissociation of the weak acid (α) << 1)

Given --
Answer :

Question Type : **SA**
Question ID : **8606541199**
Status : **Not Answered**

"