NTA JEE Mains Jan 2026

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Subject	B. Tech

Section : **Mathematics Section A**

Q.1 Let n be the number obtained on rolling a fair die. If the probability that the system

$$x - ny + z = 6$$
$$x + (n-2)y + (n+1)z = 8$$
$$(n-1)y + z = 1$$

has a unique solution is $\frac{k}{6}$, then the sum of k and all possible values of n is :

Options

1. 21
2. 24
3. 20
4. 22

Question Type : **MCQ**
Question ID : **860654982**
Option 1 ID : **8606543341**
Option 2 ID : **8606543343**
Option 3 ID : **8606543340**
Option 4 ID : **8606543342**
Status : **Answered**
Chosen Option : **4**

Q.2 Among the statements

(S1) : If A(5, −1) and B(−2, 3) are two vertices of a triangle, whose orthocentre is (0, 0), then its third vertex is (−4, −7)

and

(S2) : If positive numbers 2a, b, c are three consecutive terms of an A.P., then the lines $ax+by+c=0$ are concurrent at (2, −2),

Options

1. only (S2) is correct
2. only (S1) is correct
3. both are incorrect
4. both are correct

Question Type : **MCQ**
Question ID : **860654988**
Option 1 ID : **8606543367**
Option 2 ID : **8606543366**
Option 3 ID : **8606543365**
Option 4 ID : **8606543364**
Status : **Answered**
Chosen Option : **2**

Q.3 Let α, β be the roots of the quadratic equation $12x^2-20x+3\lambda=0, \lambda \in \mathbf{Z}$. If $\frac{1}{2} \leq |\beta - \alpha| \leq \frac{3}{2}$, then the sum of all possible values of λ is :

Options

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

Question Type : **MCQ**
Question ID : **860654978**
Option 1 ID : **8606543324**
Option 2 ID : **8606543325**
Option 3 ID : **8606543327**
Option 4 ID : **8606543326**
Status : **Answered**
Chosen Option : **2**

Q.4

If $\lim\limits_{x \to 0} \dfrac{e^{(a-1)x} + 2\cos bx + (c-2)e^{-x}}{x\cos x - \log_e(1+x)} = 2$, then $a^2+b^2+c^2$ is equal to :

Options

1. 7
2. 9
3. 3
4. 5

Question Type : **MCQ**
Question ID : **860654992**
Option 1 ID : **8606543382**
Option 2 ID : **8606543383**
Option 3 ID : **8606543380**
Option 4 ID : **8606543381**
Status : **Answered**
Chosen Option : **1**

Q.5

If $y = y(x)$ satisfies the differential equation

$16\left(\sqrt{x+9\sqrt{x}}\right)\left(4+\sqrt{9+\sqrt{x}}\right)\cos y\,dy = (1+2\sin y)dx,\ x>0$ and $y(256) = \frac{\pi}{2}$, $y(49) = \alpha$, then $2\sin\alpha$ is equal to :

Options

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

Question Type : **MCQ**
Question ID : **860654995**
Option 1 ID : **8606543394**
Option 2 ID : **8606543393**
Option 3 ID : **8606543395**
Option 4 ID : **8606543392**
Status : **Not Answered**
Chosen Option : **--**

Q.6

Let P(10, $2\sqrt{15}$) be a point on the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$, whose foci are S and S'. If the length of its latus rectum is 8, then the square of the area of Δ PSS' is equal to :

Options

1. 900
2. 4200
3. 2700
4. 1462

Question Type : **MCQ**
Question ID : **860654986**
Option 1 ID : **8606543356**
Option 2 ID : **8606543359**
Option 3 ID : **8606543357**
Option 4 ID : **8606543358**
Status : **Answered**
Chosen Option : **3**

Q.7

Let f and g be functions satisfying $f(x+y)=f(x)f(y)$, $f(1)=7$ and $g(x+y)=g(xy)$, $g(1)=1$, for all $x, y \in \mathbf{N}$. If $\sum_{x=1}^{n}\left(\frac{f(x)}{g(x)}\right)=19607$, then n is equal to :

Options

1. 7
2. 6
3. 5
4. 4

Question Type : **MCQ**
Question ID : **860654977**
Option 1 ID : **8606543323**
Option 2 ID : **8606543322**
Option 3 ID : **8606543321**
Option 4 ID : **8606543320**
Status : **Answered**
Chosen Option : **3**

Q.8

Let S and S′ be the foci of the ellipse $\frac{x^2}{25}+\frac{y^2}{9}=1$ and P(α, β) be a point on the ellipse in the first quadrant. If $(SP)^2+(S'P)^2-SP\cdot S'P=37$, then $\alpha^2+\beta^2$ is equal to :

Options

1. 13
2. 15
3. 17
4. 11

Question Type : **MCQ**
Question ID : **860654985**
Option 1 ID : **8606543353**
Option 2 ID : **8606543354**
Option 3 ID : **8606543355**
Option 4 ID : **8606543352**
Status : **Not Answered**
Chosen Option : **--**

Q.9

Let $S=\{z\in\mathbb{C}: 4z^2+\bar{z}=0\}$. Then $\sum_{z\in S}|z|^2$ is equal to :

Options

1. $\frac{7}{64}$
2. $\frac{1}{16}$
3. $\frac{5}{64}$
4. $\frac{3}{16}$

Question Type : **MCQ**
Question ID : **860654980**
Option 1 ID : **8606543335**
Option 2 ID : **8606543334**
Option 3 ID : **8606543332**
Option 4 ID : **8606543333**
Status : **Answered**
Chosen Option : **4**

Q.10 The number of elements in the relation $R = \{(x, y) : 4x^2 + y^2 < 52, x, y \in \mathbf{Z}\}$ is

Options

1. 67
2. 77
3. 86
4. 89

Question Type : **MCQ**
Question ID : **860654976**
Option 1 ID : **8606543316**
Option 2 ID : **8606543317**
Option 3 ID : **8606543318**
Option 4 ID : **8606543319**
Status : **Not Answered**
Chosen Option : **--**

Q.11 Let C_r denote the coefficient of x^r in the binomial expansion of $(1+x)^n$, $n \in \mathbf{N}$, $0 \le r \le n$. If $P_n = C_0 - C_1 + \frac{2^2}{3}C_2 - \frac{2^3}{4}C_3 + ... + \frac{(-2)^n}{n+1}C_n$, then the value of $\sum_{n=1}^{25} \frac{1}{P_{2n}}$ equals.

Options

1. 580
2. 675
3. 525
4. 650

Question Type : **MCQ**
Question ID : **860654984**
Option 1 ID : **8606543351**
Option 2 ID : **8606543348**
Option 3 ID : **8606543349**
Option 4 ID : **8606543350**
Status : **Not Answered**
Chosen Option : **--**

Q.12 Let the locus of the mid-point of the chord through the origin O of the parabola $y^2 = 4x$ be the curve S. Let P be any point on S. Then the locus of the point, which internally divides OP in the ratio 3:1, is :

Options

1. $2x^2 = 3y$
2. $2y^2 = 3x$
3. $3y^2 = 2x$
4. $3x^2 = 2y$

Question Type : **MCQ**
Question ID : **860654987**
Option 1 ID : **8606543362**
Option 2 ID : **8606543360**
Option 3 ID : **8606543361**
Option 4 ID : **8606543363**
Status : **Not Answered**
Chosen Option : **--**

Q.13 If $X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$ is a solution of the system of equations $AX = B$, where $\text{adj } A = \begin{bmatrix} 4 & 2 & 2 \\ -5 & 0 & 5 \\ 1 & -2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 4 \\ 0 \\ 2 \end{bmatrix}$, then $|x+y+z|$ is equal to :

Options

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

Question Type : **MCQ**
Question ID : **860654981**
Option 1 ID : **8606543338**
Option 2 ID : **8606543336**
Option 3 ID : **8606543339**
Option 4 ID : **8606543337**
Status : **Not Answered**
Chosen Option : **--**

Q.14

Let $[\cdot]$ denote the greatest integer function, and let $f(x) = \min\{\sqrt{2}x, x^2\}$.

Let $S = \{x \in (-2, 2) : \text{the function } g(x) = |x|[x^2] \text{ is discontinuous at } x\}$.

Then $\sum_{x \in S} f(x)$ equals

Options

1. $2 - \sqrt{2}$
2. $1 - \sqrt{2}$
3. $2\sqrt{6} - 3\sqrt{2}$
4. $\sqrt{6} - 2\sqrt{2}$

Question Type : **MCQ**
Question ID : **860654991**
Option 1 ID : **8606543376**
Option 2 ID : **8606543377**
Option 3 ID : **8606543379**
Option 4 ID : **8606543378**
Status : **Answered**
Chosen Option : **2**

Q.15

Let $f(x) = [x]^2 - [x+3] - 3$, $x \in \mathbf{R}$, where $[\cdot]$ is the greatest integer funtion. Then

Options

1. $\int_0^2 f(x)\,dx = -6$
2. $f(x) = 0$ for finitely many values of x
3. $f(x) > 0$ only for $x \in [4, \infty)$
4. $f(x) < 0$ only for $x \in [-1, 3)$

Question Type : **MCQ**
Question ID : **860654993**
Option 1 ID : **8606543387**
Option 2 ID : **8606543384**
Option 3 ID : **8606543386**
Option 4 ID : **8606543385**
Status : **Answered**
Chosen Option : **3**

Q.16

Let L be the line $\frac{x+1}{2}=\frac{y+1}{3}=\frac{z+3}{6}$ and let S be the set of all points (a, b, c) on L, whose distance from the line $\frac{x+1}{2}=\frac{y+1}{3}=\frac{z-9}{0}$ along the line L is 7. Then $\sum_{(a,b,c)\in S}(a+b+c)$ is equal to :

Options

1. 40
2. 28
3. 34
4. 6

Question Type : **MCQ**
Question ID : **860654990**
Option 1 ID : **8606543375**
Option 2 ID : **8606543373**
Option 3 ID : **8606543374**
Option 4 ID : **8606543372**
Status : **Not Answered**
Chosen Option : **--**

Q.17

The area of the region $A=\{(x, y) : 4x^2+y^2 \leq 8 \text{ and } y^2 \leq 4x\}$ is :

Options

1. $\frac{\pi}{2}+2$
2. $\pi+4$
3. $\pi+\frac{2}{3}$
4. $\frac{\pi}{2}+\frac{1}{3}$

Question Type : **MCQ**
Question ID : **860654994**
Option 1 ID : **8606543390**
Option 2 ID : **8606543391**
Option 3 ID : **8606543389**
Option 4 ID : **8606543388**
Status : **Answered**
Chosen Option : **3**

Q.18 If the mean deviation about the median of the numbers k, 2k, 3k, ..., 1000k is 500, then k^2 is equal to :

Options

1. 4
2. 1
3. 9
4. 16

Question Type : **MCQ**
Question ID : **860654983**
Option 1 ID : **8606543346**
Option 2 ID : **8606543347**
Option 3 ID : **8606543344**
Option 4 ID : **8606543345**
Status : **Answered**
Chosen Option : **2**

Q.19 Let the domain of the function $f(x) = \log_3\log_5\left(7 - \log_2\left(x^2 - 10x + 85\right)\right) + \sin^{-1}\left(\left|\frac{3x-7}{17-x}\right|\right)$ be $(\alpha, \beta]$. Then $\alpha+\beta$ is equal to :

Options

1. 8
2. 9
3. 12
4. 10

Question Type : **MCQ**
Question ID : **860654979**
Option 1 ID : **8606543328**
Option 2 ID : **8606543329**
Option 3 ID : **8606543331**
Option 4 ID : **8606543330**
Status : **Not Answered**
Chosen Option : **--**

Q.20 Let $\vec{a}=2\hat{i}-\hat{j}+\hat{k}$ and $\vec{b}=\lambda\hat{j}+2\hat{k}$, $\lambda\epsilon\mathbf{Z}$ be two vectors. Let $\vec{c}=\vec{a}\times\vec{b}$ and $\vec{d}$ be a vector of magnitude 2 in yz-plane. If $\left|\vec{c}\right|=\sqrt{53}$, then the maximum possible value of $\left(\vec{c}\cdot\vec{d}\right)^2$ is equal to :

Options

1. 208
2. 26
3. 52
4. 104

Question Type : **MCQ**
Question ID : **860654989**
Option 1 ID : **8606543371**
Option 2 ID : **8606543368**
Option 3 ID : **8606543369**
Option 4 ID : **8606543370**
Status : **Answered**
Chosen Option : **1**

Section : **Mathematics Section B**

Q.21 Let $\cos(\alpha+\beta)=-\frac{1}{10}$ and $\sin(\alpha-\beta)=\frac{3}{8}$, where $0<\alpha<\frac{\pi}{3}$ and $0<\beta<\frac{\pi}{4}$.

If $\tan2\alpha=\frac{3(1-r\sqrt{5})}{\sqrt{11}(s+\sqrt{5})}$, $r, s\epsilon\mathbf{N}$, then $r+s$ is equal to _____.

Given **--**
Answer :

Question Type : **SA**
Question ID : **860654998**
Status : **Not Answered**

Q.22 Let S be the set of the first 11 natural numbers. Then the number of elements in $A=\{B\subseteq S : n(B)\geq 2$ and the product of all elements of B is even$\}$ is _____.

Given **5111**
Answer :

Question Type : **SA**
Question ID : **860654997**
Status : **Answered**

Q.23 Let $[\cdot]$ be the greatest integer function. If $\alpha = \int_0^{64}\left(x^{1/3} - [x^{1/3}]\right)dx$, then $\frac{1}{\pi}\int_0^{\alpha\pi}\left(\frac{\sin^2\theta}{\sin^6\theta + \cos^6\theta}\right)d\theta$ is equal to _____.

Given **153**
Answer :

Question Type : **SA**
Question ID : **8606541000**
Status : **Answered**

Q.24 Suppose a, b, c are in A.P. and $a^2, 2b^2, c^2$ are in G.P. If $a < b < c$ and $a+b+c=1$, then $9(a^2+b^2+c^2)$ is equal to _____.

Given **1**
Answer :

Question Type : **SA**
Question ID : **860654996**
Status : **Answered**

Q.25 Let a vector $\vec{a} = \sqrt{2}\hat{i} - \hat{j} + \lambda\hat{k}$, $\lambda > 0$, make an obtuse angle with the vector $\vec{b} = -\lambda^2\hat{i} + 4\sqrt{2}\hat{j} + 4\sqrt{2}\hat{k}$ and an angle θ, $\frac{\pi}{6} < \theta < \frac{\pi}{2}$, with the positive z-axis. If the set of all possible values of λ is $(\alpha, \beta) - \{\gamma\}$, then $\alpha+\beta+\gamma$ is equal to _____.

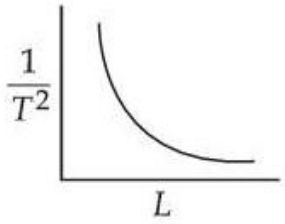
Given **5**
Answer :

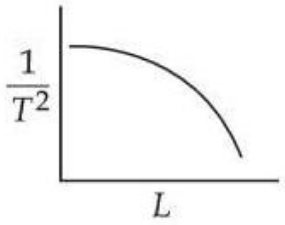
Question Type : **SA**
Question ID : **860654999**
Status : **Answered**

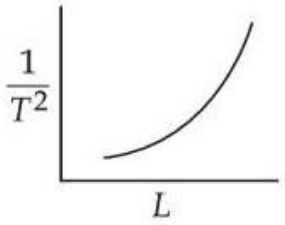
Section : **Physics Section A**

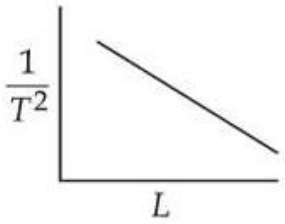
Q.26 Using a simple pendulum experiment g is determind by measuring its time period T. Which of the following plots represent the correct relation between the pendulum length L and time period T ?

Options

1. 

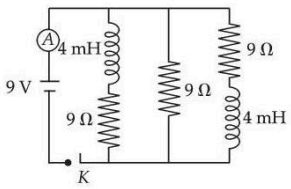
2. 

3. 

4. 

Question Type : **MCQ**
Question ID : **8606541001**
Option 1 ID : **8606543401**
Option 2 ID : **8606543403**
Option 3 ID : **8606543402**
Option 4 ID : **8606543404**
Status : **Answered**
Chosen Option : **1**

Q.27 Figure shows the circuit that contains three resistances (9 Ω each) and two inductors (4 mH each). The reading of ammeter at the moment switch K is turned ON, is _____A.



Options

1. zero
2. 2
3. 3
4. 1

Question Type : **MCQ**
Question ID : **8606541009**
Option 1 ID : **8606543436**
Option 2 ID : **8606543434**
Option 3 ID : **8606543435**
Option 4 ID : **8606543433**
Status : **Answered**
Chosen Option : **4**

Q.28 An electric power line having total resistance of 2 Ω, delivers 1 kW of power at 250 V. The percentage efficiency of transmission line is _____.

Options

1. 86.5
2. 92.5
3. 100
4. 96.9

Question Type : **MCQ**
Question ID : **8606541013**
Option 1 ID : **8606543450**
Option 2 ID : **8606543451**
Option 3 ID : **8606543449**
Option 4 ID : **8606543452**
Status : **Answered**
Chosen Option : **4**

Q.29 Light is incident on a metallic plate having work function 110×10^{-20} J. If the produced photoelectrons have zero kinetic energy then the angular frequency of the incident light is _____rad/s. ($h = 6.63 \times 10^{-34}$ J.s).

Options

1. 1.04×10^{13}
2. 1.66×10^{16}
3. 1.04×10^{16}
4. 1.66×10^{15}

Question Type : **MCQ**
Question ID : **8606541018**
Option 1 ID : **8606543469**
Option 2 ID : **8606543471**
Option 3 ID : **8606543472**
Option 4 ID : **8606543470**
Status : **Answered**
Chosen Option : **3**

Q.30 Given below are two statements :

Statement I : A satellite is moving around earth in the orbit very close to the earth surface. The time period of revolution of satellite depends upon the density of earth.

Statement II : The time period of revolution of the satellite is $T = 2\pi\sqrt{\frac{R_e}{g}}$ (for satellite very close to the earth surface), where R_e radius of earth and g acceleration due to gravity.

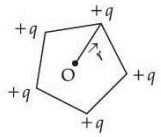
In the light of the above statements, choose the **correct** answer from the options given below :

Options

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

Question Type : **MCQ**
Question ID : **8606541006**
Option 1 ID : **8606543422**
Option 2 ID : **8606543421**
Option 3 ID : **8606543423**
Option 4 ID : **8606543424**
Status : **Answered**
Chosen Option : **2**

Q.31 Five positive charges each having charge q are placed at the vertices of a pentagon as shown in the figure. The electric potential (V) and the electric field $(\vec{E})$ at the center O of the pentagon due to these five positive charges are :



Options

1. $V=\frac{5q}{4\pi\varepsilon_0 r}$ and $\vec{E}=0$

2. $V=0$ and $\vec{E}=0$

3. $V=\frac{5q}{4\pi\varepsilon_0 r}$ and $\vec{E}=\frac{5q}{4\pi\varepsilon_0 r^2}\hat{r}$

4. $V=\frac{5q}{4\pi\varepsilon_0 r}$ and $\vec{E}=\frac{5\sqrt{3}q}{8\pi\varepsilon_0 r^2}\hat{r}$

Question Type : **MCQ**
Question ID : **8606541012**
Option 1 ID : **8606543447**
Option 2 ID : **8606543445**
Option 3 ID : **8606543446**
Option 4 ID : **8606543448**
Status : **Answered**
Chosen Option : **1**

Q.32 When a part of a straight capillary tube is placed vertically in a liquid, the liquid raises upto certain height h. If the inner radius of the capillary tube, density of the liquid and surface tension of the liquid decrease by 1% each, then the height of the liquid in the tube will change by _____ %.

Options

1. $+1$
2. -3
3. -1
4. $+3$

Question Type : **MCQ**
Question ID : **8606541007**
Option 1 ID : **8606543425**
Option 2 ID : **8606543428**
Option 3 ID : **8606543426**
Option 4 ID : **8606543427**
Status : **Answered**
Chosen Option : **4**

Q.33 The smallest wavelength of Lyman series is 91 nm. The difference between the largest wavelengths of *Paschen* and *Balmer* series is nearly _____ nm.

Options

1. 1875
2. 1550
3. 1217
4. 1784

Question Type : **MCQ**
Question ID : **8606541019**
Option 1 ID : **8606543474**
Option 2 ID : **8606543473**
Option 3 ID : **8606543476**
Option 4 ID : **8606543475**
Status : **Answered**
Chosen Option : **3**

Q.34 Given below are two statements :

Statement I : For a mechanical system of many particles total kinetic energy is the sum of kinetic energies of all the particles.

Statement II : The total kinetic energy can be the sum of kinetic energy of the center of mass w.r.t to the origin and the kinetic energy of all the particles w.r.t. the center of mass as the reference.

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

Question Type : **MCQ**
Question ID : **8606541005**
Option 1 ID : **8606543418**
Option 2 ID : **8606543417**
Option 3 ID : **8606543419**
Option 4 ID : **8606543420**
Status : **Answered**
Chosen Option : **3**

Q.35 If ϵ, E and t represent the free space permittivity, electric field and time respectively, then the unit of $\frac{\epsilon E}{t}$ will be :

Options

1. Am
2. A/m
3. A/m^2
4. Am^2

Question Type : **MCQ**
Question ID : **8606541002**
Option 1 ID : **8606543407**
Option 2 ID : **8606543408**
Option 3 ID : **8606543405**
Option 4 ID : **8606543406**
Status : **Answered**
Chosen Option : **3**

Q.36 In an open organ pipe ν_3 and ν_6 are 3^{rd} and 6^{th} harmonic frequencies, respectively. If $\nu_6 - \nu_3 = 2200$ Hz then length of the pipe is _____ mm . (Take velocity of sound in air is 330 m/s.)

Options

1. 275
2. 250
3. 200
4. 225

Question Type : **MCQ**
Question ID : **8606541011**
Option 1 ID : **8606543444**
Option 2 ID : **8606543443**
Option 3 ID : **8606543441**
Option 4 ID : **8606543442**
Status : **Answered**
Chosen Option : **4**

Q.37 In parallax method for the determination of focal length of a concave mirror, the object should always be placed :

Options

1. at any point beyond the focus(F) of the mirror
2. beyond the centre of the curvature(C) of the mirror ONLY
3. between the focus(F) and the centre of curvature(C) of the mirror ONLY
4. between the pole(P) and the focus(F) of the concave mirror ONLY

Question Type : **MCQ**
Question ID : **8606541016**
Option 1 ID : **8606543464**
Option 2 ID : **8606543463**
Option 3 ID : **8606543462**
Option 4 ID : **8606543461**
Status : **Answered**
Chosen Option : **1**

Q.38 Given below are two statements :

Statement I : An object moves from position r_1 to position r_2 under a conservative force field $\vec{F}$.

The work done by the force is $W = -\int_{r_1}^{r_2} \vec{F} \cdot \vec{dr}$.

Statement II : Any object moving from one location to another location can follow infinite number of paths. Therefore, the amount of work done by the object changes with the path it follows for a conservative force.

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

Question Type : **MCQ**
Question ID : **8606541004**
Option 1 ID : **8606543414**
Option 2 ID : **8606543415**
Option 3 ID : **8606543416**
Option 4 ID : **8606543413**
Status : **Answered**
Chosen Option : **3**

Q.39 A laser beam has intensity of 4.0×10^{14} W/m^2. The amplitude of magnetic field associated with beam is _____T. (Take $\epsilon_0 = 8.85 \times 10^{-12}$ C^2/Nm^2 and c = 3×10^8 m/s)

Options

1. 1.83
2. 18.3
3. 5.5
4. 2.0

Question Type : **MCQ**
Question ID : **8606541014**
Option 1 ID : **8606543455**
Option 2 ID : **8606543454**
Option 3 ID : **8606543453**
Option 4 ID : **8606543456**
Status : **Answered**
Chosen Option : **1**

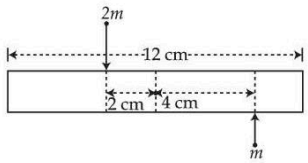
Q.40 Consider two boxes containing ideal gases A and B such that their temperatures, pressures and number densities are same. The molecular size of A is half of that of B and mass of molecule A is four times that of B. If the collision frequency in gas B is 32×10^{18}/s then collision frequency in gas A is _____/s.

Options

1. 32×10^{8}
2. 2×10^{8}
3. 8×10^{8}
4. 4×10^{8}

Question Type : **MCQ**
Question ID : **8606541010**
Option 1 ID : **8606543440**
Option 2 ID : **8606543437**
Option 3 ID : **8606543439**
Option 4 ID : **8606543438**
Status : **Answered**
Chosen Option : **3**

Q.41 A uniform bar of length 12 cm and mass 20 m lies on a smooth horizontal table. Two point masses m and $2m$ are moving in opposite directions with same speed of v and in the same plane as the bar, as shown in figure. These masses strike the bar simultaneously and get stuck to it. After collision the entire system is rotating with angular frequency ω. The ratio of v and ω is :



Options

1. 33
2. 66
3. 32
4. $2\sqrt{88}$

Question Type : **MCQ**
Question ID : **8606541003**
Option 1 ID : **8606543410**
Option 2 ID : **8606543412**
Option 3 ID : **8606543409**
Option 4 ID : **8606543411**
Status : **Answered**
Chosen Option : **1**

Q.42 Three small identical bubbles of water having same charge on each coalesce to form a bigger bubble. Then the ratio of the potentials on one initial bubble and that on the resultant bigger bubble is :

Options

1. $1:3^{1/3}$
2. $3^{2/3}:1$
3. $1:3^{2/3}$
4. $1:2^{2/3}$

Question Type : **MCQ**
Question ID : **8606541008**
Option 1 ID : **8606543430**
Option 2 ID : **8606543432**
Option 3 ID : **8606543429**
Option 4 ID : **8606543431**
Status : **Answered**
Chosen Option : **3**

Q.43 The wavelength of light, while it is passing through water is 540 nm. The refractive index of water is $4/3$. The wavelength of the same light when it is passing through a transparent medium having refractive index of $3/2$ is _____ nm.

Options

1. 540
2. 480
3. 840
4. 380

Question Type : **MCQ**
Question ID : **8606541015**
Option 1 ID : **8606543459**
Option 2 ID : **8606543457**
Option 3 ID : **8606543458**
Option 4 ID : **8606543460**
Status : **Answered**
Chosen Option : **2**

Q.44 Which of the following are true for a single slit diffraction ?

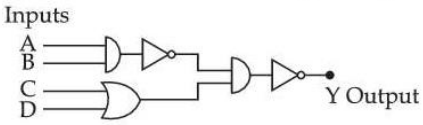
A. Width of central maxima increases with increase in wavelength keeping slit width constant.
B. Width of central maxima increases with decrease in wavelength keeping slit width constant.
C. Width of central maxima increases with decrease in slit width at constant wavelength.
D. Width of central maxima increases with increase in slit width at constant wavelength.
E. Brightness of central maxima increases for decrease in wavelength at constant slit width.

Options

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

Question Type : **MCQ**
Question ID : **8606541017**
Option 1 ID : **8606543466**
Option 2 ID : **8606543468**
Option 3 ID : **8606543465**
Option 4 ID : **8606543467**
Status : **Not Answered**
Chosen Option : **--**

Q.45 The correct truth table for the given input data of the following logic gate is :



Options

1.

Inputs				Output
A	B	C	D	Y
1	1	0	1	1
0	0	1	1	0
1	0	1	0	1
1	1	1	1	0

2.

Inputs				Output
A	B	C	D	Y
1	1	0	1	0
0	0	1	1	1
1	0	1	0	1
1	1	1	1	1

3.

Inputs				Output
A	B	C	D	Y
1	1	0	1	0
0	0	1	1	0
1	0	1	0	1
1	1	1	1	1

4.

Inputs				Output
A	B	C	D	Y
1	1	0	1	1
0	0	1	1	0
1	0	1	0	0
1	1	1	1	1

Question Type : **MCQ**
Question ID : **8606541020**
Option 1 ID : **8606543477**
Option 2 ID : **8606543480**
Option 3 ID : **8606543478**
Option 4 ID : **8606543479**
Status : **Answered**
Chosen Option : **4**

Section : **Physics Section B**

Q.46 A conducting circular loop is rotated about its diameter at a constant angular speed of 100 rad/s in a magnetic field of 0.5 T perpendicular to the axis of rotation. When the loop is rotated by 30° from the horizontal position, the induced EMF is 15.4 mV. The radius of the loop is _____ mm.

$\left(\text{Take } \pi = \frac{22}{7}\right)$

Given **14**
Answer :

Question Type : **SA**
Question ID : **8606541025**
Status : **Answered**

Q.47 Two masses m and 2m are connected by a light string going over a pulley (disc) of mass 30m with radius $r = 0.1$ m. The pulley is mounted in a vertical plane and it is free to rotate about its axis. The 2m mass is released from rest and its speed when it has descended through a height of 3.6 m is _____ m/s. (Assume string does not slip and $g = 10\ m/s^2$)

Given **2**
Answer :

Question Type : **SA**
Question ID : **8606541021**
Status : **Answered**

Q.48 An insulated cylinder of volume 60 cm^3 is filled with a gas at 27 °C and 2 atmospheric pressure. Then the gas is compressed making the final volume as 20 cm^3 while allowing the temperature to rise to 77 °C. The final pressure is _____ atmospheric pressure.

Given **7**
Answer :

Question Type : **SA**
Question ID : **8606541024**
Status : **Answered**

Q.49 A capacitor P with capacitance 10×10^{-6} F is fully charged with a potential difference of 6.0 V and disconnected from the battery. The charged capacitor P is connected across another capacitor Q with capacitance 20×10^{-6} F. The charge on capacitor Q when equilibrium is established will be $\alpha \times 10^{-5}$ C (assume capacitor Q does not have any charge initially), the value of α is _____.

Given **4**
Answer :

Question Type : **SA**
Question ID : **8606541022**
Status : **Answered**

Q.50 A cylindrical conductor of length 2 m and area of cross-section 0.2 mm^2 carries an electric current of 1.6 A when its ends are connected to a 2 V battery. Mobility of electrons in the conductor is $\alpha \times 10^{-3}$ $m^2/V.s$. The value of α is :
(electron concentration $= 5 \times 10^{28}/m^3$ and electron charge $= 1.6 \times 10^{-19}$ C)

Given **1**
Answer :

Question Type : **SA**
Question ID : **8606541023**
Status : **Answered**

Section : **Chemistry Section A**

Q.51 $[Ni(PPh_3)_2Cl_2]$ is a paramagnetic complex. Identify the **INCORRECT** statements about this complex.

A. The complex exhibits geometrical isomerism.

B. The complex is white in colour.

C. The calculated spin-only magnetic moment of the complex is 2.84 BM.

D. The calculated CFSE (Crystal Field Stabilization Energy) of Ni in this complex is $-0.8\ \Delta_o$.

E. The geometrical arrangement of ligands in this complex is similar to that in $Ni(CO)_4$.

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

Options

1. A, B and D Only

2. C, D and E Only

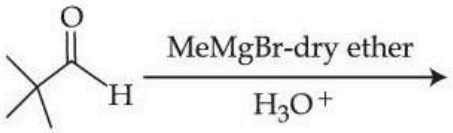
3. C and D Only

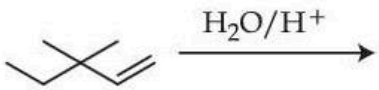
4. A and B Only

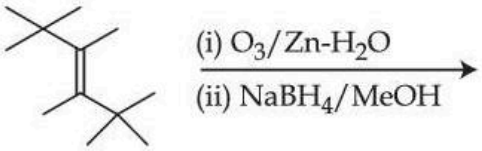
Question Type : **MCQ**
Question ID : **8606541036**
Option 1 ID : **8606543526**
Option 2 ID : **8606543529**
Option 3 ID : **8606543527**
Option 4 ID : **8606543528**
Status : **Answered**
Chosen Option : **2**

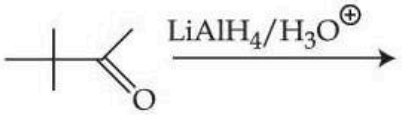
Q.52

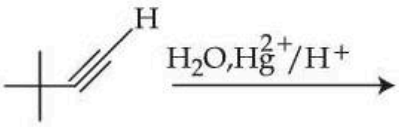
3, 3-Dimethyl-2-butanol **cannot** be prepared by :

A. 

B. 

C. 

D. 

E. 

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

Options

1. B, C and E Only
2. B Only
3. B and E Only
4. B and C Only

Question Type : **MCQ**
Question ID : **8606541043**
Option 1 ID : **8606543556**
Option 2 ID : **8606543555**
Option 3 ID : **8606543557**
Option 4 ID : **8606543554**
Status : **Answered**
Chosen Option : **1**

Q.53 Identify the **correct** statements :

A. Hydrated salts can be used as primary standard.

B. Primary standard should not undergo any reaction with air.

C. Reactions of primary standard with another substance should be instantaneous and stoichiometric.

D. Primary standard should not be soluble in water.

E. Primary standard should have low relative molar mass.

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

Options

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

Question Type : **MCQ**
Question ID : **8606541037**
Option 1 ID : **8606543530**
Option 2 ID : **8606543532**
Option 3 ID : **8606543531**
Option 4 ID : **8606543533**
Status : **Answered**
Chosen Option : **4**

Q.54 Which of the following mixture gives a buffer solution with pH = 9.25 ?
Given : $pK_b\ (NH_4OH) = 4.75$

Options

1. 0.4 M NH_4OH (1 L) + 0.1 M HCl (1 L)
2. 0.2 M NH_4OH (0.5 L) + 0.1 M HCl (0.5 L)
3. 0.5 M NH_4OH (0.2 L) + 0.2 M HCl (0.5 L)
4. 0.2 M NH_4OH (0.4 L) + 0.1 M HCl (1 L)

Question Type : **MCQ**
Question ID : **8606541029**
Option 1 ID : **8606543498**
Option 2 ID : **8606543500**
Option 3 ID : **8606543501**
Option 4 ID : **8606543499**
Status : **Answered**
Chosen Option : **2**

Q.55 When 1 g of compound (X) is subjected to Kjeldahl's method for estimation of nitrogen, 15 mL 1 M H_2SO_4 was neutralized by ammonia evolved. The percentage of nitrogen in compound (X) is :

Options

1. 21
2. 42
3. 0.42
4. 0.21

Question Type : **MCQ**
Question ID : **8606541038**
Option 1 ID : **8606543535**
Option 2 ID : **8606543536**
Option 3 ID : **8606543537**
Option 4 ID : **8606543534**
Status : **Not Answered**
Chosen Option : **--**

Q.56 Consider the following reduction processes :

$Al^{3+} + 3e^- \longrightarrow Al(s), E^o = -1.66\ V$

$Fe^{3+} + e^- \longrightarrow Fe^{2+}, E^o = +0.77\ V$

$Co^{3+} + e^- \longrightarrow Co^{2+}, E^o = +1.81\ V$

$Cr^{3+} + 3e^- \longrightarrow Cr(s), E^o = -0.74\ V$

The tendency to act as reducing agent decreases in the order :

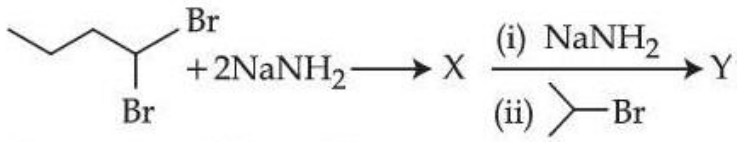
Options

1. $Cr > Fe^{2+} > Al > Co^{2+}$
2. $Al > Cr > Co^{2+} > Fe^{2+}$
3. $Al > Cr > Fe^{2+} > Co^{2+}$
4. $Al > Fe^{2+} > Cr > Co^{2+}$

Question Type : **MCQ**
Question ID : **8606541030**
Option 1 ID : **8606543505**
Option 2 ID : **8606543502**
Option 3 ID : **8606543503**
Option 4 ID : **8606543504**
Status : **Answered**
Chosen Option : **3**

Q.57

Consider the following reaction :



The product Y formed is :

Options

1. 5-methylhex-2-yne
2. 2-methylhex-3-yne
3. Isopropylbut-1-yne
4. 2-methylhex-2-yne

Question Type : **MCQ**
Question ID : **8606541040**
Option 1 ID : **8606543542**
Option 2 ID : **8606543543**
Option 3 ID : **8606543545**
Option 4 ID : **8606543544**
Status : **Answered**
Chosen Option : **2**

Q.58 $A + 2B \longrightarrow AB_2$

36.0 g of 'A' (Molar mass : 60 g mol^{-1}) and 56.0 g of 'B' (Molar mass : 80 g mol^{-1}) are allowed to react. Which of the following statements are **correct** ?

A. 'A' is the limiting reagent.

B. 77.0 g of AB_2 is formed.

C. Molar mass of AB_2 is 140 g mol^{-1}.

D. 15.0 g of A is left unreacted after the completion of reaction.

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

Options

1. A and B Only
2. A and C Only
3. C and D Only
4. B and D Only

Question Type : **MCQ**
Question ID : **8606541026**
Option 1 ID : **8606543486**
Option 2 ID : **8606543489**
Option 3 ID : **8606543488**
Option 4 ID : **8606543487**
Status : **Answered**
Chosen Option : **4**

Q.59 The compound A, $C_8H_8O_2$ reacts with acetophenone to form a single product via cross-Aldol condensation. The compound A on reaction with conc. NaOH forms a substituted benzyl alcohol as one of the two products. The compound A is :

Options

1. 2-hydroxy acetophenone
2. 4-methoxy benzaldehyde
3. 4-methyl benzoic acid
4. 4-hydroxy benzylaldehyde

Question Type : **MCQ**
Question ID : **8606541042**
Option 1 ID : **8606543552**
Option 2 ID : **8606543550**
Option 3 ID : **8606543553**
Option 4 ID : **8606543551**
Status : **Not Answered**
Chosen Option : **--**

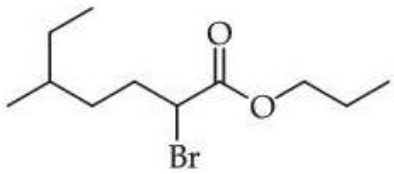
Q.60 The energy of first (lowest) Balmer line of H atom is x J. The energy (in J) of second Balmer line of H atom is :

Options

1. $2x$
2. $\frac{x}{1.35}$
3. x^2
4. $1.35x$

Question Type : **MCQ**
Question ID : **8606541027**
Option 1 ID : **8606543490**
Option 2 ID : **8606543492**
Option 3 ID : **8606543493**
Option 4 ID : **8606543491**
Status : **Answered**
Chosen Option : **4**

Q.61 The IUPAC name of the following compound is :



Options

1. 2-bromo-5-methylhexylpropanoate
2. 2-bromo-5-methylpropanoate
3. n-propyl-1-bromo-4-methylhexanoate
4. n-propyl-2-bromo-5-methylheptanoate

Question Type : **MCQ**
Question ID : **8606541039**
Option 1 ID : **8606543541**
Option 2 ID : **8606543538**
Option 3 ID : **8606543540**
Option 4 ID : **8606543539**
Status : **Answered**
Chosen Option : **4**

Q.62 Match **List - I** with **List - II**.

	List - I Reaction of Glucose with		**List - II** Product formed
A.	Hydroxylamine	I.	Gluconic acid
B.	Br_2 water	II.	Glucose pentacetate
C.	Excess acetic anhydride	III.	Saccharic acid
D.	Concentrated HNO_3	IV.	Glucoxime

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

Options

1. A-IV, B-III, C-II, D-I
2. A-IV, B-I, C-II, D-III
3. A-III, B-I, C-IV, D-II
4. A-I, B-III, C-IV, D-II

Question Type : **MCQ**
Question ID : **8606541045**
Option 1 ID : **8606543563**
Option 2 ID : **8606543562**
Option 3 ID : **8606543564**
Option 4 ID : **8606543565**
Status : **Answered**
Chosen Option : **1**

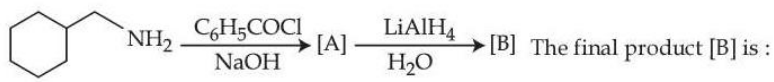
Q.63 At T(K), 100 g of 98% H_2SO_4 (w/w) aqueous solution is mixed with 100 g of 49% H_2SO_4 (w/w) aqueous solution. What is the mole fraction of H_2SO_4 in the resultant solution ?
(Given : Atomic mass H = 1 u ; S = 32 u ; O = 16 u).
(Assume that temperature after mixing remains constant)

Options

1. 0.1
2. 0.9
3. 0.337
4. 0.663

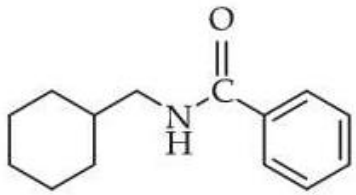
Question Type : **MCQ**
Question ID : **8606541028**
Option 1 ID : **8606543495**
Option 2 ID : **8606543496**
Option 3 ID : **8606543497**
Option 4 ID : **8606543494**
Status : **Answered**
Chosen Option : **3**

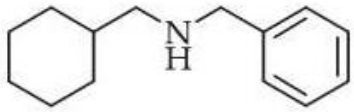
Q.64

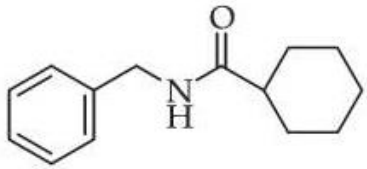


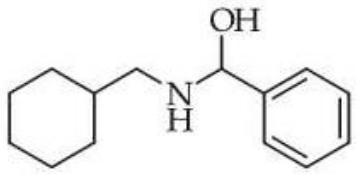
The final product [B] is :

Options

1. 

2. 

3. 

4. 

Question Type :	**MCQ**
Question ID :	**8606541044**
Option 1 ID :	**8606543559**
Option 2 ID :	**8606543561**
Option 3 ID :	**8606543558**
Option 4 ID :	**8606543560**
Status :	**Answered**
Chosen Option :	**2**

Q.65 Given below are two statements :

Statement I : Elements 'X' and 'Y' are the most and least electronegative elements, respectively among N, As, Sb and P. The nature of the oxides X_2O_3 and Y_2O_3 is acidic and amphoteric, respectively.

Statement II : BCl_3 is covalent in nature and gets hydrolysed in water. It produces $[B(OH)_4]^-$ and $[B(H_2O)_6]^{3+}$ in aqueous medium.

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

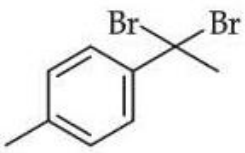
Options

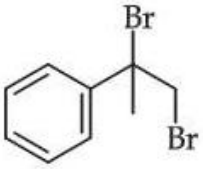
1. **Statement I** is false but **Statement II** is true
2. Both **Statement I** and **Statement II** are false
3. **Statement I** is true but **Statement II** is false
4. Both **Statement I** and **Statement II** are true

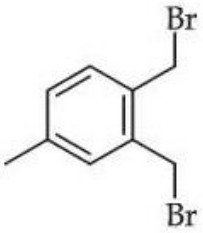
Question Type : **MCQ**
Question ID : **8606541034**
Option 1 ID : **8606543521**
Option 2 ID : **8606543519**
Option 3 ID : **8606543520**
Option 4 ID : **8606543518**
Status : **Answered**
Chosen Option : **4**

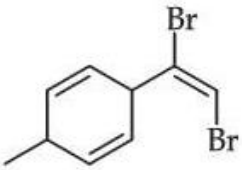
Q.66 The dibromo compound [P] (molecular formula : $C_9H_{10}Br_2$) when heated with excess sodamide followed by treatment with dilute HCl gives [Q]. On warming [Q] with mercuric sulphate and dilute sulphuric acid yield [R] which gives positive Iodoform test but negative Tollen's test. The compound [P] is :

Options

1. 

2. 

3. 

4. 

Question Type : **MCQ**
Question ID : **8606541041**
Option 1 ID : **8606543547**
Option 2 ID : **8606543546**
Option 3 ID : **8606543548**
Option 4 ID : **8606543549**
Status : **Answered**
Chosen Option : **1**

Q.67 Correct statements regarding Arrhenius equation among the following are :

A. Factor $e^{-Ea/RT}$ corresponds to fraction of molecules having kinetic energy less than Ea.

B. At a given temperature, lower the Ea, faster is the reaction.

C. Increase in temperature by about 10°C doubles the rate of reaction.

D. Plot of log k vs $\frac{1}{T}$ gives a straight line with slope $= -\frac{Ea}{R}$.

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

Options

1. B and C Only
2. A and C Only
3. A and B Only
4. B and D Only

Question Type : **MCQ**
Question ID : **8606541031**
Option 1 ID : **8606543508**
Option 2 ID : **8606543506**
Option 3 ID : **8606543509**
Option 4 ID : **8606543507**
Status : **Answered**
Chosen Option : **1**

Q.68 Given below are two statements :

Statement I : The first ionization enthalpy of Cr is lower than that of Mn.

Statement II : The second and third ionization enthalpies of Cr are higher than those of Mn.

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

Question Type : **MCQ**
Question ID : **8606541035**
Option 1 ID : **8606543522**
Option 2 ID : **8606543525**
Option 3 ID : **8606543524**
Option 4 ID : **8606543523**
Status : **Answered**
Chosen Option : **1**

Q.69 Given below are two statements :

Statement I : C < O < N < F is the correct order in terms of first ionization enthalpy values.

Statement II : S > Se > Te > Po > O is the correct order in terms of the magnitude of electron gain enthalpy values.

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

Question Type : **MCQ**
Question ID : **8606541033**
Option 1 ID : **8606543515**
Option 2 ID : **8606543517**
Option 3 ID : **8606543516**
Option 4 ID : **8606543514**
Status : **Answered**
Chosen Option : **4**

Q.70 Among H_2S, H_2O, NF_3, NH_3 and $CHCl_3$, identify the molecule (X) with lowest dipole moment value. The number of lone pairs of electrons present on the central atom of the molecule (X) is :

Options

1. 0
2. 3
3. 2
4. 1

Question Type : **MCQ**
Question ID : **8606541032**
Option 1 ID : **8606543510**
Option 2 ID : **8606543513**
Option 3 ID : **8606543512**
Option 4 ID : **8606543511**
Status : **Answered**
Chosen Option : **4**

Section : **Chemistry Section B**

Q.71 Among the following oxides of 3d elements, the number of mixed oxides are _____.
Ti_2O_3, V_2O_4, Cr_2O_3, Mn_3O_4, Fe_3O_4, Fe_2O_3, Co_3O_4

Given **3**
Answer :

Question Type : **SA**
Question ID : **8606541049**
Status : **Answered**

Q.72 If the enthalpy of sublimation of Li is 155 kJ mol^{-1}, enthalpy of dissociation of F_2 is 150 kJ mol^{-1}, ionization enthalpy of Li is 520 kJ mol^{-1}, electron gain enthalpy of F is -313 kJ mol^{-1}, standard enthalpy of formation of LiF is -594 kJ mol^{-1}. The magnitude of lattice enthalpy of LiF is _____ kJ mol^{-1}. (Nearest Integer)

Given **1507**
Answer :

Question Type : **SA**
Question ID : **8606541046**
Status : **Answered**

Q.73 The mass of benzanilide obtained from the benzoylation reaction of 5.8 g of aniline, if yield of product is 82%, is _____ g (nearest integer).
(Given molar mass in g mol^{-1} H : 1, C : 12, N : 14, O : 16)

Given **--**
Answer :

Question Type : **SA**
Question ID : **8606541050**
Status : **Not Answered**

Q.74 Consider A $\xrightarrow{k_1}$ B and C $\xrightarrow{k_2}$ D are two reactions. If the rate constant (k_1) of the A $\longrightarrow$ B reaction can be expressed by the following equation $\log_{10} k = 14.34 - \frac{1.5\times10^4}{T/K}$ and activation energy of C $\longrightarrow$ D reaction (Ea_2) is $\frac{1}{5}$th of the A $\longrightarrow$ B reaction (Ea_1), then the value of (Ea_2) is _____ kJ mol^{-1}. (Nearest Integer)

Given **14**
Answer :

Question Type : **SA**
Question ID : **8606541048**
Status : **Answered**

Q.75 Consider the following electrochemical cell :

$Pt \mid O_2(g)(1bar) \mid HCl(aq) \parallel M^{2+}(aq, 1.0\,M) \mid M(s)$

The pH above which, oxygen gas would start to evolve at anode is _____ (nearest integer).

Given :
- $E^{o}_{M^{2+}/M} = 0.994\,V$
- $E^{o}_{O_2/H_2O} = 1.23\,V$

} standard reduction potential

and $\frac{RT}{F}(2.303) = 0.059\,V$ at the given condition

Given **4**
Answer :

Question Type : **SA**
Question ID : **8606541047**
Status : **Answered**

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