JEE April 2024

Application No	[redacted]
Candidate Name	
Roll No	
Test Date	05/04/2024
Test Time	9:00 AM - 12:00 PM
Subject	B. Tech

Section : **Mathematics Section A**

Q.1 Let a circle C of radius 1 and closer to the origin be such that the lines passing through the point (3, 2) and parallel to the coordinate axes touch it. Then the shortest distance of the circle C from the point (5, 5) is :

Options

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

Question Type : **MCQ**
Question ID : **87827055620**
Option 1 ID : **878270218829**
Option 2 ID : **878270218832**
Option 3 ID : **878270218831**
Option 4 ID : **878270218830**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

Q.2 Let a rectangle ABCD of sides 2 and 4 be inscribed in another rectangle PQRS such that the vertices of the rectangle ABCD lie on the sides of the rectangle PQRS. Let a and b be the sides of the rectangle PQRS when its area is maximum. Then $(a+b)^2$ is equal to :

Options

1. 80
2. 60
3. 72
4. 64

Question Type : **MCQ**
Question ID : **87827055616**
Option 1 ID : **878270218815**
Option 2 ID : **878270218816**
Option 3 ID : **878270218813**
Option 4 ID : **878270218814**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

Q.3 If $\frac{1}{\sqrt{1}+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\ldots+\frac{1}{\sqrt{99}+\sqrt{100}}=m$ and $\frac{1}{1\cdot 2}+\frac{1}{2\cdot 3}+\ldots+\frac{1}{99\cdot 100}=n$, then the point (m, n) lies on the line

Options

1. $11(x-1)-100(y-2)=0$
2. $11(x-2)-100(y-1)=0$
3. $11(x-1)-100y=0$
4. $11x-100y=0$

Question Type : **MCQ**
Question ID : **87827055613**
Option 1 ID : **878270218804**
Option 2 ID : **878270218803**
Option 3 ID : **878270218802**
Option 4 ID : **878270218801**
Status : **Not Answered**
Chosen Option : **--**

Q.4 Let d be the distance of the point of intersection of the lines $\frac{x+6}{3}=\frac{y}{2}=\frac{z+1}{1}$ and $\frac{x-7}{4}=\frac{y-9}{3}=\frac{z-4}{2}$ from the point (7, 8, 9). Then d^2+6 is equal to :

Options

1. 72
2. 78
3. 69
4. 75

Question Type : **MCQ**
Question ID : **87827055624**
Option 1 ID : **878270218846**
Option 2 ID : **878270218848**
Option 3 ID : **878270218845**
Option 4 ID : **878270218847**
Status : **Not Answered**
Chosen Option : **--**

Q.5 Let the line $2x+3y-k=0$, $k>0$, intersect the x-axis and y-axis at the points A and B, respectively. If the equation of the circle having the line segment AB as a diameter is $x^2+y^2-3x-2y=0$ and the length of the latus rectum of the ellipse $x^2+9y^2=k^2$ is $\frac{m}{n}$, where m and n are coprime, then $2m+n$ is equal to

Options

1. 11
2. 10
3. 13
4. 12

Question Type : **MCQ**
Question ID : **87827055622**
Option 1 ID : **878270218838**
Option 2 ID : **878270218837**
Option 3 ID : **878270218840**
Option 4 ID : **878270218839**
Status : **Not Answered**
Chosen Option : **--**

Q.6 The coefficients a, b, c in the quadratic equation $ax^2+bx+c=0$ are chosen from the set {1, 2, 3, 4, 5, 6, 7, 8}. The probability of this equation having repeated roots is :

Options

1. $\frac{3}{128}$
2. $\frac{1}{64}$
3. $\frac{1}{128}$
4. $\frac{3}{256}$

Question Type : **MCQ**
Question ID : **87827055626**
Option 1 ID : **878270218855**
Option 2 ID : **878270218856**
Option 3 ID : **878270218854**
Option 4 ID : **878270218853**
Status : **Not Answered**
Chosen Option : **--**

Q.7 Suppose $\theta \in \left[0, \frac{\pi}{4}\right]$ is a solution of $4\cos\theta - 3\sin\theta = 1$. Then $\cos\theta$ is equal to :

Options

1. $\frac{4}{(3\sqrt{6}-2)}$
2. $\frac{6-\sqrt{6}}{(3\sqrt{6}-2)}$
3. $\frac{4}{(3\sqrt{6}+2)}$
4. $\frac{6+\sqrt{6}}{(3\sqrt{6}+2)}$

Question Type : **MCQ**
Question ID : **87827055627**
Option 1 ID : **878270218858**
Option 2 ID : **878270218857**
Option 3 ID : **878270218859**
Option 4 ID : **878270218860**
Status : **Not Answered**
Chosen Option : **--**

Q.8

For the function

$$f(x) = \sin x + 3x - \frac{2}{\pi}(x^2 + x), \text{ where } x \in \left[0, \frac{\pi}{2}\right],$$

consider the following two statements :

(I) f is increasing in $\left(0, \frac{\pi}{2}\right)$.

(II) f' is decreasing in $\left(0, \frac{\pi}{2}\right)$.

Between the above two statements,

Options

1. only (II) is true.
2. neither (I) nor (II) is true.
3. both (I) and (II) are true.
4. only (I) is true.

Question Type : **MCQ**
Question ID : **87827055612**
Option 1 ID : **878270218798**
Option 2 ID : **878270218799**
Option 3 ID : **878270218800**
Option 4 ID : **878270218797**
Status : **Answered**
Chosen Option : **4**

Q.9

Let $f(x) = x^5 + 2x^3 + 3x + 1$, $x \in \mathbf{R}$, and $g(x)$ be a function such that $g(f(x)) = x$ for all $x \in \mathbf{R}$. Then $\frac{g(7)}{g'(7)}$ is equal to :

Options

1. 7
2. 42
3. 14
4. 1

Question Type : **MCQ**
Question ID : **87827055615**
Option 1 ID : **878270218810**
Option 2 ID : **878270218812**
Option 3 ID : **878270218811**
Option 4 ID : **878270218809**
Status : **Not Answered**
Chosen Option : **--**

Q.10

If the system of equations

$$11x + y + \lambda z = -5$$
$$2x + 3y + 5z = 3$$
$$8x - 19y - 39z = \mu$$

has infinitely many solutions, then $\lambda^4 - \mu$ is equal to :

Options

1. 45
2. 51
3. 47
4. 49

Question Type : **MCQ**
Question ID : **87827055611**
Option 1 ID : **878270218793**
Option 2 ID : **878270218796**
Option 3 ID : **878270218794**
Option 4 ID : **878270218795**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

Q.11

The value of $\int_{-\pi}^{\pi} \frac{2y(1+\sin y)}{1+\cos^2 y}\,dy$ is :

Options

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

Question Type : **MCQ**
Question ID : **87827055617**
Option 1 ID : **878270218820**
Option 2 ID : **878270218818**
Option 3 ID : **878270218817**
Option 4 ID : **878270218819**
Status : **Not Answered**
Chosen Option : **--**

Q.12 If the line $\frac{2-x}{3}=\frac{3y-2}{4\lambda+1}=4-z$ makes a right angle with the line $\frac{x+3}{3\mu}=\frac{1-2y}{6}=\frac{5-z}{7}$, then $4\lambda+9\mu$ is equal to :

Options

1. 13
2. 5
3. 4
4. 6

Question Type : **MCQ**
Question ID : **87827055623**
Option 1 ID : **878270218844**
Option 2 ID : **878270218842**
Option 3 ID : **878270218841**
Option 4 ID : **878270218843**
Status : **Answered**
Chosen Option : **2**

Q.13 If A(1, −1, 2), B(5, 7, −6), C(3, 4, −10) and D(−1, −4, −2) are the vertices of a quadrilateral ABCD, then its area is :

Options

1. $12\sqrt{29}$
2. $24\sqrt{29}$
3. $48\sqrt{7}$
4. $24\sqrt{7}$

Question Type : **MCQ**
Question ID : **87827055625**
Option 1 ID : **878270218849**
Option 2 ID : **878270218850**
Option 3 ID : **878270218851**
Option 4 ID : **878270218852**
Status : **Answered**
Chosen Option : **1**

Q.14 Let A and B be two square matrices of order 3 such that $|A| = 3$ and $|B| = 2$. Then $\left|A^T A(\text{adj}(2A))^{-1} (\text{adj}(4B)) (\text{adj}(AB))^{-1} AA^T\right|$ is equal to :

Options

1. 64
2. 81
3. 108
4. 32

Question Type : **MCQ**
Question ID : **87827055610**
Option 1 ID : **878270218790**
Option 2 ID : **878270218791**
Option 3 ID : **878270218792**
Option 4 ID : **878270218789**
Status : **Not Attempted and Marked For Review**
Chosen Option : **--**

Q.15 Let $A = \{1, 3, 7, 9, 11\}$ and $B = \{2, 4, 5, 7, 8, 10, 12\}$. Then the total number of one-one maps $f : A \to B$, such that $f(1) + f(3) = 14$, is :

Options

1. 120
2. 180
3. 480
4. 240

Question Type : **MCQ**
Question ID : **87827055608**
Option 1 ID : **878270218781**
Option 2 ID : **878270218782**
Option 3 ID : **878270218784**
Option 4 ID : **878270218783**
Status : **Not Answered**
Chosen Option : **--**

Q.16

The integral $\int_0^{\pi/4} \frac{136 \sin x}{3 \sin x + 5 \cos x}\, dx$ is equal to :

Options

1. $3\pi - 10 \log_e (2\sqrt{2}) + 10 \log_e 5$
2. $3\pi - 50 \log_e 2 + 20 \log_e 5$
3. $3\pi - 30 \log_e 2 + 20 \log_e 5$
4. $3\pi - 25 \log_e 2 + 10 \log_e 5$

Question Type : **MCQ**
Question ID : **87827055618**
Option 1 ID : **878270218821**
Option 2 ID : **878270218824**
Option 3 ID : **878270218822**
Option 4 ID : **878270218823**
Status : **Not Answered**
Chosen Option : **--**

Q.17

If $y = y(x)$ is the solution of the differential equation $\frac{dy}{dx} + 2y = \sin(2x)$, $y(0) = \frac{3}{4}$, then $y\left(\frac{\pi}{8}\right)$ is equal to :

Options

1. $e^{\pi/8}$
2. $e^{-\pi/8}$
3. $e^{\pi/4}$
4. $e^{-\pi/4}$

Question Type : **MCQ**
Question ID : **87827055619**
Option 1 ID : **878270218827**
Option 2 ID : **878270218828**
Option 3 ID : **878270218826**
Option 4 ID : **878270218825**
Status : **Not Answered**
Chosen Option : **--**

Q.18 Let two straight lines drawn from the origin O intersect the line $3x+4y=12$ at the points P and Q such that ΔOPQ is an isosceles triangle and $\angle POQ=90°$. If $l=OP^2+PQ^2+QO^2$, then the greatest integer less than or equal to l is :

Options

1. 44
2. 48
3. 42
4. 46

Question Type : **MCQ**
Question ID : **87827055621**
Option 1 ID : **878270218835**
Option 2 ID : **878270218833**
Option 3 ID : **878270218834**
Option 4 ID : **878270218836**
Status : **Not Answered**
Chosen Option : **--**

Q.19 If the function $f(x)=\dfrac{\sin 3x+\alpha\sin x-\beta\cos 3x}{x^3}$, $x\in\mathbf{R}$, is continuous at $x=0$, then $f(0)$ is equal to :

Options

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

Question Type : **MCQ**
Question ID : **87827055614**
Option 1 ID : **878270218808**
Option 2 ID : **878270218807**
Option 3 ID : **878270218805**
Option 4 ID : **878270218806**
Status : **Not Answered**
Chosen Option : **--**

Q.20 Consider the following two statements :

Statement I : For any two non-zero complex numbers z_1, z_2,

$$(|z_1| + |z_2|)\left|\frac{z_1}{|z_1|} + \frac{z_2}{|z_2|}\right| \le 2(|z_1| + |z_2|), \text{ and}$$

Statement II : If x, y, z are three distinct complex numbers and a, b, c are three positive real numbers such that $\frac{a}{|y-z|} = \frac{b}{|z-x|} = \frac{c}{|x-y|}$, then

$$\frac{a^2}{y-z} + \frac{b^2}{z-x} + \frac{c^2}{x-y} = 1.$$

Between the above two statements,

Options

1. Statement I is correct but Statement II is incorrect.
2. both Statement I and Statement II are correct.
3. Statement I is incorrect but Statement II is correct.
4. both Statement I and Statement II are incorrect.

Question Type : **MCQ**
Question ID : **87827055609**
Option 1 ID : **878270218787**
Option 2 ID : **878270218785**
Option 3 ID : **878270218788**
Option 4 ID : **878270218786**
Status : **Not Answered**
Chosen Option : **--**

Section : **Mathematics Section B**

Q.21 Let $a_1, a_2, a_3, \ldots$ be in an arithmetic progression of positive terms.

Let $A_k = a_1^2 - a_2^2 + a_3^2 - a_4^2 + \ldots + a_{2k-1}^2 - a_{2k}^2$.

If $A_3 = -153$, $A_5 = -435$ and $a_1^2 + a_2^2 + a_3^2 = 66$, then $a_{17} - A_7$ is equal to _____.

Given --
Answer :

Question Type : **SA**
Question ID : **87827055632**
Status : **Not Answered**

Q.22 Suppose AB is a focal chord of the parabola $y^2 = 12x$ of length l and slope $m < \sqrt{3}$. If the distance of the chord AB from the origin is d, then $l d^2$ is equal to _____.

Given --
Answer :

Question Type : **SA**
Question ID : **87827055635**
Status : **Not Answered**

Q.23 The number of distinct real roots of the equation $|x||x+2|-5|x+1|-1=0$ is _____.

Given --
Answer :

Question Type : **SA**
Question ID : **87827055629**
Status : **Not Answered**

Q.24 If $S=\{a \in \mathbf{R} : |2a-1|=3[a]+2\{a\}\}$, where [t] denotes the greatest integer less than or equal to t and {t} represents the fractional part of t, then $72\sum_{a \in S} a$ is equal to _____.

Given --
Answer :

Question Type : **SA**
Question ID : **87827055628**
Status : **Not Answered**

Q.25 Let $\vec{a}=\hat{i}-3\hat{j}+7\hat{k}$, $\vec{b}=2\hat{i}-\hat{j}+\hat{k}$ and $\vec{c}$ be a vector such that $\left(\vec{a}+2\vec{b}\right)\times\vec{c}=3\left(\vec{c}\times\vec{a}\right)$.

If $\vec{a}\cdot\vec{c}=130$, then $\vec{b}\cdot\vec{c}$ is equal to _____.

Given --
Answer :

Question Type : **SA**
Question ID : **87827055636**
Status : **Not Answered**

Q.26 The area of the region enclosed by the parabolas $y=x^2-5x$ and $y=7x-x^2$ is _____.

Given --
Answer :

Question Type : **SA**
Question ID : **87827055634**
Status : **Not Answered**

Q.27 Let f be a differentiable function in the interval $(0, \infty)$ such that $f(1)=1$ and $\lim_{t \to x} \frac{t^2 f(x)-x^2 f(t)}{t-x}=1$ for each $x > 0$. Then $2f(2)+3f(3)$ is equal to _____.

Given --
Answer :

Question Type : **SA**
Question ID : **87827055633**
Status : **Not Attempted and Marked For Review**

Q.28 If the constant term in the expansion of $(1+2x-3x^3)\left(\frac{3}{2}x^2-\frac{1}{3x}\right)^9$ is p, then 108p is equal to _____.

Given --
Answer :

Question Type : **SA**
Question ID : **87827055631**
Status : **Not Answered**

Q.29 From a lot of 10 items, which include 3 defective items, a sample of 5 items is drawn at random. Let the random variable X denote the number of defective items in the sample. If the variance of X is σ^2, then $96\sigma^2$ is equal to _____.

Given --
Answer :

Question Type : **SA**
Question ID : **87827055637**
Status : **Not Answered**

Q.30 The number of ways of getting a sum 16 on throwing a dice four times is _____.

Given --
Answer :

Question Type : **SA**
Question ID : **87827055630**
Status : **Not Answered**

Section : **Physics Section A**

Q.31 Given below are two statements :

Statement I : When a capillary tube is dipped into a liquid, the liquid neither rises nor falls in the capillary. The contact angle may be 0°.

Statement II : The contact angle between a solid and a liquid is a property of the material of the solid and liquid as well.

In the light of the above statement, choose the **correct** answer from the options given below.

Options

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

Question Type : **MCQ**
Question ID : **87827055644**
Option 1 ID : **878270218895**
Option 2 ID : **878270218897**
Option 3 ID : **878270218898**
Option 4 ID : **878270218896**
Status : **Not Answered**
Chosen Option : **--**

Q.32 Match **List I** with **List II** :

List I		List II	
(A)	Kinetic energy of planet	(I)	$-GMm/a$
(B)	Gravitation Potential energy of sun-planet system	(II)	$GMm/2a$
(C)	Total mechanical energy of planet	(III)	$\frac{Gm}{r}$
(D)	Escape energy at the surface of planet for unit mass object	(IV)	$-GMm/2a$

(Where a = radius of planet orbit, r = radius of planet, M = mass of Sun, m = mass of planet)
Choose the **correct** answer from the options given below :

Options

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

Question Type : **MCQ**
Question ID : **87827055643**
Option 1 ID : **878270218891**
Option 2 ID : **878270218893**
Option 3 ID : **878270218894**
Option 4 ID : **878270218892**
Status : **Answered**
Chosen Option : **1**

Q.33 In hydrogen like system the ratio of coulombian force and gravitational force between an electron and a proton is in the order of :

Options

1. 10^{39}
2. 10^{19}
3. 10^{29}
4. 10^{36}

Question Type : **MCQ**
Question ID : **87827055648**
Option 1 ID : **878270218912**
Option 2 ID : **878270218914**
Option 3 ID : **878270218913**
Option 4 ID : **878270218911**
Status : **Marked For Review**
Chosen Option : **2**

Q.34 If G be the gravitational constant and u be the energy density then which of the following quantity have the dimensions as that of the $\sqrt{uG}$:

Options

1. Energy per unit mass
2. Gravitational potential
3. Force per unit mass
4. pressure gradient per unit mass

Question Type : **MCQ**
Question ID : **87827055638**
Option 1 ID : **878270218873**
Option 2 ID : **878270218872**
Option 3 ID : **878270218871**
Option 4 ID : **878270218874**
Status : **Answered**
Chosen Option : **3**

Q.35 A simple pendulum doing small oscillations at a place R height above earth surface has time period of $T_1 = 4$ s. T_2 would be it's time period if it is brought to a point which is at a height 2R from earth surface. Choose the correct relation [R = radius of earth] :

Options

1. $T_1 = T_2$
2. $2T_1 = 3T_2$
3. $2T_1 = T_2$
4. $3T_1 = 2T_2$

Question Type : **MCQ**
Question ID : **87827055647**
Option 1 ID : **878270218907**
Option 2 ID : **878270218910**
Option 3 ID : **878270218908**
Option 4 ID : **878270218909**
Status : **Answered**
Chosen Option : **4**

Q.36 Light emerges out of a convex lens when a source of light kept at its focus. The shape of wavefront of the light is :

Options

1. spherical
2. plane
3. both spherical and cylindrical
4. cylindrical

Question Type : **MCQ**
Question ID : **87827055653**
Option 1 ID : **878270218931**
Option 2 ID : **878270218934**
Option 3 ID : **878270218933**
Option 4 ID : **878270218932**
Status : **Not Answered**
Chosen Option : **--**

Q.37 An alternating voltage of amplitude 40 V and frequency 4 kHz is applied directly across the capacitor of 12 μF. The maximum displacement current between the plates of the capacitor is nearly :

Options

1. 10 A
2. 8 A
3. 13 A
4. 12 A

Question Type : **MCQ**
Question ID : **87827055652**
Option 1 ID : **878270218927**
Option 2 ID : **878270218930**
Option 3 ID : **878270218929**
Option 4 ID : **878270218928**
Status : **Not Answered**
Chosen Option : **--**

Q.38

The angle between vector $\vec{Q}$ and the resultant of $\left(2\vec{Q} + 2\vec{P}\right)$ and $\left(2\vec{Q} - 2\vec{P}\right)$ is :

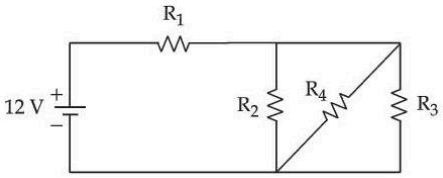
Options

1. $\tan^{-1}\left(P/Q\right)$
2. $0°$
3. $\tan^{-1}\left(2Q/P\right)$
4. $\tan^{-1}\dfrac{\left(2\vec{Q} - 2\vec{P}\right)}{2\vec{Q} + 2\vec{P}}$

Question Type : **MCQ**
Question ID : **87827055639**
Option 1 ID : **878270218876**
Option 2 ID : **878270218878**
Option 3 ID : **878270218875**
Option 4 ID : **878270218877**
Status : **Answered**
Chosen Option : **2**

Q.39

In the given figure $R_1 = 10\Omega$, $R_2 = 8\Omega$, $R_3 = 4\Omega$ and $R_4 = 8\Omega$. Battery is ideal with emf 12V. Equivalent resistant of the circuit and current supplied by battery are respectively :

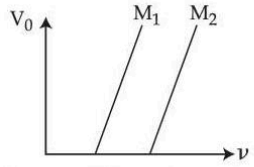


Options

1. 12 Ω and 1 A
2. 10.5 Ω and 1 A
3. 12 Ω and 11.4 A
4. 10.5 Ω and 1.14 A

Question Type : **MCQ**
Question ID : **87827055649**
Option 1 ID : **878270218917**
Option 2 ID : **878270218918**
Option 3 ID : **878270218916**
Option 4 ID : **878270218915**
Status : **Answered**
Chosen Option : **1**

Q.40 Given below are two statements :



Statement I : Figure shows the variation of stopping potential with frequency (ν) for the two photosensitive materials M_1 and M_2. The slope gives value of $\frac{h}{e}$, where h is Planck's constant, e is the charge of electron.

Statement II : M_2 will emit photoelectrons of greater kinetic energy for the incident radiation having same frequency.

In the light of the above statements, choose the **most appropriate** answer from the options given below.

Options

1. **Statement I** is correct and **Statement II** is incorrect
2. **Statement I** is incorrect but **Statement II** is correct
3. Both **Statement I** and **Statement II** are correct
4. Both **Statement I** and **Statement II** are incorrect

Question Type : **MCQ**
Question ID : **87827055654**
Option 1 ID : **878270218937**
Option 2 ID : **878270218938**
Option 3 ID : **878270218935**
Option 4 ID : **878270218936**
Status : **Answered**
Chosen Option : **3**

Q.41 An electron rotates in a circle around a nucleus having positive charge Ze. Correct relation between total energy (E) of electron to its potential energy (U) is :

Options

1. $E = 2U$
2. $2E = 3U$
3. $2E = U$
4. $E = U$

Question Type : **MCQ**
Question ID : **87827055655**
Option 1 ID : **878270218939**
Option 2 ID : **878270218942**
Option 3 ID : **878270218941**
Option 4 ID : **878270218940**
Status : **Answered**
Chosen Option : **3**

Q.42 A wooden block of mass 5 kg rests on a soft horizontal floor. When an iron cylinder of mass 25 kg is placed on the top of the block, the floor yields and the block and the cylinder together go down with an acceleration of 0.1 ms^{-2}. The action force of the system on the floor is equal to :

Options

1. 196 N
2. 294 N
3. 291 N
4. 297 N

Question Type : **MCQ**
Question ID : **87827055640**
Option 1 ID : **878270218882**
Option 2 ID : **878270218880**
Option 3 ID : **878270218881**
Option 4 ID : **878270218879**
Status : **Answered**
Chosen Option : **4**

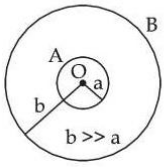
Q.43 If the collision frequency of hydrogen molecules in a closed chamber at 27°C is Z, then the collision frequency of the same system at 127°C is :

Options

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

Question Type : **MCQ**
Question ID : **87827055646**
Option 1 ID : **878270218904**
Option 2 ID : **878270218903**
Option 3 ID : **878270218906**
Option 4 ID : **878270218905**
Status : **Not Answered**
Chosen Option : **--**

Q.44 Two conducting circular loops A and B are placed in the same plane with their centres coinciding as shown in figure. The mutual inductance between them is :



Options

1. $\frac{\mu_o}{2\pi} \cdot \frac{b^2}{a}$

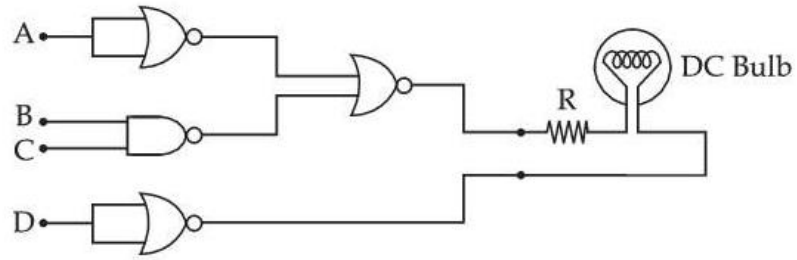
2. $\frac{\mu_o}{2\pi} \cdot \frac{a^2}{b}$

3. $\frac{\mu_o \pi b^2}{2a}$

4. $\frac{\mu_o \pi a^2}{2b}$

Question Type : **MCQ**
Question ID : **87827055651**
Option 1 ID : **878270218923**
Option 2 ID : **878270218924**
Option 3 ID : **878270218925**
Option 4 ID : **878270218926**
Status : **Answered**
Chosen Option : **4**

Q.45 Following gates section is connected in a complete suitable circuit.



For which of the following combination, bulb will glow (ON) :

Options

1. $A=1, B=1, C=1, D=0$
2. $A=1, B=0, C=0, D=0$
3. $A=0, B=0, C=0, D=1$
4. $A=0, B=1, C=1, D=1$

Question Type : **MCQ**
Question ID : **87827055656**
Option 1 ID : **878270218943**
Option 2 ID : **878270218945**
Option 3 ID : **878270218946**
Option 4 ID : **878270218944**
Status : **Answered**
Chosen Option : **2**

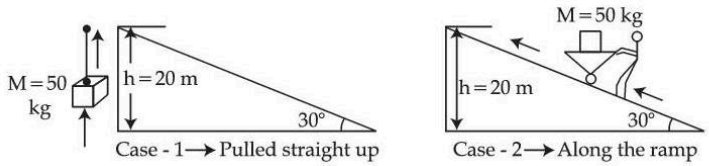
Q.46 In a co-axial straight cable, the central conductor and the outer conductor carry equal currents in opposite directions. The magnetic field is zero :

Options

1. outside the cable
2. inside the inner conductor
3. inside the outer conductor
4. in between the two conductors

Question Type : **MCQ**
Question ID : **87827055650**
Option 1 ID : **878270218919**
Option 2 ID : **878270218920**
Option 3 ID : **878270218921**
Option 4 ID : **878270218922**
Status : **Answered**
Chosen Option : **1**

Q.47 A body of mass 50 kg is lifted to a height of 20 m from the ground in the two different ways as shown in the figures. The ratio of work done against the gravity in both the respective cases, will be :

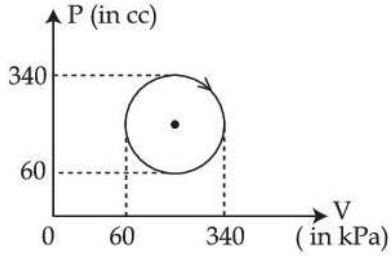


Options

1. $1 : 2$
2. $\sqrt{3} : 2$
3. $1 : 1$
4. $2 : 1$

Question Type : **MCQ**
Question ID : **87827055641**
Option 1 ID : **878270218883**
Option 2 ID : **878270218885**
Option 3 ID : **878270218886**
Option 4 ID : **878270218884**
Status : **Answered**
Chosen Option : **3**

Q.48 The heat absorbed by a system in going through the given cyclic process is :



Options

1. 431.2 J
2. 19.6 J
3. 61.6 J
4. 616 J

Question Type : **MCQ**
Question ID : **87827055645**
Option 1 ID : **878270218899**
Option 2 ID : **878270218902**
Option 3 ID : **878270218901**
Option 4 ID : **878270218900**
Status : **Not Answered**
Chosen Option : **--**

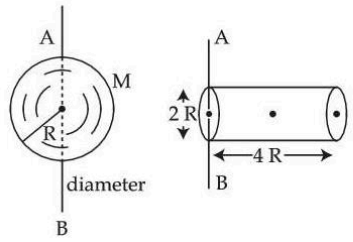
Q.49 Time periods of oscillation of the same simple pendulum measured using four different measuring clocks were recorded as 4.62 s, 4.632 s, 4.6 s and 4.64 s. The arithmetic mean of these readings in correct significant figure is :

Options

1. 4.623 s
2. 5 s
3. 4.62 s
4. 4.6 s

Question Type : **MCQ**
Question ID : **87827055657**
Option 1 ID : **878270218947**
Option 2 ID : **878270218950**
Option 3 ID : **878270218948**
Option 4 ID : **878270218949**
Status : **Not Answered**
Chosen Option : **--**

Q.50 Ratio of radius of gyration of a hollow sphere to that of a solid cylinder of equal mass, for moment of Inertia about their diameter axis AB as shown in figure is $\sqrt{8/x}$. The value of x is :



Options

1. 51
2. 17
3. 67
4. 34

Question Type : **MCQ**
Question ID : **87827055642**
Option 1 ID : **878270218889**
Option 2 ID : **878270218887**
Option 3 ID : **878270218888**
Option 4 ID : **878270218890**
Status : **Not Answered**
Chosen Option : **--**

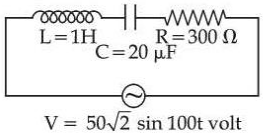
Section : **Physics Section B**

Q.51 If three helium nuclei combine to form a carbon nucleus then the energy released in this reaction is _____ $\times 10^{-2}$ MeV. (Given 1 u = 931 MeV/c^2, atomic mass of helium = 4.002603u)

Given **727**
Answer :

Question Type : **SA**
Question ID : **87827055666**
Status : **Answered**

Q.52 An ac source is connected in given series LCR circuit. The rms potential difference across the capacitor of 20 μF is _____ V.

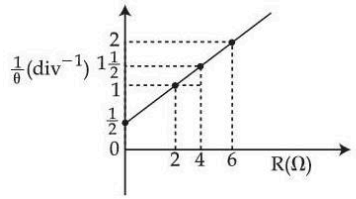


$V = 50\sqrt{2} \sin 100t$ volt

Given **--**
Answer :

Question Type : **SA**
Question ID : **87827055664**
Status : **Not Answered**

Q.53 In the experiment to determine the galvanometer resistance by half-deflection method, the plot of $\frac{1}{\theta}$ vs the resistance (R) of the resistance box is shown in the figure. The figure of merit of the galvanometer is _____ $\times 10^{-1}$ A/division. [The source has emf 2V]



Given **--**
Answer :

Question Type : **SA**
Question ID : **87827055667**
Status : **Not Answered**

Q.54 A 2A current carrying straight metal wire of resistance 1 Ω, resistivity 2×10^{-6} Ωm, area of cross-section 10 mm^2 and mass 500 g is suspended horizontally in mid air by applying a uniform magnetic field $\vec{B}$. The magnitude of B is _____ $\times 10^{-1}$ T (given, g = 10 m/s^2).

Given **5**
Answer :

Question Type : **SA**
Question ID : **87827055663**
Status : **Answered**

Q.55 The electric field between the two parallel plates of a capacitor of 1.5 μF capacitance drops to one third of its initial value in 6.6 μs when the plates are connected by a thin wire.
The resistance of this wire is _____ Ω. (Given, $\log 3 = 1.1$)

Given --
Answer :

Question Type : **SA**
Question ID : **87827055662**
Status : **Not Answered**

Q.56 The density and breaking stress of a wire are 6×10^4 kg/m^3 and 1.2×10^8 N/m^2 respectively. The wire is suspended from a rigid support on a planet where acceleration due to gravity is $\frac{1}{3}^{rd}$ of the value on the surface of earth. The maximum length of the wire with breaking is _____ m (take, $g = 10$ m/s^2).

Given --
Answer :

Question Type : **SA**
Question ID : **87827055660**
Status : **Not Answered**

Q.57 A body moves on a frictionless plane starting from rest. If S_n is distance moved between $t = n-1$ and $t = n$ and S_{n-1} is distance moved between $t = n-2$ and $t = n-1$, then the ratio $\frac{S_{n-1}}{S_n}$ is $\left(1 - \frac{2}{x}\right)$ for $n = 10$. The value of x is _____.

Given **19**
Answer :

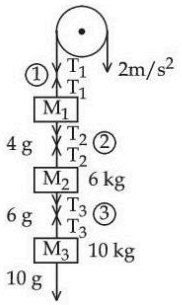
Question Type : **SA**
Question ID : **87827055658**
Status : **Answered**

Q.58 In Young's double slit experiment, carried out with light of wavelength 5000 Å, the distance between the slits is 0.3 mm and the screen is at 200 cm from the slits. The central maximum is at $x = 0$ cm. The value of x for third maxima is _____ mm.

Given --
Answer :

Question Type : **SA**
Question ID : **87827055665**
Status : **Not Answered**

Q.59 Three blocks M_1, M_2, M_3 having masses 4 kg, 6 kg and 10 kg respectively are hanging from a smooth pully using rope 1, 2 and 3 as shown in figure. The tension in the rope 1, T_1 when they are moving upward with acceleration of $2ms^{-2}$ is _____ N(if $g = 10\ m/s^2$).



Given --
Answer :

Question Type : **SA**
Question ID : **87827055659**
Status : **Not Answered**

Q.60 Three capacitors of capacitances 25 μF, 30 μF and 45 μF are connected in parallel to a supply of 100 V. Energy stored in the above combination is E. When these capacitors are connected in series to the same supply, the stored energy is $\frac{9}{x}$ E. The value of x is _____.

Given **86**
Answer :

Question Type : **SA**
Question ID : **87827055661**
Status : **Answered**

Section : **Chemistry Section A**

Q.61 Given below are two statements : One is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**

Assertion (A) : Enthalpy of neutralisation of strong monobasic acid with strong monoacidic base is always -57 kJ mol^{-1}

Reason (R) : Enthalpy of neutralisation is the amount of heat liberated when one mole of H^+ ions furnished by acid combine with one mole of ^-OH ions furnished by base to form one mole of water.

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

Options

1. **(A)** is true but **(R)** is false

2. **(A)** is false but **(R)** is true

3. Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**

4. Both **(A)** and **(R)** are true but **(R)** is **not** the correct explanation of **(A)**

Question Type : **MCQ**
Question ID : **87827055679**
Option 1 ID : **878270219007**
Option 2 ID : **878270219008**
Option 3 ID : **878270219005**
Option 4 ID : **878270219006**
Status : **Answered**
Chosen Option : **2**

Q.62 The number of neutrons present in the more abundant isotope of boron is 'x'. Amorphous boron upon heating with air forms a product, in which the oxidation state of boron is 'y'. The value of $x+y$ is _____.

Options

1. 3

2. 6

3. 4

4. 9

Question Type : **MCQ**
Question ID : **87827055675**
Option 1 ID : **878270218990**
Option 2 ID : **878270218989**
Option 3 ID : **878270218992**
Option 4 ID : **878270218991**
Status : **Not Answered**
Chosen Option : **--**

Q.63 The **incorrect** postulates of the Dalton's atomic theory are :

(A) Atoms of different elements differ in mass.

(B) Matter consists of divisible atoms.

(C) Compounds are formed when atoms of different element combine in a fixed ratio.

(D) All the atoms of given element have different properties including mass.

(E) Chemical reactions involve reorganisation of atoms.

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

Options

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

Question Type : **MCQ**
Question ID : **87827055668**
Option 1 ID : **878270218964**
Option 2 ID : **878270218963**
Option 3 ID : **878270218961**
Option 4 ID : **878270218962**
Status : **Answered**
Chosen Option : **4**

Q.64 Given below are two statements :

Statement I : In group 13, the stability of +1 oxidation state increases down the group.

Statement II : The atomic size of gallium is greater than that of aluminium.

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

Options

1. Both **Statement I** and **Statement II** are incorrect
2. Both **Statement I** and **Statement II** are correct
3. **Statement I** is correct but **Statement II** is incorrect
4. **Statement I** is incorrect but **Statement II** is correct

Question Type : **MCQ**
Question ID : **87827055674**
Option 1 ID : **878270218986**
Option 2 ID : **878270218985**
Option 3 ID : **878270218987**
Option 4 ID : **878270218988**
Status : **Answered**
Chosen Option : **3**

Q.65 The reaction at cathode in the cells commonly used in clocks involves.

Options

1. reduction of Mn from +4 to +3
2. oxidation of Mn from +3 to +4
3. oxidation of Mn from +2 to +7
4. reduction of Mn from +7 to +2

Question Type : **MCQ**
Question ID : **87827055671**
Option 1 ID : **878270218974**
Option 2 ID : **878270218975**
Option 3 ID : **878270218976**
Option 4 ID : **878270218973**
Status : **Answered**
Chosen Option : **4**

Q.66 The following reaction occurs in the Blast furnance where iron ore is reduced to iron metal

$$Fe_2O_{3(s)} + 3CO_{(g)} \rightleftharpoons Fe_{(l)} + 3CO_{2(g)}$$

Using the Le-chatelier's principle, predict which one of the following will not disturb the equilibrium.

Options

1. Removal of CO
2. Removal of CO_2
3. Addition of CO_2
4. Addition of Fe_2O_3

Question Type : **MCQ**
Question ID : **87827055670**
Option 1 ID : **878270218969**
Option 2 ID : **878270218970**
Option 3 ID : **878270218971**
Option 4 ID : **878270218972**
Status : **Answered**
Chosen Option : **4**

Q.67 The correct order of ligands arranged in increasing field strength.

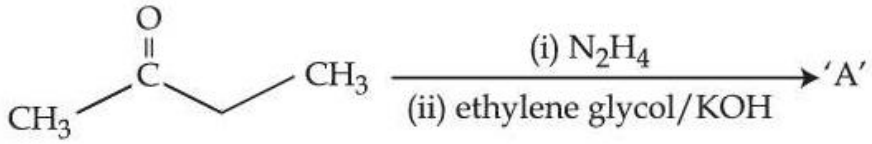
Options

1. $F^- < Br^- < I^- < NH_3$
2. $Cl^- < {}^-OH < Br^- < CN^-$
3. $H_2O < {}^-OH < CN^- < NH_3$
4. $Br^- < F^- < H_2O < NH_3$

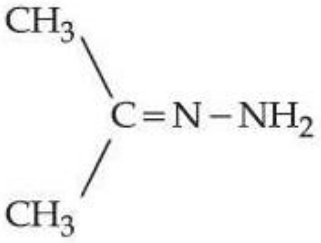
Question Type : **MCQ**
Question ID : **87827055677**
Option 1 ID : **878270218998**
Option 2 ID : **878270219000**
Option 3 ID : **878270218999**
Option 4 ID : **878270218997**
Status : **Answered**
Chosen Option : **3**

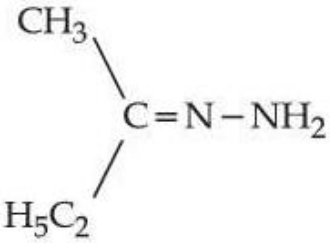
Q.68

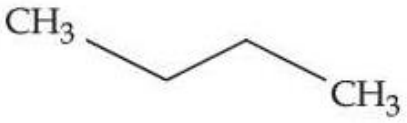
Identify 'A' in the following reaction :

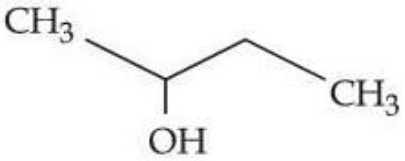


Options

1. 

2. 

3. 

4. 

Question Type : **MCQ**
Question ID : **87827055686**
Option 1 ID : **878270219033**
Option 2 ID : **878270219035**
Option 3 ID : **878270219034**
Option 4 ID : **878270219036**
Status : **Not Answered**
Chosen Option : **--**

Q.69

For the Compounds :

(A) $H_3C-CH_2-O-CH_2-CH_2-CH_3$

(B) $H_3C-CH_2-CH_2-CH_2-CH_3$

(C) $CH_3-CH_2-\underset{\underset{O}{\|}}{C}-CH_2-CH_3$

(D) $H_3C-\underset{\underset{OH}{|}}{CH}-CH_2-CH_2-CH_3$

The increasing order of boiling point is :

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

Options

1. (A) < (B) < (C) < (D)

2. (B) < (A) < (C) < (D)

3. (D) < (C) < (A) < (B)

4. (B) < (A) < (D) < (C)

Question Type : **MCQ**
Question ID : **87827055682**
Option 1 ID : **878270219017**
Option 2 ID : **878270219018**
Option 3 ID : **878270219019**
Option 4 ID : **878270219020**
Status : **Not Answered**
Chosen Option : **--**

Q.70

Molar ionic conductivities of divalent cation and anion are 57 S cm^2 mol^{-1} and 73 S cm^2 mol^{-1} respectively. The molar conductivity of solution of an electrolyte with the above cation and anion will be :

Options

1. 260 S cm^2 mol^{-1}

2. 130 S cm^2 mol^{-1}

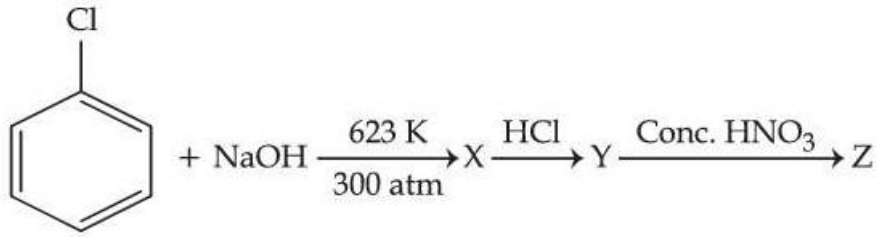
3. 65 S cm^2 mol^{-1}

4. 187 S cm^2 mol^{-1}

Question Type : **MCQ**
Question ID : **87827055672**
Option 1 ID : **878270218979**
Option 2 ID : **878270218977**
Option 3 ID : **878270218978**
Option 4 ID : **878270218980**
Status : **Answered**
Chosen Option : **2**

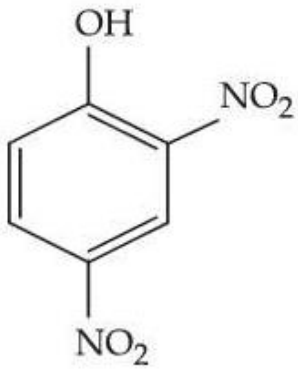
Q.71

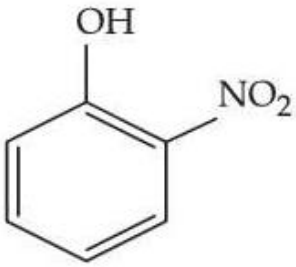
Identify compound (Z) in the following reaction sequence.

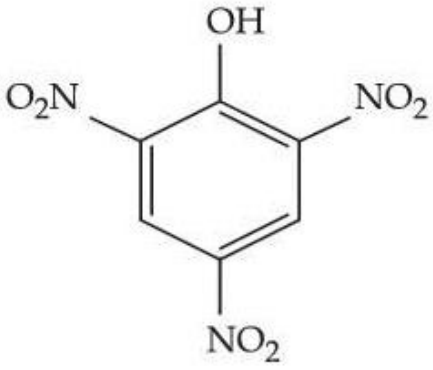


Options

1.


2.


3.


4.


Question Type : **MCQ**
Question ID : **87827055685**

Option 1 ID : **878270219031**
Option 2 ID : **878270219029**
Option 3 ID : **878270219030**
Option 4 ID : **878270219032**
Status : **Not Answered**
Chosen Option : **--**

Q.72 Which one of the following complexes will exhibit the least paramagnetic behaviour ?
[Atomic number, Cr = 24, Mn = 25, Fe = 26, Co = 27]

Options

1. $[Co(H_2O)_6]^{2+}$
2. $[Mn(H_2O)_6]^{2+}$
3. $[Fe(H_2O)_6]^{2+}$
4. $[Cr(H_2O)_6]^{2+}$

Question Type : **MCQ**
Question ID : **87827055678**
Option 1 ID : **878270219004**
Option 2 ID : **878270219002**
Option 3 ID : **878270219003**
Option 4 ID : **878270219001**
Status : **Answered**
Chosen Option : **4**

Q.73 The metal that shows highest and maximum number of oxidation state is :

Options

1. Ti
2. Mn
3. Fe
4. Co

Question Type : **MCQ**
Question ID : **87827055676**
Option 1 ID : **878270218994**
Option 2 ID : **878270218995**
Option 3 ID : **878270218993**
Option 4 ID : **878270218996**
Status : **Answered**
Chosen Option : **2**

Q.74 The statement(s) that are **correct** about the species O^{2-}, F^-, Na^+ and Mg^{2+}.

(A) All are isoelectronic
(B) All have the same nuclear charge
(C) O^{2-} has the largest ionic radii
(D) Mg^{2+} has the smallest ionic radii

Choose the **most appropriate** answer from the options given below :

Options

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

Question Type : **MCQ**
Question ID : **87827055673**
Option 1 ID : **878270218982**
Option 2 ID : **878270218984**
Option 3 ID : **878270218981**
Option 4 ID : **878270218983**
Status : **Answered**
Chosen Option : **1**

Q.75 Number of σ and π bonds present in ethylene molecule is respectively :

Options

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

Question Type : **MCQ**
Question ID : **87827055669**
Option 1 ID : **878270218968**
Option 2 ID : **878270218967**
Option 3 ID : **878270218965**
Option 4 ID : **878270218966**
Status : **Answered**
Chosen Option : **2**

Q.76 Given below are two statement :

Statements I : Bromination of phenol in solvent with low polarity such as $CHCl_3$ or CS_2 requires Lewis acid catalyst.

Statements II : The Lewis acid catalyst polarises the bromine to generate Br^+.

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 : **87827055684**
Option 1 ID : **878270219026**
Option 2 ID : **878270219027**
Option 3 ID : **878270219028**
Option 4 ID : **878270219025**
Status : **Not Answered**
Chosen Option : **--**

Q.77 An organic compound has 42.1% carbon, 6.4% hydrogen and remainder is oxygen. If its molecular weight is 342, then its molecular formula is :

Options

1. $C_{11}H_{18}O_{12}$
2. $C_{12}H_{22}O_{11}$
3. $C_{14}H_{20}O_{10}$
4. $C_{12}H_{20}O_{12}$

Question Type : **MCQ**
Question ID : **87827055680**
Option 1 ID : **878270219010**
Option 2 ID : **878270219009**
Option 3 ID : **878270219011**
Option 4 ID : **878270219012**
Status : **Answered**
Chosen Option : **2**

Q.78 Which of the following gives a positive test with ninhydrin ?

Options

1. Cellulose
2. Starch
3. Egg albumin
4. Polyvinyl chloride

Question Type : **MCQ**
Question ID : **87827055687**
Option 1 ID : **878270219039**
Option 2 ID : **878270219038**
Option 3 ID : **878270219040**
Option 4 ID : **878270219037**
Status : **Not Answered**
Chosen Option : **--**

Q.79 Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Cis form of alkene is found to be more polar than the trans form.

Reason (R) : Dipole moment of trans isomer of 2-butene is zero.

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

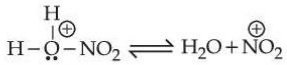
Options

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

Question Type : **MCQ**
Question ID : **87827055683**
Option 1 ID : **878270219023**
Option 2 ID : **878270219024**
Option 3 ID : **878270219022**
Option 4 ID : **878270219021**
Status : **Answered**
Chosen Option : **4**

Q.80 Given below are two statements :

Statement I : Nitration of benzene involves the following step -



Statement II : Use of Lewis base promotes the electrophilic substitution of benzene.

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

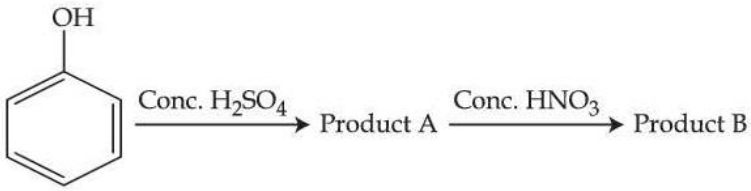
Options

1. Both **Statement I** and **Statement II** are correct
2. Both **Statement I** and **Statement II** are incorrect
3. **Statement I** is incorrect but **Statement II** is correct
4. **Statement I** is correct but **Statement II** is incorrect

Question Type : **MCQ**
Question ID : **87827055681**
Option 1 ID : **878270219013**
Option 2 ID : **878270219014**
Option 3 ID : **878270219016**
Option 4 ID : **878270219015**
Status : **Answered**
Chosen Option : **1**

Section : **Chemistry Section B**

Q.81 Consider the given chemical reaction sequence :



Total sum of oxygen atoms in Product A and Product B are _____.

Given --
Answer :

Question Type : **SA**
Question ID : **87827055696**
Status : **Not Answered**

Q.82 During Kinetic study of reaction $2A + B \rightarrow C + D$, the following results were obtained :

	A [M]	B [M]	initial rate of formation of D
I	0.1	0.1	6.0×10^{-3}
II	0.3	0.2	7.2×10^{-2}
III	0.3	0.4	2.88×10^{-1}
IV	0.4	0.1	2.40×10^{-2}

Based on above data, overall order of the reaction is _____.

Given **5**
Answer :

Question Type : **SA**
Question ID : **87827055692**
Status : **Marked For Review**

Q.83 An artificial cell is made by encapsulating 0.2 M glucose solution within a semipermeable membrane. The osmotic pressure developed when the artificial cell is placed within a 0.05 M solution of NaCl at 300 K is _____ $\times 10^{-1}$ bar. (nearest integer).

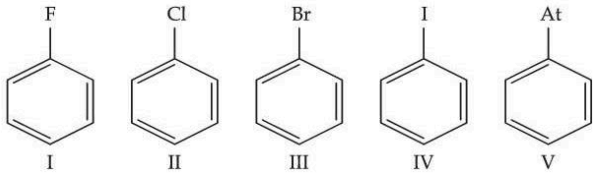
[Given : $R = 0.083$ L bar $mol^{-1} K^{-1}$]

Assume complete dissociation of NaCl

Given **--**
Answer :

Question Type : **SA**
Question ID : **87827055691**
Status : **Not Answered**

Q.84 The number of halobenzenes from the following that can be prepared by Sandmeyer's reaction is _____.



I II III IV V

Given **--**
Answer :

Question Type : **SA**
Question ID : **87827055695**
Status : **Not Answered**

Q.85 In the lewis dot structure for NO_2^-, total number of valence electrons around nitrogen is _____.

Given **6**
Answer :

Question Type : **SA**
Question ID : **87827055689**
Status : **Answered**

Q.86 The spin-only magnetic moment value of the ion among Ti^{2+}, V^{2+}, Co^{3+} and Cr^{2+}, that acts as strong oxidising agent in aqueous solution is _____ BM (Near integer).
(Given atomic numbers : Ti : 22, V : 23, Cr : 24, Co : 27)

Given **5**
Answer :

Question Type : **SA**
Question ID : **87827055693**
Status : **Answered**

Q.87 9.3 g of pure aniline is treated with bromine water at room temperature to give a white precipitate of the product 'P'. The mass of product 'P' obtaind is 26.4 g. The percentage yield is _____%.

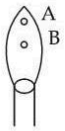
Given **--**
Answer :

Question Type : **SA**
Question ID : **87827055697**
Status : **Not Answered**

Q.88 The value of Rydberg constant (R_H) is 2.18×10^{-18} J. The velocity of electron having mass 9.1×10^{-31} kg in Bohr's first orbit of hydrogen atom = _____ $\times 10^5$ ms^{-1} (nearest integer).

Given **--**
Answer :

Question Type : **SA**
Question ID : **87827055688**
Status : **Not Attempted and Marked For Review**

Q.89 

In a borax bead test under hot condition, a metal salt (one from the given) is heated at point B of the flame, resulted in green colour salt bead. The spin-only magnetic moment value of the salt is _____ BM (Nearest integer)
[Given atomic number of Cu = 29, Ni = 28, Mn = 25, Fe = 26]

Given **--**
Answer :

Question Type : **SA**
Question ID : **87827055694**
Status : **Not Answered**

Q.90 The heat of combustion of solid benzoic acid at constant volume is -321.30 kJ at 27°C. The heat of combustion at constant pressure is $(-321.30 - xR)$ kJ, the value of x is _____.

Given **--**
Answer :

Question Type : **SA**
Question ID : **87827055690**
Status : **Not Answered**