JEE MAINS PAPER 1 2025

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Test Date	28/01/2025
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Subject	B. Tech

Section : **Mathematics Section A**

Q.1 If $\alpha+i\beta$ and $\gamma+i\delta$ are the roots of $x^2-(3-2i)x-(2i-2)=0$, $i=\sqrt{-1}$, then $\alpha\gamma+\beta\delta$ is equal to :

Options

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

Question Type : **MCQ**
Question ID : **656445679**
Option 1 ID : **6564452311**
Option 2 ID : **6564452310**
Option 3 ID : **6564452308**
Option 4 ID : **6564452309**
Status : **Answered**
Chosen Option : **4**

Q.2

If $\sum_{r=1}^{13}\left\{\frac{1}{\sin\left(\frac{\pi}{4}+(r-1)\frac{\pi}{6}\right)\sin\left(\frac{\pi}{4}+\frac{r\pi}{6}\right)}\right\}=a\sqrt{3}+b$, $a, b \in \mathbf{Z}$, then a^2+b^2 is equal to :

Options

1. 2
2. 8
3. 10
4. 4

Question Type : **MCQ**
Question ID : **656445688**
Option 1 ID : **6564452344**
Option 2 ID : **6564452347**
Option 3 ID : **6564452346**
Option 4 ID : **6564452345**
Status : **Not Answered**
Chosen Option : **--**

Q.3 Let A, B, C be three points in xy-plane, whose position vector are given by $\sqrt{3}\hat{i}+\hat{j}, \hat{i}+\sqrt{3}\hat{j}$ and $a\hat{i}+(1-a)\hat{j}$ respectively with respect to the origin O. If the distance of the point C from the line bisecting the angle between the vectors $\overrightarrow{OA}$ and $\overrightarrow{OB}$ is $\frac{9}{\sqrt{2}}$, then the sum of all the possible values of a is :

Options

1. 1
2. 2
3. $9/2$
4. 0

Question Type : **MCQ**
Question ID : **656445689**
Option 1 ID : **6564452350**
Option 2 ID : **6564452349**
Option 3 ID : **6564452348**
Option 4 ID : **6564452351**
Status : **Answered**
Chosen Option : **3**

Q.4

If the midpoint of a chord of the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$ is $\left(\sqrt{2}, \frac{4}{3}\right)$, and the length of the chord is $\frac{2\sqrt{\alpha}}{3}$, then α is :

Options

1. 18
2. 22
3. 26
4. 20

Question Type : **MCQ**
Question ID : **656445686**
Option 1 ID : **6564452336**
Option 2 ID : **6564452338**
Option 3 ID : **6564452339**
Option 4 ID : **6564452337**
Status : **Answered**
Chosen Option : **3**

Q.5 The area of the region bounded by the curves $x(1+y^2)=1$ and $y^2=2x$ is:

Options

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

Question Type : **MCQ**
Question ID : **656445695**
Option 1 ID : **6564452375**
Option 2 ID : **6564452374**
Option 3 ID : **6564452373**
Option 4 ID : **6564452372**
Status : **Answered**
Chosen Option : **4**

Q.6 Let $f : \mathbf{R} \to \mathbf{R}$ be a twice differentiable function such that $f(2)=1$. If $F(x) = xf(x)$ for all $x \in \mathbf{R}$, $\int_0^2 x\, F'(x)dx = 6$ and $\int_0^2 x^2\, F''(x)dx = 40$, then $F'(2) + \int_0^2 F(x)dx$ is equal to :

Options

1. 11
2. 15
3. 13
4. 9

Question Type : **MCQ**
Question ID : **656445692**
Option 1 ID : **6564452361**
Option 2 ID : **6564452363**
Option 3 ID : **6564452362**
Option 4 ID : **6564452360**
Status : **Not Answered**
Chosen Option : **--**

Q.7 Bag B_1 contains 6 white and 4 blue balls, Bag B_2 contains 4 white and 6 blue balls, and Bag B_3 contains 5 white and 5 blue balls. One of the bags is selected at random and a ball is drawn from it. If the ball is white, then the probability, that the ball is drawn from Bag B_2, is :

Options

1. $\frac{2}{3}$
2. $\frac{2}{5}$
3. $\frac{1}{3}$
4. $\frac{4}{15}$

Question Type : **MCQ**
Question ID : **656445684**
Option 1 ID : **6564452331**
Option 2 ID : **6564452329**
Option 3 ID : **6564452330**
Option 4 ID : **6564452328**
Status : **Answered**
Chosen Option : **1**

Q.8

For positive integers n, if $4a_n = (n^2 + 5n + 6)$ and $S_n = \sum_{k=1}^{n} \left(\frac{1}{a_k}\right)$, then the value of $507\ S_{2025}$ is :

Options

1. 675
2. 540
3. 135
4. 1350

Question Type : **MCQ**
Question ID : **656445681**
Option 1 ID : **6564452318**
Option 2 ID : **6564452317**
Option 3 ID : **6564452316**
Option 4 ID : **6564452319**
Status : **Not Answered**
Chosen Option : **--**

Q.9 Let the coefficients of three consecutive terms T_r, T_{r+1} and T_{r+2} in the binomial expansion of $(a+b)^{12}$ be in a G.P. and let p be the number of all possible values of r. Let q be the sum of all rational terms in the binomial expansion of $\left(\sqrt[4]{3}+\sqrt[3]{4}\right)^{12}$. Then $p+q$ is equal to :

Options

1. 287
2. 295
3. 299
4. 283

Question Type : **MCQ**
Question ID : **656445682**
Option 1 ID : **6564452322**
Option 2 ID : **6564452321**
Option 3 ID : **6564452323**
Option 4 ID : **6564452320**
Status : **Not Answered**
Chosen Option : **--**

Q.10

If $f(x) = \int \frac{1}{x^{1/4}(1+x^{1/4})} dx$, $f(0) = -6$, then $f(1)$ is equal to :

Options

1. $2 - \log_e 2$
2. $\log_e 2 + 2$
3. $4(\log_e 2 + 2)$
4. $4(\log_e 2 - 2)$

Question Type : **MCQ**
Question ID : **656445694**
Option 1 ID : **6564452369**
Option 2 ID : **6564452371**
Option 3 ID : **6564452368**
Option 4 ID : **6564452370**
Status : **Not Answered**
Chosen Option : **--**

Q.11

The square of the distance of the point $\left(\frac{15}{7}, \frac{32}{7}, 7\right)$ from the line $\frac{x+1}{3} = \frac{y+3}{5} = \frac{z+5}{7}$ in the direction of the vector $\hat{i} + 4\hat{j} + 7\hat{k}$ is :

Options

1. 41
2. 54
3. 44
4. 66

Question Type : **MCQ**
Question ID : **656445691**
Option 1 ID : **6564452356**
Option 2 ID : **6564452358**
Option 3 ID : **6564452357**
Option 4 ID : **6564452359**
Status : **Answered**
Chosen Option : **4**

Q.12

Let f be a real valued continuous function defined on the positive real axis such that $g(x) = \int_0^x t\, f(t)\, dt$.

If $g(x^3) = x^6 + x^7$, then value of $\sum_{r=1}^{15} f(r^3)$ is :

Options

1. 340
2. 310
3. 270
4. 320

Question Type : **MCQ**
Question ID : **656445693**
Option 1 ID : **6564452364**
Option 2 ID : **6564452365**
Option 3 ID : **6564452366**
Option 4 ID : **6564452367**
Status : **Not Answered**
Chosen Option : **--**

Q.13 Let $f : [0, 3] \to A$ be defined by $f(x) = 2x^3 - 15x^2 + 36x + 7$ and $g : [0, \infty) \to B$ be defined by $g(x) = \frac{x^{2025}}{x^{2025} + 1}$. If both the functions are onto and $S = \{x \in \mathbf{Z} : x \in A \text{ or } x \in B\}$, then n(S) is equal to :

Options

1. 30
2. 29
3. 31
4. 36

Question Type : **MCQ**
Question ID : **656445677**
Option 1 ID : **6564452302**
Option 2 ID : **6564452303**
Option 3 ID : **6564452301**
Option 4 ID : **6564452300**
Status : **Not Answered**
Chosen Option : **--**

Q.14 Let $[x]$ denote the greatest integer less than or equal to x. Then the domain of $f(x)=\sec^{-1}(2[x]+1)$ is :

Options

1. $(-\infty, -1]\cup[1, \infty)$
2. $(-\infty, \infty)$
3. $(-\infty, \infty)-\{0\}$
4. $(-\infty, -1]\cup[0, \infty)$

Question Type : **MCQ**
Question ID : **656445676**
Option 1 ID : **6564452299**
Option 2 ID : **6564452296**
Option 3 ID : **6564452297**
Option 4 ID : **6564452298**
Status : **Not Answered**
Chosen Option : **--**

Q.15 If the components of $\vec{a} = \alpha\hat{i} + \beta\hat{j} + \gamma\hat{k}$ along and perpendicular to $\vec{b} = 3\hat{i} + \hat{j} - \hat{k}$ respectively, are

$\frac{16}{11}\left(3\hat{i} + \hat{j} - \hat{k}\right)$ and $\frac{1}{11}\left(-4\hat{i} - 5\hat{j} - 17\hat{k}\right)$, then $\alpha^2 + \beta^2 + \gamma^2$ is equal to :

Options

1. 23
2. 16
3. 18
4. 26

Question Type : **MCQ**
Question ID : **656445690**
Option 1 ID : **6564452354**
Option 2 ID : **6564452352**
Option 3 ID : **6564452353**
Option 4 ID : **6564452355**
Status : **Not Answered**
Chosen Option : **--**

Q.16 Two equal sides of an isosceles triangle are along $-x+2y=4$ and $x+y=4$. If m is the slope of its third side, then the sum, of all possible distinct values of m, is :

Options

1. $-2\sqrt{10}$
2. -6
3. 12
4. 6

Question Type : **MCQ**
Question ID : **656445685**
Option 1 ID : **6564452335**
Option 2 ID : **6564452334**
Option 3 ID : **6564452332**
Option 4 ID : **6564452333**
Status : **Not Answered**
Chosen Option : **--**

Q.17 Let S be the set of all the words that can be formed by arranging all the letters of the word GARDEN. From the set S, one word is selected at random. The probability that the selected word will **NOT** have vowels in alphabetical order is :

Options

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

Question Type : **MCQ**
Question ID : **656445683**
Option 1 ID : **6564452324**
Option 2 ID : **6564452326**
Option 3 ID : **6564452325**
Option 4 ID : **6564452327**
Status : **Answered**
Chosen Option : **1**

Q.18

Let $A=\begin{bmatrix}\frac{1}{\sqrt{2}} & -2\\ 0 & 1\end{bmatrix}$ and $P=\begin{bmatrix}\cos\theta & -\sin\theta\\ \sin\theta & \cos\theta\end{bmatrix}$, $\theta>0$. If $B=PAP^T$, $C=P^TB^{10}P$ and the sum of the diagonal elements of C is $\frac{m}{n}$, where $\gcd(m, n)=1$, then $m+n$ is :

Options

1. 2049
2. 127
3. 65
4. 258

Question Type : **MCQ**
Question ID : **656445680**
Option 1 ID : **6564452312**
Option 2 ID : **6564452314**
Option 3 ID : **6564452315**
Option 4 ID : **6564452313**
Status : **Not Answered**
Chosen Option : **--**

Q.19

Let $f: \mathbf{R} - \{0\} \to (-\infty, 1)$ be a polynomial of degree 2, satisfying $f(x)f\left(\frac{1}{x}\right) = f(x) + f\left(\frac{1}{x}\right)$. If $f(K) = -2K$, then the sum of squares of all possible values of K is :

Options

1. 9
2. 7
3. 6
4. 1

Question Type : **MCQ**
Question ID : **656445678**
Option 1 ID : **6564452307**
Option 2 ID : **6564452305**
Option 3 ID : **6564452306**
Option 4 ID : **6564452304**
Status : **Not Answered**
Chosen Option : **--**

Q.20

If A and B are the points of intersection of the circle $x^2+y^2-8x=0$ and the hyperbola $\frac{x^2}{9}-\frac{y^2}{4}=1$ and a point P moves on the line $2x-3y+4=0$, then the centroid of ΔPAB lies on the line :

Options

1. $x+9y=36$
2. $4x-9y=12$
3. $6x-9y=20$
4. $9x-9y=32$

Question Type : **MCQ**
Question ID : **656445687**
Option 1 ID : **6564452343**
Option 2 ID : **6564452340**
Option 3 ID : **6564452341**
Option 4 ID : **6564452342**
Status : **Answered**
Chosen Option : **2**

Section : **Mathematics Section B**

Q.21 Let A and B be the two points of intersection of the line $y+5=0$ and the mirror image of the parabola $y^2=4x$ with respect to the line $x+y+4=0$. If d denotes the distance between A and B, and a denotes the area of ΔSAB, where S is the focus of the parabola $y^2=4x$, then the value of $(a+d)$ is _____.

Given Answer: --

Question Type : **SA**
Question ID : **656445698**
Status : **Not Answered**

Q.22 Let $f(x)=\lim\limits_{n\to\infty}\sum\limits_{r=0}^{n}\left(\frac{\tan\left(x/2^{r+1}\right)+\tan^3\left(x/2^{r+1}\right)}{1-\tan^2\left(x/2^{r+1}\right)}\right)$. Then $\lim\limits_{x\to 0}\frac{e^x-e^{f(x)}}{(x-f(x))}$ is equal to _____.

Given Answer: --

Question Type : **SA**
Question ID : **656445699**
Status : **Not Answered**

Q. 23 The number of natural numbers, between 212 and 999, such that the sum of their digits is 15, is _____.

Given Answer: --

Question Type : **SA**
Question ID : **656445697**
Status : **Not Answered**

Q. 24 The interior angles of a polygon with n sides, are in an A.P. with common difference 6°. If the largest interior angle of the polygon is 219°, then n is equal to _____.

Given Answer: --

Question Type : **SA**
Question ID : **656445696**
Status : **Not Answered**

Q. 25 If $y = y(x)$ is the solution of the differential equation,

$$\sqrt{4-x^2}\,\frac{dy}{dx} = \left(\left(\sin^{-1}\left(\frac{x}{2}\right)\right)^2 - y\right)\sin^{-1}\left(\frac{x}{2}\right),\ -2 \le x \le 2,\ y(2) = \frac{\pi^2-8}{4},$$

then $y^2(0)$ is equal to

_____.

Given Answer: --

Question Type : **SA**
Question ID : **656445700**
Status : **Not Answered**

Section : **Physics Section A**

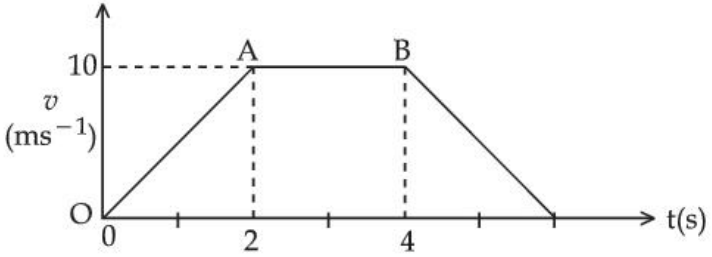
Q.26 The frequency of revolution of the electron in Bohr's orbit varies with n, the principal quantum number as

Options

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

Question Type : **MCQ**
Question ID : **656445718**
Option 1 ID : **6564452449**
Option 2 ID : **6564452450**
Option 3 ID : **6564452451**
Option 4 ID : **6564452452**
Status : **Answered**
Chosen Option : **3**

Q.27 The velocity-time graph of an object moving along a straight line is shown in figure. What is the distance covered by the object between t = 0 to t = 4s ?



Options

1. 30 m
2. 13 m
3. 10 m
4. 11 m

Question Type : **MCQ**
Question ID : **656445703**
Option 1 ID : **6564452392**
Option 2 ID : **6564452391**
Option 3 ID : **6564452389**
Option 4 ID : **6564452390**
Status : **Not Answered**
Chosen Option : **--**

Q.28 A concave mirror produces an image of an object such that the distance between the object and image is 20 cm. If the magnification of the image is '-3', then the magnitude of the radius of curvature of the mirror is :

Options

1. 7.5 cm
2. 30 cm
3. 3.75 cm
4. 15 cm

Question Type : **MCQ**
Question ID : **656445717**
Option 1 ID : **6564452446**
Option 2 ID : **6564452448**
Option 3 ID : **6564452445**
Option 4 ID : **6564452447**
Status : **Answered**
Chosen Option : **4**

Q.29 Given below are two statements. One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Knowing initial position x_0 and initial momentum p_0 is enough to determine the position and momentum at any time t for a simple harmonic motion with a given angular frequency ω.

Reason (R) : The amplitude and phase can be expressed in terms of x_0 and p_0.

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

Options

1. Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**
2. **(A)** is false but **(R)** is true
3. **(A)** is true but **(R)** is false
4. Both **(A)** and **(R)** are true but **(R)** is **NOT** the correct explanation of **(A)**

Question Type : **MCQ**
Question ID : **656445711**
Option 1 ID : **6564452421**
Option 2 ID : **6564452424**
Option 3 ID : **6564452423**
Option 4 ID : **6564452422**
Status : **Answered**
Chosen Option : **1**

Q.30 A uniform rod of mass 250 g having length 100 cm is balanced on a sharp edge at 40 cm mark. A mass of 400 g is suspended at 10 cm mark. To maintain the balance of the rod, the mass to be suspended at 90 cm mark, is

Options

1. 200 g
2. 300 g
3. 190 g
4. 290 g

Question Type : **MCQ**
Question ID : **656445705**
Option 1 ID : **6564452399**
Option 2 ID : **6564452398**
Option 3 ID : **6564452400**
Option 4 ID : **6564452397**
Status : **Answered**
Chosen Option : **1**

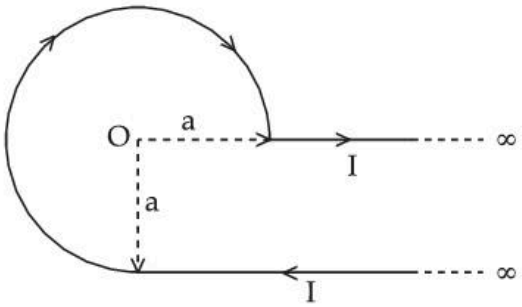
Q.31 The kinetic energy of translation of the molecules in 50 g of CO_2 gas at 17°C is

Options

1. 4102.8 J
2. 3986.3 J
3. 4205.5 J
4. 3582.7 J

Question Type : **MCQ**
Question ID : **656445709**
Option 1 ID : **6564452413**
Option 2 ID : **6564452414**
Option 3 ID : **6564452415**
Option 4 ID : **6564452416**
Status : **Not Answered**
Chosen Option : **--**

Q.32



An infinite wire has a circular bend of radius a, and carrying a current I as shown in figure. The magnitude of magnetic field at the origin O of the arc is given by :

Options

1. $\frac{\mu_0}{4\pi}\frac{I}{a}\left[\frac{3\pi}{2}+1\right]$

2. $\frac{\mu_0}{4\pi}\frac{I}{a}\left[\frac{3\pi}{2}+2\right]$

3. $\frac{\mu_0}{4\pi}\frac{I}{a}\left[\frac{\pi}{2}+1\right]$

4. $\frac{\mu_0}{2\pi}\frac{I}{a}\left[\frac{\pi}{2}+2\right]$

Question Type : **MCQ**
Question ID : **656445713**
Option 1 ID : **6564452431**
Option 2 ID : **6564452432**
Option 3 ID : **6564452430**
Option 4 ID : **6564452429**
Status : **Answered**
Chosen Option : **3**

Q.33 A parallel plate capacitor of capacitance 1 μF is charged to a potential difference of 20 V. The distance between plates is 1 μm. The energy density between plates of capacitor is.

Options

1. $1.8 \times 10^3\ \mathrm{J/m^3}$
2. $1.8 \times 10^5\ \mathrm{J/m^3}$
3. $2 \times 10^2\ \mathrm{J/m^3}$
4. $2 \times 10^{-4}\ \mathrm{J/m^3}$

Question Type : **MCQ**
Question ID : **656445712**
Option 1 ID : **6564452426**
Option 2 ID : **6564452427**
Option 3 ID : **6564452428**
Option 4 ID : **6564452425**
Status : **Not Answered**
Chosen Option : **--**

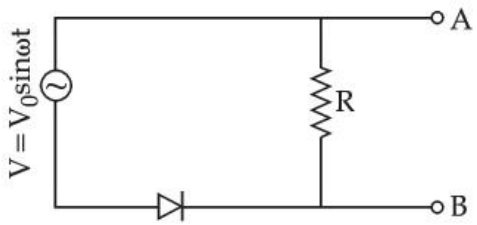
Q.34 A uniform magnetic field of 0.4 T acts perpendicular to a circular copper disc 20 cm in radius. The disc is having a uniform angular velocity of 10 π rad s^{-1} about an axis through its centre and perpendicular to the disc. What is the potential difference developed between the axis of the disc and the rim ? ($\pi = 3.14$)

Options

1. 0.5024 V
2. 0.0628 V
3. 0.1256 V
4. 0.2512 V

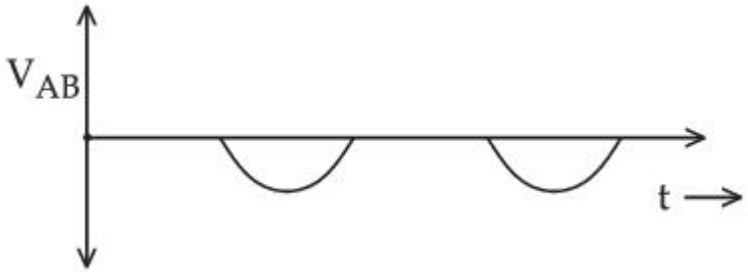
Question Type : **MCQ**
Question ID : **656445714**
Option 1 ID : **6564452436**
Option 2 ID : **6564452435**
Option 3 ID : **6564452434**
Option 4 ID : **6564452433**
Status : **Not Answered**
Chosen Option : **--**

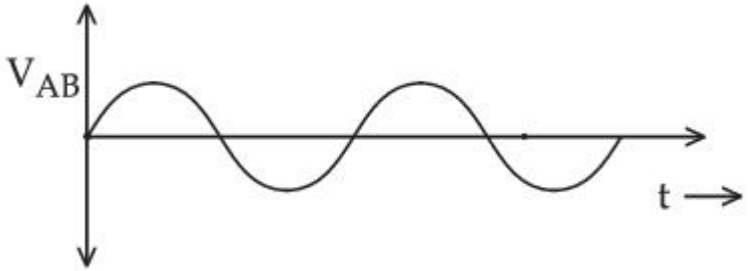
Q.35



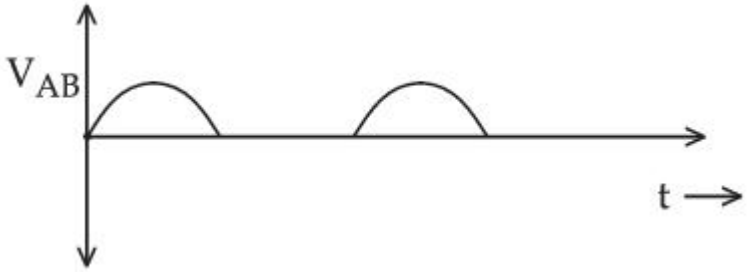
In the circuit shown here, assuming threshold voltage of diode is negligibly small, then voltage V_{AB} is correctly represented by :

Options

1. 

2. 

3. V_{AB} would be zero at all times

4. 

Question Type : **MCQ**
Question ID : **656445720**

Option 1 ID : **6564452459**
Option 2 ID : **6564452457**
Option 3 ID : **6564452460**
Option 4 ID : **6564452458**
Status : **Not Answered**
Chosen Option : **--**

Q.36 In a long glass tube, mixture of two liquids A and B with refractive indices 1.3 and 1.4 respectively, forms a convex refractive meniscus towards A. If an object placed at 13 cm from the vertex of the meniscus in A forms an image with a magnification of '-2' then the radius of curvature of meniscus is :

Options

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

Question Type : **MCQ**
Question ID : **656445716**
Option 1 ID : **6564452443**
Option 2 ID : **6564452441**
Option 3 ID : **6564452442**
Option 4 ID : **6564452444**
Status : **Not Answered**
Chosen Option : **--**

Q.37 A balloon and its content having mass M is moving up with an acceleration 'a'. The mass that must be released from the content so that the balloon starts moving up with an acceleration '3a' will be

(Take 'g' as acceleration due to gravity)

Options

1. $\frac{2\,Ma}{3\,a-g}$

2. $\frac{3\,Ma}{2\,a+g}$

3. $\frac{2\,Ma}{3\,a+g}$

4. $\frac{3\,Ma}{2\,a-g}$

Question Type : **MCQ**
Question ID : **656445707**
Option 1 ID : **6564452408**
Option 2 ID : **6564452405**
Option 3 ID : **6564452406**
Option 4 ID : **6564452407**
Status : **Not Answered**
Chosen Option : **--**

Q.38 A body of mass 4 kg is placed on a plane at a point P having coordinate (3, 4) m. Under the action of force $\vec{F} = \left(2\hat{i} + 3\hat{j}\right)N$, it moves to a new point Q having coordinates (6, 10)m in 4 sec. The average power and instanteous power at the end of 4 sec are in the ratio of :

Options

1. $4 : 3$
2. $13 : 6$
3. $6 : 13$
4. $1 : 2$

Question Type : **MCQ**
Question ID : **656445706**
Option 1 ID : **6564452403**
Option 2 ID : **6564452401**
Option 3 ID : **6564452404**
Option 4 ID : **6564452402**
Status : **Not Answered**
Chosen Option : **--**

Q.39 Earth has mass 8 times and radius 2 times that of a planet. If the escape velocity from the earth is 11.2 km/s, the escape velocity in km/s from the planet will be :

Options

1. 2.8
2. 11.2
3. 8.4
4. 5.6

Question Type : **MCQ**
Question ID : **656445704**
Option 1 ID : **6564452393**
Option 2 ID : **6564452395**
Option 3 ID : **6564452396**
Option 4 ID : **6564452394**
Status : **Not Answered**
Chosen Option : **--**

Q.40 Which of the following phenomena can not be explained by wave theory of light ?

Options

1. Refraction of light
2. Compton effect
3. Diffraction of light
4. Reflection of light

Question Type : **MCQ**
Question ID : **656445719**
Option 1 ID : **6564452454**
Option 2 ID : **6564452456**
Option 3 ID : **6564452455**
Option 4 ID : **6564452453**
Status : **Answered**
Chosen Option : **3**

Q.41 Match **List - I** with **List - II**.

	List - I		List - II
(A)	Angular Impulse	(I)	$[M^0 L^2 T^{-2}]$
(B)	Latent Heat	(II)	$[M L^2 T^{-3} A^{-1}]$
(C)	Electrical resistivity	(III)	$[M L^2 T^{-1}]$
(D)	Electromotive force	(IV)	$[M L^3 T^{-3} A^{-2}]$

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

Options

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

Question Type : **MCQ**
Question ID : **656445702**
Option 1 ID : **6564452388**
Option 2 ID : **6564452385**
Option 3 ID : **6564452387**
Option 4 ID : **6564452386**
Status : **Not Answered**
Chosen Option : **--**

Q.42 A 400 g solid cube having an edge of length 10 cm floats in water. How much volume of the cube is outside the water ?

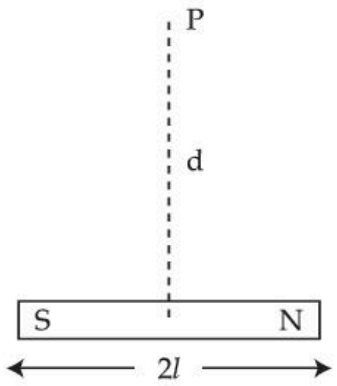
(Given : density of water = 1000 kg m^{-3})

Options

1. 1400 cm^3
2. 600 cm^3
3. 400 cm^3
4. 4000 cm^3

Question Type : **MCQ**
Question ID : **656445708**
Option 1 ID : **6564452411**
Option 2 ID : **6564452410**
Option 3 ID : **6564452409**
Option 4 ID : **6564452412**
Status : **Not Answered**
Chosen Option : **--**

Q.43



A bar magnet has total length $2l = 20$ units and the field point P is at a distance $d = 10$ units from the centre of the magnet. If the relative uncertainty of length measurement is 1%, then uncertainty of the magnetic field at point P is :

Options

1. 4%
2. 3%
3. 5%
4. 10%

Question Type : **MCQ**
Question ID : **656445701**
Option 1 ID : **6564452384**
Option 2 ID : **6564452382**
Option 3 ID : **6564452383**
Option 4 ID : **6564452381**
Status : **Not Answered**
Chosen Option : **--**

Q.44

The ratio of vapour densities of two gases at the same temperature is $\frac{4}{25}$, then the ratio of r.m.s. velocities will be :

Options

1. $\frac{4}{25}$
2. $\frac{2}{5}$
3. $\frac{5}{2}$
4. $\frac{25}{4}$

Question Type : **MCQ**
Question ID : **656445710**
Option 1 ID : **6564452420**
Option 2 ID : **6564452418**
Option 3 ID : **6564452417**
Option 4 ID : **6564452419**
Status : **Answered**
Chosen Option : **3**

Q.45

The magnetic field of an E.M. wave is given by $\vec{B} = \left(\frac{\sqrt{3}}{2}\hat{i} + \frac{1}{2}\hat{j}\right) 30 \sin\left[\omega\left(t - \frac{z}{c}\right)\right]$ (S.I. Units).

The corresponding electric field in S.I. units is :

Options

1. $\vec{E} = \left(\frac{3}{4}\hat{i} + \frac{1}{4}\hat{j}\right) 30\, c \cos\left[\omega\left(t - \frac{z}{c}\right)\right]$

2. $\vec{E} = \left(\frac{1}{2}\hat{i} + \frac{\sqrt{3}}{2}\hat{j}\right) 30\, c \sin\left[\omega\left(t + \frac{z}{c}\right)\right]$

3. $\vec{E} = \left(\frac{1}{2}\hat{i} - \frac{\sqrt{3}}{2}\hat{j}\right) 30\, c \sin\left[\omega\left(t - \frac{z}{c}\right)\right]$

4. $\vec{E} = \left(\frac{\sqrt{3}}{2}\hat{i} - \frac{1}{2}\hat{j}\right) 30\, c \sin\left[\omega\left(t + \frac{z}{c}\right)\right]$

Question Type : **MCQ**
Question ID : **656445715**
Option 1 ID : **6564452438**
Option 2 ID : **6564452440**
Option 3 ID : **6564452439**
Option 4 ID : **6564452437**
Status : **Not Answered**
Chosen Option : **--**

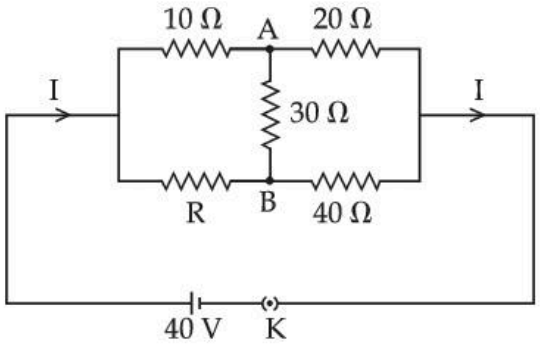
Section : **Physics Section B**

Q.46 The volume contraction of a solid copper cube of edge length 10 cm, when subjected to a hydraulic pressure of 7×10^6 Pa, would be _____ mm^3.
(Given bulk modulus of copper $= 1.4 \times 10^{11}$ N m^{-2})

Given Answer: --

Question Type : **SA**
Question ID : **656445721**
Status : **Not Answered**

Q.47 The value of current I in the electrical circuit as given below, when potential at A is equal to the potential at B, will be _____ A.



Given Answer: --

Question Type : **SA**
Question ID : **656445723**
Status : **Not Answered**

Q.48 An electric dipole of dipole moment 6×10^{-6} Cm is placed in uniform electric field of magnitude 10^6 V/m. Initially, the dipole moment is parallel to electric field. The work that needs to be done on the dipole to make its dipole moment opposite to the field, will be _____ J.

Given Answer: --

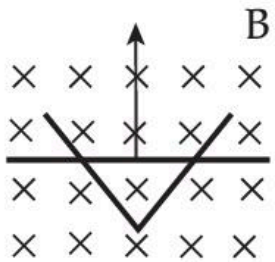
Question Type : **SA**
Question ID : **656445722**
Status : **Not Answered**

Q.49 A thin transparent film with refractive index 1.4, is held on circular ring of radius 1.8 cm. The fluid in the film evaporates such that transmission through the film at wavelength 560 nm goes to a minimum every 12 seconds. Assuming that the film is flat on its two sides, the rate of evaporation is _____ $\pi \times 10^{-13} m^3/s$.

Given Answer: --

Question Type : **SA**
Question ID : **656445725**
Status : **Not Answered**

Q.50



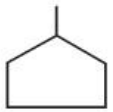
A conducting bar moves on two conducting rails as shown in the figure. A constant magnetic field B exists into the page. The bar starts to move from the vertex at time t = 0 with a constant velocity. If the induced EMF is $E \propto t^n$, then value of n is _____.

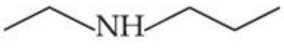
Given Answer: --

Question Type : **SA**
Question ID : **656445724**
Status : **Not Answered**

Section : **Chemistry Section A**

Q.51 Given below are two statements :

Statement (I) :  and  are isomeric compounds.

Statement (II) :  NH_2 and  are functional group isomers.

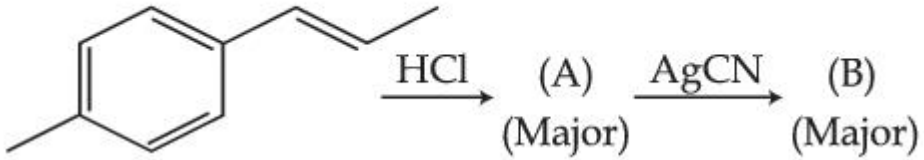
In the light of the above statements, choose the **correct** answer from the options given below :

Options

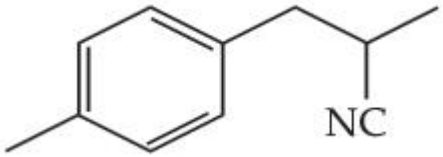
1. Both **Statement I** and **Statement II** are false
2. **Statement I** is false but **Statement II** is true
3. **Statement I** is true but **Statement II** is false
4. Both **Statement I** and **Statement II** are true

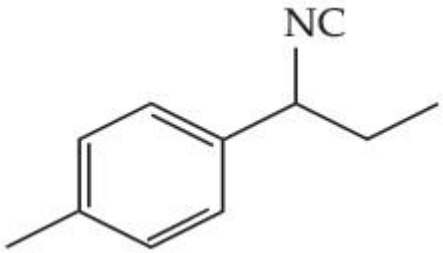
Question Type : **MCQ**
Question ID : **656445738**
Option 1 ID : **6564452515**
Option 2 ID : **6564452517**
Option 3 ID : **6564452516**
Option 4 ID : **6564452514**
Status : **Answered**
Chosen Option : **2**

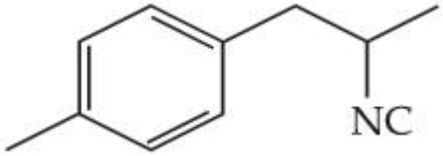
Q.52 The product B formed in the following reaction sequence is :

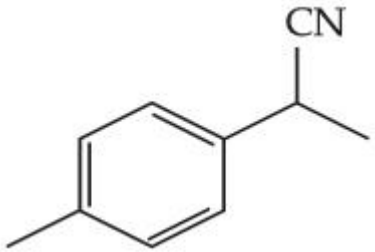


Options

1.


2.


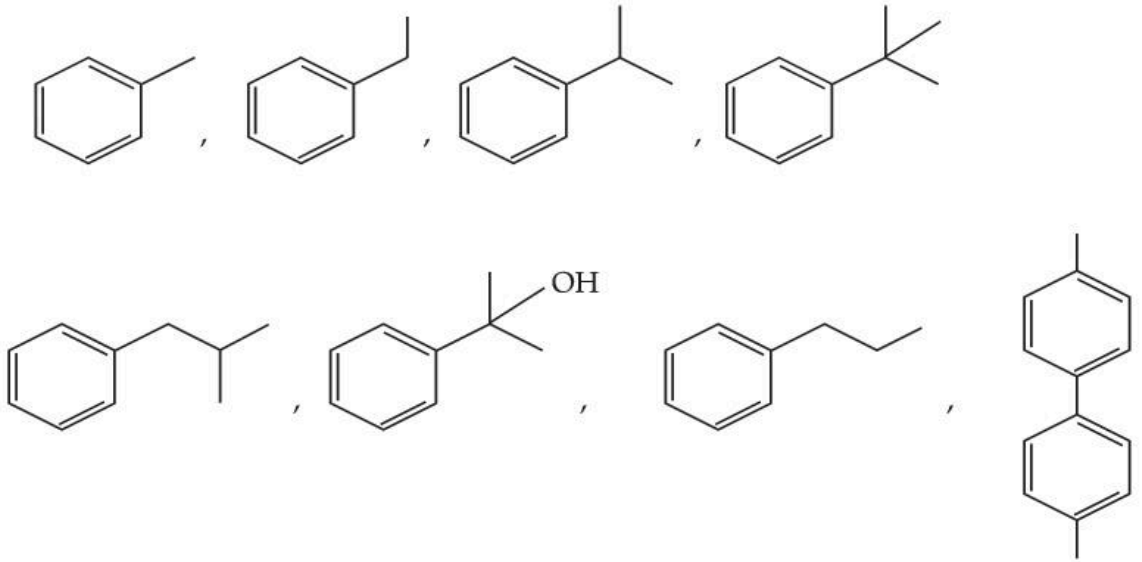
3.


4.


Question Type : **MCQ**
Question ID : **656445741**
Option 1 ID : **6564452529**
Option 2 ID : **6564452526**
Option 3 ID : **6564452527**
Option 4 ID : **6564452528**

Status : **Not Answered**
Chosen Option : **--**

Q.53 The total number of compounds from below when treated with hot $KMnO_4$ giving benzoic acid is :



Options

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

Question Type : **MCQ**
Question ID : **656445742**
Option 1 ID : **6564452531**
Option 2 ID : **6564452530**
Option 3 ID : **6564452532**
Option 4 ID : **6564452533**
Status : **Not Answered**
Chosen Option : **--**

Q.54 Concentrated nitric acid is labelled as 75% by mass. The volume in mL of the solution which contains 30 g of nitric acid is _____.

Given : Density of nitric acid solution is 1.25 g/mL.

Options

1. 32
2. 55
3. 40
4. 45

Question Type : **MCQ**
Question ID : **656445729**
Option 1 ID : **6564452480**
Option 2 ID : **6564452481**
Option 3 ID : **6564452478**
Option 4 ID : **6564452479**
Status : **Not Answered**
Chosen Option : **--**

Q.55 Identify correct conversion during acidic hydrolysis from the following :

(A) starch gives galactose.

(B) cane sugar gives equal amount of glucose and fructose.

(C) milk sugar gives glucose and galactose.

(D) amylopectin gives glucose and fructose.

(E) amylose gives only glucose.

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

Options

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

Question Type : **MCQ**
Question ID : **656445745**
Option 1 ID : **6564452543**
Option 2 ID : **6564452544**
Option 3 ID : **6564452545**
Option 4 ID : **6564452542**
Status : **Not Answered**
Chosen Option : **--**

Q.56 Given below are two statements :

Statement (I) : According to the Law of Octaves, the elements were arranged in the increasing order of their atomic number.

Statement (II) : Meyer observed a periodically repeated pattern upon plotting physical properties of certain elements against their respective atomic numbers.

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

Question Type : **MCQ**
Question ID : **656445734**
Option 1 ID : **6564452501**
Option 2 ID : **6564452498**
Option 3 ID : **6564452499**
Option 4 ID : **6564452500**
Status : **Not Answered**
Chosen Option : **--**

Q.57 Match **List - I** with **List - II**.

List - I (Complex)		**List - II (Hybridisation of central metal ion)**	
(A)	$[CoF_6]^{3-}$	(I)	d^2sp^3
(B)	$[NiCl_4]^{2-}$	(II)	sp^3
(C)	$[Co(NH_3)_6]^{3+}$	(III)	sp^3d^2
(D)	$[Ni(CN)_4]^{2-}$	(IV)	dsp^2

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

Options

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

Question Type : **MCQ**
Question ID : **656445736**
Option 1 ID : **6564452508**
Option 2 ID : **6564452507**
Option 3 ID : **6564452506**
Option 4 ID : **6564452509**
Status : **Answered**
Chosen Option : **1**

Q.58 Identify correct statements :

(A) Primary amines do not give diazonium salts when treated with $NaNO_2$ in acidic condition.

(B) Aliphatic and aromatic primary amines on heating with $CHCl_3$ and ethanolic KOH form carbylamines.

(C) Secondary and tertiary amines also give carbylamine test.

(D) Benzenesulfonyl chloride is known as Hinsberg's reagent.

(E) Tertiary amines reacts with benzenesulfonyl chloride very easily.

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

Options

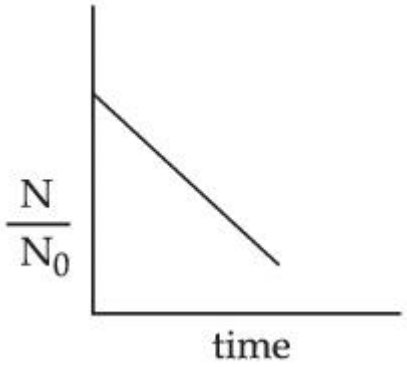
1. (D) and (E) only
2. (A) and (B) only
3. (B) and (C) only
4. (B) and (D) only

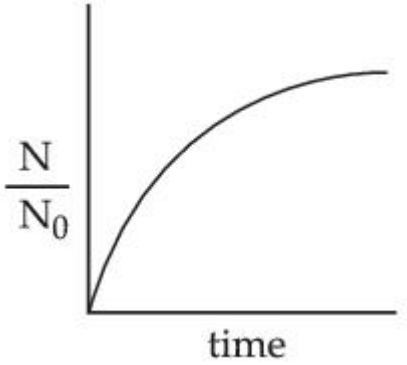
Question Type : **MCQ**
Question ID : **656445743**
Option 1 ID : **6564452537**
Option 2 ID : **6564452534**
Option 3 ID : **6564452535**
Option 4 ID : **6564452536**
Status : **Not Answered**
Chosen Option : **--**

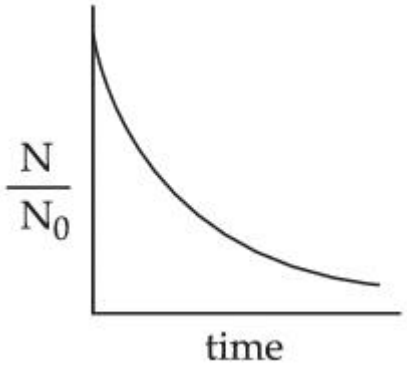
Q.59 For bacterial growth in a cell culture, growth law is very similar to the law of radioactive decay. Which of the following graphs is most suitable to represent bacterial colony growth ?

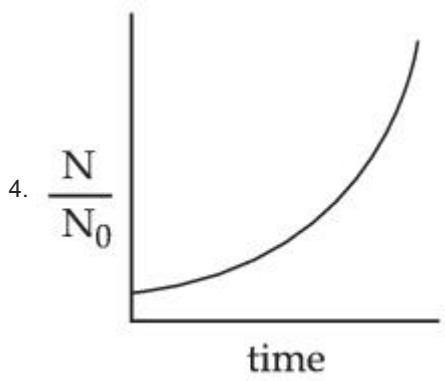
Where N - Number of Bacteria at any time, N_0 - Initial number of Bacteria.

Options

1. 

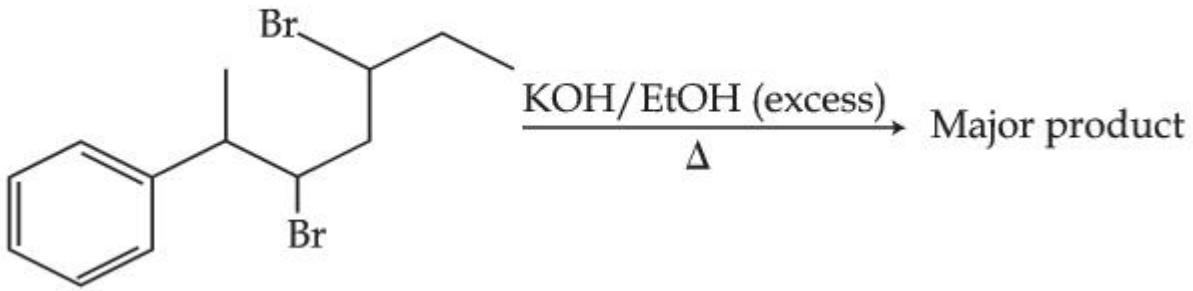
2. 

3. 

4. 

Question Type : **MCQ**
Question ID : **656445731**
Option 1 ID : **6564452488**
Option 2 ID : **6564452489**
Option 3 ID : **6564452486**
Option 4 ID : **6564452487**
Status : **Answered**
Chosen Option : **2**

Q.60 The major product of the following reaction is :



Options

1. 6-Phenylhepta-3,5-diene
2. 2-Phenylhepta-2,4-diene
3. 6-Phenylhepta-2,4-diene
4. 2-Phenylhepta-2,5-diene

Question Type : **MCQ**
Question ID : **656445740**
Option 1 ID : **6564452524**
Option 2 ID : **6564452525**
Option 3 ID : **6564452522**
Option 4 ID : **6564452523**
Status : **Not Answered**
Chosen Option : **--**

Q.61 Which of the following is/are not correct with respect to energy of atomic orbitals of hydrogen atom ?

(A) $1s < 2p < 3d < 4s$

(B) $1s < 2s = 2p < 3s = 3p$

(C) $1s < 2s < 2p < 3s < 3p$

(D) $1s < 2s < 4s < 3d$

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

Options

1. (A) and (B) only
2. (B) and (D) only
3. (C) and (D) only
4. (A) and (C) only

Question Type : **MCQ**
Question ID : **656445726**
Option 1 ID : **6564452466**
Option 2 ID : **6564452469**
Option 3 ID : **6564452467**
Option 4 ID : **6564452468**
Status : **Answered**
Chosen Option : **4**

Q.62 Consider an elementary reaction

$A(g) + B(g) \rightarrow C(g) + D(g)$

If the volume of reaction mixture is suddenly reduced to $\frac{1}{3}$ of its initial volume, the reaction rate will become 'x' times of the original reaction rate. The value of x is :

Options

1. 3
2. $\frac{1}{9}$
3. 9
4. $\frac{1}{3}$

Question Type : **MCQ**
Question ID : **656445732**
Option 1 ID : **6564452490**
Option 2 ID : **6564452491**
Option 3 ID : **6564452493**
Option 4 ID : **6564452492**
Status : **Answered**
Chosen Option : **2**

Q.63 The amphoteric oxide among V_2O_3, V_2O_4 and V_2O_5, upon reaction with alkali leads to formation of an oxide anion. The oxidation state of V in the oxide anion is :

Options

1. $+3$
2. $+5$
3. $+4$
4. $+7$

Question Type : **MCQ**
Question ID : **656445735**
Option 1 ID : **6564452502**
Option 2 ID : **6564452504**
Option 3 ID : **6564452503**
Option 4 ID : **6564452505**
Status : **Answered**
Chosen Option : **4**

Q.64 Identify the inorganic sulphides that are yellow in colour :

(A) $(NH_4)_2S$

(B) PbS

(C) CuS

(D) As_2S_3

(E) As_2S_5

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

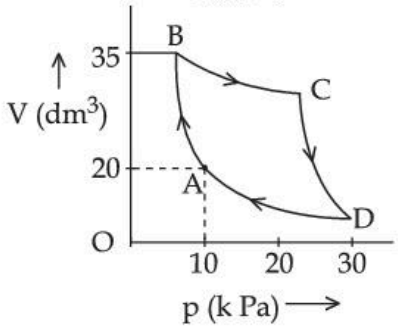
Options

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

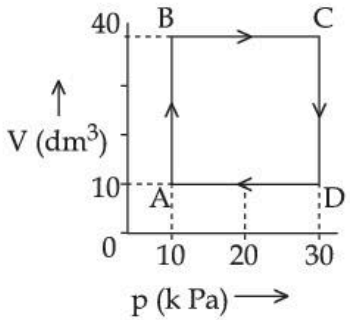
Question Type : **MCQ**
Question ID : **656445733**
Option 1 ID : **6564452496**
Option 2 ID : **6564452495**
Option 3 ID : **6564452494**
Option 4 ID : **6564452497**
Status : **Answered**
Chosen Option : **3**

Q.65

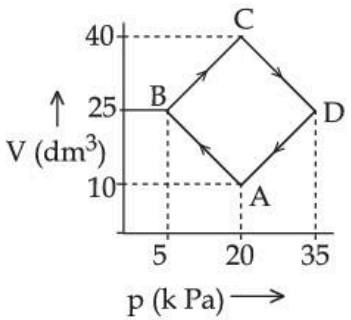
Case - I



Case - II



Case - III



An ideal gas undergoes a cyclic transformation starting from the point A and coming back to the same point by tracing the path A→B→C→D→A as shown in the three cases above.

Choose the **correct** option regarding ΔU :

Options

1. $\Delta U(\text{Case-I}) = \Delta U(\text{Case-II}) = \Delta U(\text{Case-III})$
2. $\Delta U(\text{Case-III}) > \Delta U(\text{Case-II}) > \Delta U(\text{Case-I})$
3. $\Delta U(\text{Case-I}) > \Delta U(\text{Case-III}) > \Delta U(\text{Case-II})$
4. $\Delta U(\text{Case-I}) > \Delta U(\text{Case-II}) > \Delta U(\text{Case-III})$

Question Type : **MCQ**
Question ID : **656445727**
Option 1 ID : **6564452473**
Option 2 ID : **6564452471**
Option 3 ID : **6564452472**
Option 4 ID : **6564452470**
Status : **Answered**
Chosen Option : **2**

Q.66 Arrange the following in increasing order of solubility product :

$Ca(OH)_2$, AgBr, PbS, HgS

Options

1. $HgS < PbS < AgBr < Ca(OH)_2$
2. $Ca(OH)_2 < AgBr < HgS < PbS$
3. $PbS < HgS < Ca(OH)_2 < AgBr$
4. $HgS < AgBr < PbS < Ca(OH)_2$

Question Type : **MCQ**
Question ID : **656445730**
Option 1 ID : **6564452483**
Option 2 ID : **6564452485**
Option 3 ID : **6564452484**
Option 4 ID : **6564452482**
Status : **Not Answered**
Chosen Option : **--**

Q.67 The purification method based on the following physical transformation is :

$$\underset{(X)}{\text{Solid}} \xrightarrow{\text{Heat}} \underset{(X)}{\text{Vapour}} \xrightarrow{\text{Cool}} \underset{(X)}{\text{Solid}}$$

Options

1. Extraction
2. Crystallization
3. Distillation
4. Sublimation

Question Type : **MCQ**
Question ID : **656445737**
Option 1 ID : **6564452513**
Option 2 ID : **6564452512**
Option 3 ID : **6564452510**
Option 4 ID : **6564452511**
Status : **Not Answered**
Chosen Option : **--**

Q.68 Match **List - I** with **List - II**.

List - I (Saccharides)		**List - II (Glycosidic-linkages found)**
(A) Sucrose	(I)	$\alpha\ 1-4$
(B) Maltose	(II)	$\alpha\ 1-4$ and $\alpha\ 1-6$
(C) Lactose	(III)	$\alpha\ 1-\beta\ 2$
(D) Amylopectin	(IV)	$\beta\ 1-4$

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

Options

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

Question Type : **MCQ**
Question ID : **656445744**
Option 1 ID : **6564452541**
Option 2 ID : **6564452540**
Option 3 ID : **6564452539**
Option 4 ID : **6564452538**
Status : **Not Answered**
Chosen Option : **--**

Q.69 Assume a living cell with 0.9%(ω/ω) of glucose solution (aqueous). This cell is immersed in another solution having equal mole fraction of glucose and water.

(Consider the data upto first decimal place only)

The cell will :

Options 1.

shrink since solution is 0.45%(ω/ω) as a result of association of glucose molecules (due to hydrogen bonding)

2. shrink since solution is 0.5%(ω/ω)

3. swell up since solution is 1%(ω/ω)

4. show no change in volume since solution is 0.9%(ω/ω)

Question Type : **MCQ**
Question ID : **656445728**
Option 1 ID : **6564452477**
Option 2 ID : **6564452474**
Option 3 ID : **6564452475**
Option 4 ID : **6564452476**
Status : **Not Answered**
Chosen Option : **--**

Q.70 Identify product [A], [B] and [C] in the following reaction sequence.

$$CH_3 - C \equiv CH \xrightarrow[H_2]{Pd/C} [A] \xrightarrow[(ii)\ Zn,\ H_2O]{(i)\ O_3} [B] + [C]$$

Options

1. $[A] : CH_3-CH=CH_2,\ [B] : CH_3CHO,\ [C] : CH_3CH_2OH$
2. $[A] : CH_3CH_2CH_3,\ [B] : CH_3CHO,\ [C] : HCHO$
3. $[A] : CH_2=CH_2,\ [B] : H_3C-\overset{\overset{O}{\|}}{C}-CH_3,\ [C] : HCHO$
4. $[A] : CH_3-CH=CH_2,\ [B] : CH_3CHO,\ [C] : HCHO$

Question Type : **MCQ**
Question ID : **656445739**
Option 1 ID : **6564452520**
Option 2 ID : **6564452521**
Option 3 ID : **6564452519**
Option 4 ID : **6564452518**
Status : **Not Answered**
Chosen Option : **--**

Section : **Chemistry Section B**

Q.71 Total number of molecules/species from following which will be paramagnetic is _____.

O_2, O_2^+, O_2^-, NO, NO_2, CO, $K_2[NiCl_4]$, $[Co(NH_3)_6]Cl_3$, $K_2[Ni(CN)_4]$

Given Answer: --

Question Type : **SA**
Question ID : **656445748**
Status : **Not Answered**

Q.72 Electrolysis of 600 mL aqueous solution of NaCl for 5 min changes the pH of the solution to 12. The current in Amperes used for the given electrolysis is _____. (Nearest integer).

Given Answer: --

Question Type : **SA**
Question ID : **656445747**
Status : **Not Answered**

Q.73 A group 15 element forms $d\pi - d\pi$ bond with transition metals. It also forms hydride, which is a strongest base among the hydrides of other group members that form $d\pi - d\pi$ bond. The atomic number of the element is _____.

Given Answer: --

Question Type : **SA**
Question ID : **656445749**
Status : **Not Answered**

Q.74 Consider the following data :

Heat of formation of $CO_2(g) = -393.5$ kJ mol^{-1}

Heat of formation of $H_2O(l) = -286.0$ kJ mol^{-1}

Heat of combustion of benzene $= -3267.0$ kJ mol^{-1}

The heat of formation of benzene is _____ kJ mol^{-1}.

(Nearest integer)

Given Answer: --

Question Type : **SA**

Question ID : **656445746**

Status : **Not Answered**

Q.75 The spin only magnetic moment (μ) value (B.M.) of the compound with strongest oxidising power among Mn_2O_3, TiO and VO is _____ B.M. (Nearest integer).

Given Answer: --

Question Type : **SA**
Question ID : **656445750**
Status : **Not Answered**