JEE April 2024

Application No	
Candidate Name	
Roll No	
Test Date	04/04/2024
Test Time	3:00 PM - 6:00 PM
Subject	B. Tech

Section : **Mathematics Section A**

Q.1 Let $f(x)=3\sqrt{x-2}+\sqrt{4-x}$ be a real valued function. If α and β are respectively the minimum and the maximum values of f, then $\alpha^2 + 2\beta^2$ is equal to

Options
1. 44
2. 42
3. 24
4. 38

Question Type : **MCQ**
Question ID : **68019113800**
Option 1 ID : **68019154397**
Option 2 ID : **68019154398**
Option 3 ID : **68019154395**
Option 4 ID : **68019154396**
Status : **Not Answered**
Chosen Option : **--**

Q.2 Let $A=\begin{bmatrix}1 & 2\\ 0 & 1\end{bmatrix}$ and $B = I + \text{adj}(A) + (\text{adj } A)^2 + ... + (\text{adj } A)^{10}$.

Then, the sum of all the elements of the matrix B is:

Options
1. -110
2. -88
3. 22
4. -124

Question Type : **MCQ**
Question ID : **68019113796**
Option 1 ID : **68019154380**
Option 2 ID : **68019154382**
Option 3 ID : **68019154379**
Option 4 ID : **68019154381**
Status : **Answered**
Chosen Option : **3**

Q.3 Let three real numbers a, b, c be in arithmetic progression and $a + 1, b, c + 3$ be in geometric progression. If $a > 10$ and the arithmetic mean of a, b and c is 8, then the cube of the geometric mean of a, b and c is

Options
1. 316
2. 120
3. 128
4. 312

Question Type : **MCQ**
Question ID : **68019113799**
Option 1 ID : **68019154394**
Option 2 ID : **68019154393**
Option 3 ID : **68019154391**
Option 4 ID : **68019154392**
Status : **Not Answered**
Chosen Option : **--**

Q.4 Let a relation R on $\mathbb{N} \times \mathbb{N}$ be defined as:
(x_1, y_1) R (x_2, y_2) if and only if $x_1 \leq x_2$ or $y_1 \leq y_2$.
Consider the two statements:
(I) R is reflexive but not symmetric.
(II) R is transitive
Then which one of the following is true?

Options
1. Neither (I) nor (II) is correct.
2. Only (II) is correct.
3. Only (I) is correct.
4. Both (I) and (II) are correct.

Question Type : **MCQ**
Question ID : **68019113794**
Option 1 ID : **68019154374**
Option 2 ID : **68019154372**
Option 3 ID : **68019154371**
Option 4 ID : **68019154373**
Status : **Answered**
Chosen Option : **4**

Q.5 Given that the inverse trigonometric function assumes principal values only. Let x, y be any two real numbers in [-1, 1] such that $\cos^{-1}x - \sin^{-1}y = \alpha, \frac{-\pi}{2} \le \alpha \le \pi$.

Then , the minimum value of $x^2 + y^2 + 2xy\sin\alpha$ is

Options
1. -1
2. 0
3. $\frac{1}{2}$
4. $\frac{-1}{2}$

Question Type : **MCQ**
Question ID : **68019113813**
Option 1 ID : **68019154447**
Option 2 ID : **68019154449**
Option 3 ID : **68019154450**
Option 4 ID : **68019154448**
Status : **Answered**
Chosen Option : **2**

Q.6 If the function

$$f(x) = \begin{cases} \dfrac{72^x - 9^x - 8^x + 1}{\sqrt{2} - \sqrt{1+\cos x}} & , \quad x \neq 0 \\ a\log_e 2 \log_e 3 & , \quad x = 0 \end{cases}$$

is continuous at $x = 0$, then the value of a^2 is equal to

Options
1. 746
2. 968
3. 1250
4. 1152

Question Type : **MCQ**
Question ID : **68019113801**
Option 1 ID : **68019154399**
Option 2 ID : **68019154400**
Option 3 ID : **68019154402**
Option 4 ID : **68019154401**
Status : **Not Answered**
Chosen Option : **--**

Q.7 Let C be a circle with radius $\sqrt{10}$ units and centre at the origin. Let the line $x + y = 2$ intersects the circle C at the points P and Q. Let MN be a chord of C of length 2 unit and slope –1. Then, a distance (in units) between the chord PQ and the chord MN is

Options
1. $2-\sqrt{3}$
2. $\sqrt{2}+1$
3. $\sqrt{2}-1$
4. $3-\sqrt{2}$

Question Type : **MCQ**
Question ID : **68019113806**
Option 1 ID : **68019154422**
Option 2 ID : **68019154421**
Option 3 ID : **68019154419**
Option 4 ID : **68019154420**
Status : **Not Answered**
Chosen Option : **--**

Q.8 If the mean of the following probability distribution of a radam variable X:

X	0	2	4	6	8
P(X)	a	$2a$	$a+b$	$2b$	$3b$

is $\frac{46}{9}$, then the variance of the distribution is

Options
1. $\frac{566}{81}$
2. $\frac{173}{27}$
3. $\frac{581}{81}$
4. $\frac{151}{27}$

Question Type : **MCQ**
Question ID : **68019113812**
Option 1 ID : **68019154444**
Option 2 ID : **68019154446**
Option 3 ID : **68019154445**
Option 4 ID : **68019154443**
Status : **Not Answered**
Chosen Option : **--**

Q.9 The area (in sq. units) of the region
$S=\{z\in\mathbb{C}:|z-1|\le 2;(z+\bar{z})+i(z-\bar{z})\le 2,\mathrm{Im}(z)\ge 0\}$ is

Options
1. $\frac{7\pi}{3}$
2. $\frac{7\pi}{4}$
3. $\frac{17\pi}{8}$
4. $\frac{3\pi}{2}$

Question Type : **MCQ**
Question ID : **68019113795**
Option 1 ID : **68019154376**
Option 2 ID : **68019154377**
Option 3 ID : **68019154378**
Option 4 ID : **68019154375**
Status : **Not Answered**
Chosen Option : **--**

Q.10 Let $\vec{a}=\hat{i}+\hat{j}+\hat{k}$, $\vec{b}=2\hat{i}+4\hat{j}-5\hat{k}$ and $\vec{c}=x\hat{i}+2\hat{j}+3\hat{k}, x\in\mathbb{R}$.

If $\vec{d}$ is the unit vector in the direction of $\vec{b}+\vec{c}$ such that $\vec{a}\cdot\vec{d}=1$, then $(\vec{a}\times\vec{b})\cdot\vec{c}$ is equal to

Options
1. 3
2. 6
3. 11
4. 9

Question Type : **MCQ**
Question ID : **68019113810**
Option 1 ID : **68019154435**
Option 2 ID : **68019154436**
Option 3 ID : **68019154438**
Option 4 ID : **68019154437**
Status : **Answered**
Chosen Option : **3**

Q.11 Let P be the point of intersection of the lines $\frac{x-2}{1}=\frac{y-4}{5}=\frac{z-2}{1}$ and $\frac{x-3}{2}=\frac{y-2}{3}=\frac{z-3}{2}$. Then, the shortest distance of P from the line $4x = 2y = z$ is

Options

1. $\frac{\sqrt{14}}{7}$
2. $\frac{6\sqrt{14}}{7}$
3. $\frac{5\sqrt{14}}{7}$
4. $\frac{3\sqrt{14}}{7}$

Question Type : **MCQ**
Question ID : **68019113809**
Option 1 ID : **68019154432**
Option 2 ID : **68019154434**
Option 3 ID : **68019154433**
Option 4 ID : **68019154431**
Status : **Not Answered**
Chosen Option : **--**

Q.12 Let $y = y(x)$ be the solution of the differential equation $(x^2+4)^2\,dy + (2x^3y + 8xy - 2)dx = 0$. If $y(0) = 0$, then $y(2)$ is equal to

Options

1. $\frac{\pi}{32}$
2. $\frac{\pi}{8}$
3. $\frac{\pi}{16}$
4. 2π

Question Type : **MCQ**
Question ID : **68019113805**
Option 1 ID : **68019154415**
Option 2 ID : **68019154417**
Option 3 ID : **68019154416**
Option 4 ID : **68019154418**
Status : **Not Answered**
Chosen Option : **--**

Q.13 For $\lambda > 0$, let θ be the angle between the vectors $\vec{a} = \hat{i} + \lambda\hat{j} - 3\hat{k}$ and $\vec{b} = 3\hat{i} - \hat{j} + 2\hat{k}$. If the vectors $\vec{a} + \vec{b}$ and $\vec{a} - \vec{b}$ are mutually perpendicular, then the value of $(14 \cos \theta)^2$ is equal to

Options

1. 40
2. 25
3. 50
4. 20

Question Type : **MCQ**
Question ID : **68019113811**
Option 1 ID : **68019154442**
Option 2 ID : **68019154439**
Option 3 ID : **68019154441**
Option 4 ID : **68019154440**
Status : **Not Answered**
Chosen Option : **--**

Q.14 The area (in sq. units) of the region described by $\{(x, y) : y^2 \le 2x, \text{ and } y \ge 4x - 1\}$ is

Options

1. $\frac{11}{32}$
2. $\frac{11}{12}$
3. $\frac{9}{32}$
4. $\frac{8}{9}$

Question Type : **MCQ**
Question ID : **68019113804**
Option 1 ID : **68019154413**
Option 2 ID : **68019154414**
Option 3 ID : **68019154411**
Option 4 ID : **68019154412**
Status : **Not Answered**
Chosen Option : **--**

Q.15 Let PQ be a chord of the parabola $y^2 = 12x$ and the midpoint of PQ be at (4, 1). Then, which of the following point lies on the line passing through the points P and Q?

Options

1. $(3, -3)$
2. $\left(\frac{3}{2}, -16\right)$
3. $\left(\frac{1}{2}, -20\right)$
4. $(2, -9)$

Question Type : **MCQ**
Question ID : **68019113808**
Option 1 ID : **68019154427**
Option 2 ID : **68019154429**
Option 3 ID : **68019154430**
Option 4 ID : **68019154428**
Status : **Not Answered**
Chosen Option : **--**

Q.16 If the coefficients of x^4, x^5 and x^6 in the expansion of $(1 + x)^n$ are in the arithmetic progression, then the maximum value of n is:

Options

1. 14
2. 21
3. 28
4. 7

Question Type : **MCQ**
Question ID : **68019113797**
Option 1 ID : **68019154384**
Option 2 ID : **68019154385**
Option 3 ID : **68019154386**
Option 4 ID : **68019154383**
Status : **Not Answered**
Chosen Option : **--**

Q.17 The value of $\frac{1\times2^2+2\times3^2+....+100\times(101)^2}{1^2\times2+2^2\times3+....+100^2\times101}$ is

Options

1. $\frac{306}{305}$
2. $\frac{31}{30}$
3. $\frac{32}{31}$
4. $\frac{305}{301}$

Question Type : **MCQ**
Question ID : **68019113798**
Option 1 ID : **68019154390**
Option 2 ID : **68019154387**
Option 3 ID : **68019154389**
Option 4 ID : **68019154388**
Status : **Answered**
Chosen Option : **3**

Q.18 Let $f(x)=\int_0^x\left(t+\sin\left(1-e^t\right)\right)dt, x\in\mathbb{R}$. Then, $\lim\limits_{x\to0}\frac{f(x)}{x^3}$ is equal to

Options

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

Question Type : **MCQ**
Question ID : **68019113802**
Option 1 ID : **68019154404**
Option 2 ID : **68019154405**
Option 3 ID : **68019154406**
Option 4 ID : **68019154403**
Status : **Answered**
Chosen Option : **3**

Q.19 If the value of the integral $\int_{-1}^{1} \frac{\cos \alpha x}{1+3^x} dx$ is $\frac{2}{\pi}$ .Then, a value of α is

Options

1. $\frac{\pi}{4}$
2. $\frac{\pi}{2}$
3. $\frac{\pi}{6}$
4. $\frac{\pi}{3}$

Question Type : **MCQ**
Question ID : **68019113803**
Option 1 ID : **68019154407**
Option 2 ID : **68019154409**
Option 3 ID : **68019154410**
Option 4 ID : **68019154408**
Status : **Not Answered**
Chosen Option : **--**

Q.20 Consider a hyperbola H having centre at the origin and foci on the x-axis. Let C_1 be the circle touching the hyperbola H and having the centre at the origin. Let C_2 be the circle touching the hyperbola H at its vertex and having the centre at one of its foci. If areas (in sq units) of C_1 and C_2 are 36π and 4π, respectively, then the length (in units) of latus rectum of H is

Options

1. $\frac{14}{3}$
2. $\frac{28}{3}$
3. $\frac{10}{3}$
4. $\frac{11}{3}$

Question Type : **MCQ**
Question ID : **68019113807**
Option 1 ID : **68019154424**
Option 2 ID : **68019154423**
Option 3 ID : **68019154425**
Option 4 ID : **68019154426**
Status : **Not Answered**
Chosen Option : **--**

Section : **Mathematics Section B**

Q.21 Consider the function $f:\mathbb{R}\to\mathbb{R}$ defined by $f(x)=\frac{2x}{\sqrt{1+9x^2}}$. If the composition of f, $\underbrace{(f\circ f\circ f\circ\cdots\circ f)}_{10\text{ times}}(x)=\frac{2^{10}x}{\sqrt{1+9\alpha x^2}}$, then the value of $\sqrt{3\alpha+1}$ is equal to _____

Given --
Answer :

Question Type : **SA**
Question ID : **68019113814**
Status : **Not Answered**

Q.22 If $\int \operatorname{cosec}^5 x\,dx=\alpha\cot x\operatorname{cosec}x\left(\operatorname{coesc}^2 x+\frac{3}{2}\right)+\beta\log_e\left|\tan\frac{x}{2}\right|+C$

where $\alpha,\beta\in\mathbb{R}$ and C is the constant of integration, then the value of $8(\alpha+\beta)$ equals _____

Given --
Answer :

Question Type : **SA**
Question ID : **68019113819**
Status : **Not Answered**

Q.23 Let $f:\mathbb{R}\to\mathbb{R}$ be a thrice differentiable function such that $f(0)=0, f(1)=1, f(2)=-1, f(3)=2$ and $f(4)=-2$. Then, the minimum number of zeros of $(3f'f''+ff''')(x)$ is_____

Given --
Answer :

Question Type : **SA**
Question ID : **68019113818**
Status : **Not Answered**

Q.24 Let A be a 2×2 symmetric matrix such that $A\begin{bmatrix}1\\1\end{bmatrix}=\begin{bmatrix}3\\7\end{bmatrix}$ and the determinant of A be 1. If $A^{-1}=\alpha A+\beta I$, where I is an identity matrix of order 2×2, then $\alpha+\beta$ equals _____

Given --
Answer :

Question Type : **SA**
Question ID : **68019113816**
Status : **Not Answered**

Q.25 Let $S=\{\sin^2 2\theta : (\sin^4\theta+\cos^4\theta)x^2+(\sin 2\theta)x+(\sin^6\theta+\cos^6\theta)=0 \text{ has real roots}\}$. If α and β be the smallest and largest elements of the set S, respectively, then $3((\alpha-2)^2+(\beta-1)^2)$ equals _____

Given --
Answer :

Question Type : **SA**
Question ID : **68019113815**
Status : **Not Answered**

Q.26 There are 4 men and 5 women in Group A, and 5 men and 4 women in Group B. If 4 persons are selected from each group, then the number of ways of selecting 4 men and 4 women is _____

Given --
Answer :

Question Type : **SA**
Question ID : **68019113817**
Status : **Not Answered**

Q.27 Consider a line L passing through the points P(1, 2, 1) and Q(2, 1, –1). If the mirror image of the point A(2, 2, 2) in the line L is (α, β, γ), then $\alpha + \beta + 6\gamma$ is equal to _____.

Given --
Answer :

Question Type : **SA**
Question ID : **68019113822**
Status : **Not Answered**

Q.28 In a tournament, a team plays 10 matches with probabilities of winning and losing each match as $\frac{1}{3}$ and $\frac{2}{3}$ respectively. Let x be the number of matches that the team wins, and y be the number of matches that team loses. If the probability $P(|x-y| \leq 2)$ is p, then 3^9p equals _____.

Given --
Answer :

Question Type : **SA**
Question ID : **68019113823**
Status : **Not Answered**

Q.29 Let $y = y(x)$ be the solution of the differential equation $(x + y + 2)^2\, dx = dy$, $y(0) = -2$. Let the maximum and minimum values of the function $y = y(x)$ in $\left[0, \frac{\pi}{3}\right]$ be α and β, respectively. If $(3\alpha + \pi)^2 + \beta^2 = \gamma + \delta\sqrt{3}, \gamma, \delta \in \mathbb{Z}$, then $\gamma + \delta$ equals _____

Given --
Answer :

Question Type : **SA**
Question ID : **68019113820**
Status : **Not Answered**

Q.30 Consider a triangle ABC having the vertices A(1, 2), B(α, β) and C(γ, δ) and angles $\angle ABC = \frac{\pi}{6}$ and $\angle BAC = \frac{2\pi}{3}$. If the points B and C lie on the line $y = x + 4$, then $\alpha^2 + \gamma^2$ is equal to _____.

Given --
Answer :

Question Type : **SA**
Question ID : **68019113821**
Status : **Not Answered**

Section : **Physics Section A**

Q.31 The translational degrees of freedom (f_t) and rotational degrees of freedom (f_r) of CH_4 molecule are:

Options
1. $f_t = 3$ and $f_r = 2$
2. $f_t = 3$ and $f_r = 3$
3. $f_t = 2$ and $f_r = 2$
4. $f_t = 2$ and $f_r = 3$

Question Type : **MCQ**
Question ID : **68019113833**
Option 1 ID : **68019154497**
Option 2 ID : **68019154499**
Option 3 ID : **68019154500**
Option 4 ID : **68019154498**
Status : **Answered**
Chosen Option : **4**

Q.32 Correct formula for height of a satellite from earths surface is:

Options
1. $\left(\frac{T^2R^2g}{4\pi^2}\right)^{1/3} - R$
2. $\left(\frac{T^2R^2}{4\pi^2g}\right)^{1/3} - R$
3. $\left(\frac{T^2R^2g}{4\pi}\right)^{1/2} - R$
4. $\left(\frac{T^2R^2g}{4\pi^2}\right)^{-1/3} + R$

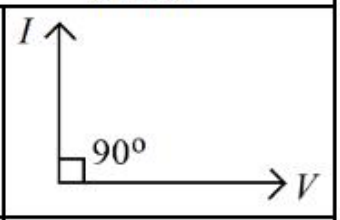
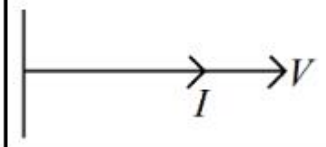
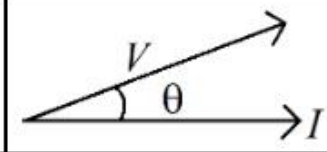
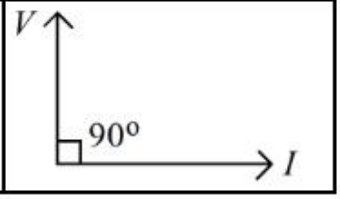
Question Type : **MCQ**
Question ID : **68019113830**
Option 1 ID : **68019154488**
Option 2 ID : **68019154485**
Option 3 ID : **68019154486**
Option 4 ID : **68019154487**
Status : **Answered**
Chosen Option : **1**

Q.33 The width of one of the two slits in a Young's double slit experiment is 4 times that of the other slit. The ratio of the maximum of the minimum intensity in the interference pattern is:

Options
1. $16:1$
2. $1:1$
3. $4:1$
4. $9:1$

Question Type : **MCQ**
Question ID : **68019113839**
Option 1 ID : **68019154522**
Option 2 ID : **68019154524**
Option 3 ID : **68019154523**
Option 4 ID : **68019154521**
Status : **Answered**
Chosen Option : **4**

Q.34 Match List I with List II

LIST I		LIST II	
A.	Purely capacitive circuit	I.	
B.	Purely inductive circuit	II.	
C.	LCR series at resonance	III.	
D.	LCR series circuit	IV.	

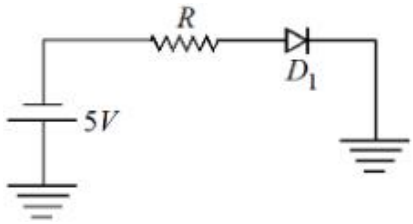
Choose the correct answer from the options given below:

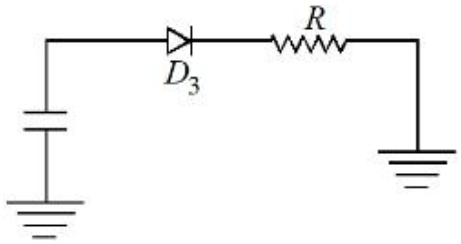
Options
1. A-I. B-IV, C-II, D-III
2. A-IV. B-I, C-III, D-II
3. A-I. B-IV, C-III, D-II
4. A-IV. B-I, C-II, D-III

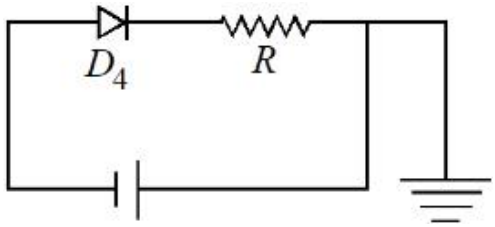
Question Type : **MCQ**
Question ID : **68019113837**
Option 1 ID : **68019154514**
Option 2 ID : **68019154513**
Option 3 ID : **68019154515**
Option 4 ID : **68019154516**
Status : **Answered**
Chosen Option : **4**

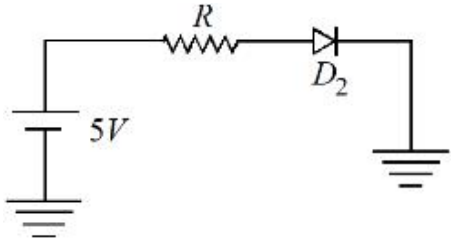
Q.35 Which of the diode circuit shows correct biasing used for the measurement of dynamic resistance of p-n junction diode :

Options

1. 

2. 

3. 

4. 

Question Type : **MCQ**
Question ID : **68019113824**
Option 1 ID : **68019154461**
Option 2 ID : **68019154463**
Option 3 ID : **68019154464**
Option 4 ID : **68019154462**
Status : **Answered**
Chosen Option : **4**

Q.36 An electric bulb rated 50 W - 200 V is connected across a 100 V supply. The power dissipation of the bulb is:

Options

1. 25 W
2. 12.5 W
3. 50 W
4. 100 W

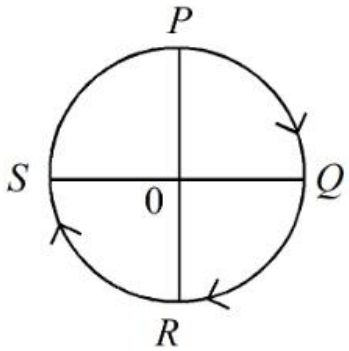
Question Type : **MCQ**
Question ID : **68019113835**
Option 1 ID : **68019154508**
Option 2 ID : **68019154505**
Option 3 ID : **68019154506**
Option 4 ID : **68019154507**
Status : **Answered**
Chosen Option : **1**

Q.37 A 2 kg brick begins to slide over a surface which is inclined at an angle of 45° with respect to horizontal axis. The co-efficient of static friction between their surfaces is:

Options
1. $\frac{1}{\sqrt{3}}$
2. 1
3. 0.5
4. 1.7

Question Type : **MCQ**
Question ID : **68019113827**
Option 1 ID : **68019154474**
Option 2 ID : **68019154473**
Option 3 ID : **68019154476**
Option 4 ID : **68019154475**
Status : **Not Answered**
Chosen Option : **--**

Q.38 A cyclist starts from the point P of a circular ground of radius 2 km and travels along its circumference to the point S. The displacement of a cyclist is:



Options
1. 4 km
2. $\sqrt{8}$ km
3. 8 km
4. 6 km

Question Type : **MCQ**
Question ID : **68019113826**
Option 1 ID : **68019154470**
Option 2 ID : **68019154471**
Option 3 ID : **68019154469**
Option 4 ID : **68019154472**
Status : **Answered**
Chosen Option : **2**

Q.39 Arrange the following in the ascending order of wavelength:

A. Gamma rays (λ_1)
B. x - rays (λ_2)
C. Infrared waves (λ_3)
D. Microwaves (λ_4)

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

Options
1. $\lambda_1 < \lambda_2 < \lambda_3 < \lambda_4$
2. $\lambda_2 < \lambda_1 < \lambda_4 < \lambda_3$
3. $\lambda_4 < \lambda_3 < \lambda_2 < \lambda_1$
4. $\lambda_4 < \lambda_3 < \lambda_1 < \lambda_2$

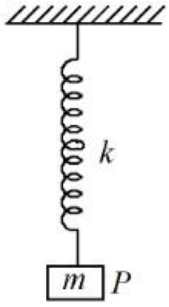
Question Type : **MCQ**
Question ID : **68019113838**
Option 1 ID : **68019154520**
Option 2 ID : **68019154519**
Option 3 ID : **68019154517**
Option 4 ID : **68019154518**
Status : **Answered**
Chosen Option : **3**

Q.40 The magnetic moment of a bar magnet is 0.5 Am^2. It is suspended in a uniform magnetic field of 8×10^{-2}T. The work done in rotating it from its most stable to most unstable position is:

Options
1. 8×10^{-2} J
2. Zero
3. 4×10^{-2} J
4. 16×10^{-2} J

Question Type : **MCQ**
Question ID : **68019113836**
Option 1 ID : **68019154511**
Option 2 ID : **68019154509**
Option 3 ID : **68019154510**
Option 4 ID : **68019154512**
Status : **Answered**
Chosen Option : **2**

Q.41 In simple harmonic motion, the total mechanical energy of given system is E. If mass of oscillating particle P is doubled then the new energy of the system for same amplitude is:



Options

1. $E/\sqrt{2}$
2. E
3. $E\sqrt{2}$
4. $2E$

Question Type : **MCQ**
Question ID : **68019113843**
Option 1 ID : **68019154538**
Option 2 ID : **68019154540**
Option 3 ID : **68019154537**
Option 4 ID : **68019154539**
Status : **Answered**
Chosen Option : **2**

Q.42 A sample of gas at temperature T is adiabatically expanded to double its volume. Adiabatic constant for the gas is $\gamma = 3/2$. The work done by the gas in the process is:

(μ = 1 mole)

Options

1. $RT\left[2\sqrt{2}-1\right]$
2. $RT\left[2-\sqrt{2}\right]$
3. $RT\left[1-2\sqrt{2}\right]$
4. $RT\left[\sqrt{2}-2\right]$

Question Type : **MCQ**
Question ID : **68019113832**
Option 1 ID : **68019154495**
Option 2 ID : **68019154493**
Option 3 ID : **68019154496**
Option 4 ID : **68019154494**
Status : **Not Answered**
Chosen Option : **--**

Q.43 A 90 kg body placed at 2R distance from surface of earth experiences gravitational pull of :

(R = Radius of earth, g = 10 m s^{-2})

Options

1. 225 N
2. 120 N
3. 300 N
4. 100 N

Question Type : **MCQ**
Question ID : **68019113828**
Option 1 ID : **68019154478**
Option 2 ID : **68019154479**
Option 3 ID : **68019154477**
Option 4 ID : **68019154480**
Status : **Answered**
Chosen Option : **1**

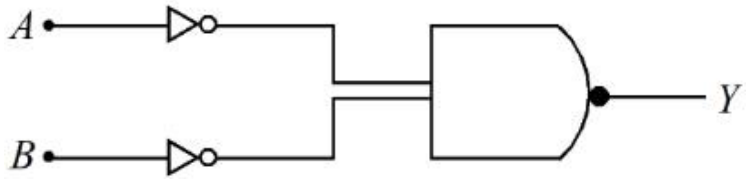
Q.44 According to Bohr's theory, the moment of momentum of an electron revolving in 4^{th} orbit of hydrogen atom is:

Options

1. $2\frac{h}{\pi}$
2. $\frac{h}{\pi}$
3. $\frac{h}{2\pi}$
4. $8\frac{h}{\pi}$

Question Type : **MCQ**
Question ID : **68019113841**
Option 1 ID : **68019154529**
Option 2 ID : **68019154530**
Option 3 ID : **68019154532**
Option 4 ID : **68019154531**
Status : **Answered**
Chosen Option : **1**

Q.45 Identify the logic gate given in the circuit:



Options

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

Question Type : **MCQ**
Question ID : **68019113842**
Option 1 ID : **68019154535**
Option 2 ID : **68019154536**
Option 3 ID : **68019154534**
Option 4 ID : **68019154533**
Status : **Answered**
Chosen Option : **4**

Q.46 Applying the principle of homogeneity of dimensions, determine which one is correct,

where T is time period, G is gravitational constant, M is mass, r is radius of orbit.

Options

1. $T^2 = \frac{4\pi^2 r^3}{GM}$
2. $T^2 = \frac{4\pi^2 r}{GM^2}$
3. $T^2 = \frac{4\pi^2 r^2}{GM}$
4. $T^2 = 4\pi^2 r^3$

Question Type : **MCQ**
Question ID : **68019113825**
Option 1 ID : **68019154465**
Option 2 ID : **68019154468**
Option 3 ID : **68019154466**
Option 4 ID : **68019154467**
Status : **Answered**
Chosen Option : **1**

Q.47 Given below are two statements :

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

Statement II : The rise of a liquid in a capillary tube does not depend on the inner radius of the tube.

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

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

Question Type : **MCQ**
Question ID : **68019113831**
Option 1 ID : **68019154492**
Option 2 ID : **68019154491**
Option 3 ID : **68019154490**
Option 4 ID : **68019154489**
Status : **Not Answered**
Chosen Option : **--**

Q.48 Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R**.

Assertion A: Number of photons increases with increase in frequency of light.

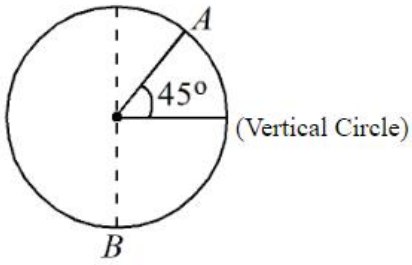
Reason R: Maximum kinetic energy of emitted electrons increases with the frequency of incident radiation.

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

Options
1. Both **A** and **R** are correct and **R** is **NOT** the correct explanation of **A**.
2. **A** is correct but **R** is not correct.
3. Both **A** and **R** are correct and **R** is the correct explanation of **A**.
4. **A** is not correct but **R** is correct.

Question Type : **MCQ**
Question ID : **68019113840**
Option 1 ID : **68019154526**
Option 2 ID : **68019154527**
Option 3 ID : **68019154525**
Option 4 ID : **68019154528**
Status : **Answered**
Chosen Option : **2**

Q.49 A body of m kg slides from rest along the curve of vertical circle from point A to B in friction less path. The velocity of the body at B is:



(Vertical Circle)

(given, $R = 14\ m$, $g = 10\ m/s^2$ and $\sqrt{2} = 1.4$)

Options
1. 21.9 m/s
2. 10.6 m/s
3. 16.7 m/s
4. 19.8 m/s

Question Type : **MCQ**
Question ID : **68019113829**
Option 1 ID : **68019154481**
Option 2 ID : **68019154484**
Option 3 ID : **68019154482**
Option 4 ID : **68019154483**
Status : **Answered**
Chosen Option : **1**

Q.50 A charge q is placed at the center of one of the surface of a cube. The flux linked with the cube is:

Options
1. Zero
2. $\frac{q}{2\epsilon_0}$
3. $\frac{q}{8\epsilon_0}$
4. $\frac{q}{4\epsilon_0}$

Question Type : **MCQ**
Question ID : **68019113834**
Option 1 ID : **68019154504**
Option 2 ID : **68019154501**
Option 3 ID : **68019154503**
Option 4 ID : **68019154502**
Status : **Answered**
Chosen Option : **3**

Section : **Physics Section B**

Q.51 A rod of length 60 *cm* rotates with a uniform angular velocity 20 rad s^{-1} about its perpendicular bisector, in a uniform magnetic filed 0.5*T*. The direction of magnetic field is parallel to the axis of rotation. The potential difference between the two ends of the rod is _____ V.

Given --
Answer :

Question Type : **SA**
Question ID : **68019113846**
Status : **Not Answered**

Q.52 Two wires *A* and *B* are made up of the same material and have the same mass. Wire *A* has radius of 2.0 mm and wire *B* has radius of 4.0 *mm*. The resistance of wire *B* is 2Ω. The resistance of wire *A* is _____Ω.

Given --
Answer :

Question Type : **SA**
Question ID : **68019113848**
Status : **Not Answered**

Q.53 A parallel plate capacitor of capacitance 12.5 *pF* is charged by a battery connected between its plates to potential difference of 12.0 V. The battery is now disconnected and a dielectric slab ($\epsilon_r = 6$) is inserted between the plates. The change in its potential energy after inserting the dielectric slab is _____ × 10^{-12} J.

Given --
Answer :

Question Type : **SA**
Question ID : **68019113853**
Status : **Not Answered**

Q.54 A light ray is incident on a glass slab of thickness $4\sqrt{3}$ cm and refractive index $\sqrt{2}$. The angle of incidence is equal to the critical angle for the glass slab with air. The lateral displacement of ray after passing through glass slab is _____ cm.

(Given sin15° = 0.25)

Given --
Answer :

Question Type : **SA**
Question ID : **68019113845**
Status : **Not Answered**

Q.55 The displacement of a particle executing SHM is given by $x = 10\sin\left(wt + \frac{\pi}{3}\right)m$. The time period of motion is 3.14 s. The velocity of the particle at $t = 0$ is _____ *m/s*.

Given --
Answer :

Question Type : **SA**
Question ID : **68019113849**
Status : **Not Answered**

Q.56 The disintegration energy Q for the nuclear fission of $^{235}U \rightarrow {}^{140}Ce + {}^{94}Zr + n$ is _____ MeV.

Given atomic masses of ^{235}U: 235.0439u; ^{140}Ce : 139.9054 u,

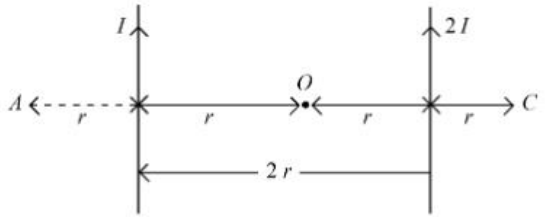
^{94}Zr : 93.9063u ; n : 1.0086 u,

Value of $c^2 = 931\ MeV/u$.

Given --
Answer :

Question Type : **SA**
Question ID : **68019113844**
Status : **Not Answered**

Q.57 Two parallel long current carrying wire separated by a distance $2r$ are shown in the figure. The ratio of magnetic field at A to the magnetic field produced at C is $\frac{x}{7}$.
The value of x is _____.



Given --
Answer :

Question Type : **SA**
Question ID : **68019113847**
Status : **Not Answered**

Q.58 A bus moving along a straight highway with speed of 72 km/h is brought to halt within 4 s after applying the brakes. The distance travelled by the bus during this time (Assume the retardation is uniform) is _____m.

Given --
Answer :

Question Type : **SA**
Question ID : **68019113852**
Status : **Not Answered**

Q.59 Mercury is filled in a tube of radius 2 cm up to a height of 30 cm. The force exerted by mercury on the bottom of the tube is _____ N.

(Given, atmospheric pressure = $10^5\ Nm^{-2}$, density of mercury = $1.36 \times 10^4\ kg\ m^{-3}$, g = 10 $m\ s^{-2}$, $\pi = \frac{22}{7}$)

Given --
Answer :

Question Type : **SA**
Question ID : **68019113850**
Status : **Not Answered**

Q.60 In a system two particles of masses $m_1 = 3\ kg$ and $m_2 = 2\ kg$ are placed at certain distance from each other. The particle of mass m_1 is moved towards the center of mass of the system through a distance 2 cm. In order to keep the center of mass of the system at the original position, the particle of mass m_2 should move towards the center of mass by the distance _____ cm.

Given --
Answer :

Question Type : **SA**
Question ID : **68019113851**
Status : **Not Answered**

Section : **Chemistry Section A**

Q.61 Choose the **Incorrect** Statement about Dalton's Atomic Theory

Options 1. chemical reactions involve reorganization of atoms

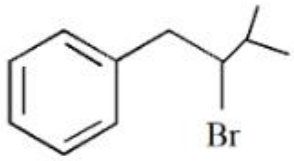
2. Compounds are formed when atoms of different elements combine in any ratio.

3. Matter consists of indivisible atoms.

4. All the atoms of a given element have identical properties including identical mass.

Question Type : **MCQ**
Question ID : **68019113854**
Option 1 ID : **68019154554**
Option 2 ID : **68019154553**
Option 3 ID : **68019154551**
Option 4 ID : **68019154552**
Status : **Answered**
Chosen Option : **3**

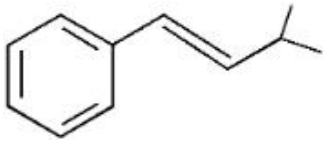
Q.62

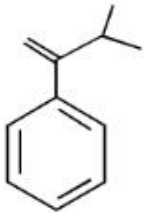


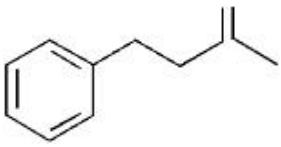
$\xrightarrow[\Delta]{KOH(alc)}$ major product "P"

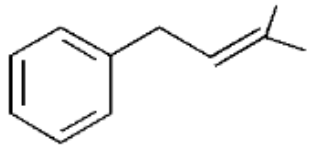
Product P is

Options

1. 

2. 

3. 

4. 

Question Type :	**MCQ**
Question ID :	**68019113870**
Option 1 ID :	**68019154615**
Option 2 ID :	**68019154618**
Option 3 ID :	**68019154617**
Option 4 ID :	**68019154616**
Status :	**Answered**
Chosen Option :	**1**

Q.63 Match **List I** with **List II**

	LIST I		LIST II
A.	α - Glucose and α - Galactose	I.	Functional isomers
B.	α - Glucose and β - Glucose	II.	Homologous
C.	α - Glucose and α - Fructose	III.	Anomers
D.	α - Glucose and α - Ribose	IV.	Epimers

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

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

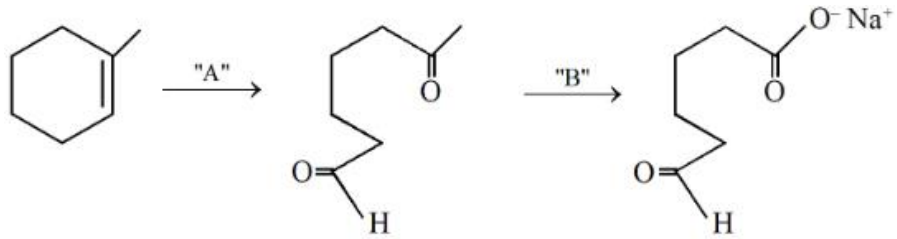
Question Type : **MCQ**
Question ID : **68019113873**
Option 1 ID : **68019154629**
Option 2 ID : **68019154630**
Option 3 ID : **68019154628**
Option 4 ID : **68019154627**
Status : **Answered**
Chosen Option : **4**

Q.64 A first row transition metal in its +2 oxidation state has a spin-only magnetic moment value of 3.86 BM. The atomic number of the metal is

Options
1. 25
2. 23
3. 22
4. 26

Question Type : **MCQ**
Question ID : **68019113862**
Option 1 ID : **68019154583**
Option 2 ID : **68019154584**
Option 3 ID : **68019154585**
Option 4 ID : **68019154586**
Status : **Answered**
Chosen Option : **2**

Q.65



In the above chemical reaction sequence "A" and "B" respectively are

Options
1. O_3, Zn/H_2O and $NaOH_{(alc)}/I_2$
2. H_2O, H^+ and $KMnO_4$
3. H_2O, H^+ and $NaOH_{(alc)}/I_2$
4. O_3, Zn/H_2O and $KMnO_4$

Question Type : **MCQ**
Question ID : **68019113868**
Option 1 ID : **68019154608**
Option 2 ID : **68019154607**
Option 3 ID : **68019154609**
Option 4 ID : **68019154610**
Status : **Answered**
Chosen Option : **1**

Q.66 The equilibrium constant for the reaction

$$SO_3(g) \rightleftharpoons SO_2(g) + \frac{1}{2} O_2(g)$$

is $K_c = 4.9 \times 10^{-2}$. The value of K_c for the reaction given below is

$$2\,SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g) \text{ is :}$$

Options
1. 41.6
2. 416
3. 4.9
4. 49

Question Type : **MCQ**
Question ID : **68019113856**
Option 1 ID : **68019154561**
Option 2 ID : **68019154560**
Option 3 ID : **68019154559**
Option 4 ID : **68019154562**
Status : **Not Answered**
Chosen Option : **--**

Q.67 For a strong electrolyte, a plot of molar conductivity against (concentration)$^{1/2}$ is a straight line, with a negative slope, the correct unit for the slope is

Options
1. S cm^2 mol^{-1} L$^{1/2}$
2. S cm^2 mol$^{-3/2}$ L$^{1/2}$
3. S cm^2 mol$^{-3/2}$L
4. S cm^2 mol$^{-3/2}$ L$^{-1/2}$

Question Type : **MCQ**
Question ID : **68019113858**
Option 1 ID : **68019154567**
Option 2 ID : **68019154570**
Option 3 ID : **68019154568**
Option 4 ID : **68019154569**
Status : **Not Answered**
Chosen Option : **--**

Q.68 When MnO_2 and H_2SO_4 is added to a salt (A), the greenish yellow gas liberated as salt (A) is :

Options
1. KNO_3
2. NaBr
3. CaI_2
4. NH_4Cl

Question Type : **MCQ**
Question ID : **68019113865**
Option 1 ID : **68019154598**
Option 2 ID : **68019154595**
Option 3 ID : **68019154597**
Option 4 ID : **68019154596**
Status : **Not Answered**
Chosen Option : **--**

Q.69 Common name of Benzene - 1, 2 - diol is -

Options
1. o-cresol
2. quinol
3. catechol
4. resorcinol

Question Type : **MCQ**
Question ID : **68019113871**
Option 1 ID : **68019154622**
Option 2 ID : **68019154620**
Option 3 ID : **68019154621**
Option 4 ID : **68019154619**
Status : **Answered**
Chosen Option : **1**

Q.70 The correct statement/s about Hydrogen bonding is/are

A. Hydrogen bonding exists when H is covalently bonded to the highly electro negative atom.
B. Intermolecular H bonding is present in *o*-nitro phenol
C. Intramolecular H bonding is present in HF.
D. The magnitude of H bonding depends on the physical state of the compound.
E. H-bonding has powerful effect on the structure and properties of compounds

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

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

Question Type : **MCQ**
Question ID : **68019113855**
Option 1 ID : **68019154555**
Option 2 ID : **68019154558**
Option 3 ID : **68019154556**
Option 4 ID : **68019154557**
Status : **Answered**
Chosen Option : **3**

Q.71 The number of unpaired d-electrons in $[Co(H_2O)_6]^{3+}$ is _____.

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

Question Type : **MCQ**
Question ID : **68019113863**
Option 1 ID : **68019154589**
Option 2 ID : **68019154588**
Option 3 ID : **68019154590**
Option 4 ID : **68019154587**
Status : **Answered**
Chosen Option : **3**

Q.72 Given below are two statements :

Statement I : The correct order of first ionization enthalpy values of Li, Na, F and Cl is Na < Li < Cl < F.

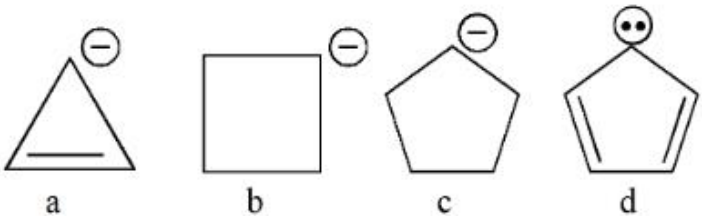
Statement II : The correct order of negative electron gain enthalpy values of Li, Na, F and Cl is Na < Li < F < Cl

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

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

Question Type : **MCQ**
Question ID : **68019113859**
Option 1 ID : **68019154572**
Option 2 ID : **68019154571**
Option 3 ID : **68019154573**
Option 4 ID : **68019154574**
Status : **Answered**
Chosen Option : **4**

Q.73 Correct order of stability of carbanion is -



Options
1. a > b > c > d
2. c > b > d > a
3. d > c > b > a
4. d > a > c > b

Question Type : **MCQ**
Question ID : **68019113867**
Option 1 ID : **68019154604**
Option 2 ID : **68019154606**
Option 3 ID : **68019154603**
Option 4 ID : **68019154605**
Status : **Answered**
Chosen Option : **4**

Q.74 The correct order of the first ionization enthalpy is

Options
1. B > Al > Ga
2. Ga > Al > B
3. Tl > Ga > Al
4. Al > Ga > Tl

Question Type : **MCQ**
Question ID : **68019113860**
Option 1 ID : **68019154576**
Option 2 ID : **68019154575**
Option 3 ID : **68019154577**
Option 4 ID : **68019154578**
Status : **Answered**
Chosen Option : **2**

Q.75 Fuel cell, using hydrogen and oxygen as fuels,

A. has been used in spaceship
B. has as efficiency of 40% to produce electricity
C. uses aluminum as catalysts
D. is eco-friendry
E. is actually a type of Galvanic cell only

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

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

Question Type : **MCQ**
Question ID : **68019113857**
Option 1 ID : **68019154564**
Option 2 ID : **68019154563**
Option 3 ID : **68019154566**
Option 4 ID : **68019154565**
Status : **Answered**
Chosen Option : **3**

Q.76 The number of species from the following that have pyramidal geometry around the central atom is _____

$S_2O_3^{2-}, SO_4^{2-}, SO_3^{2-}, S_2O_7^{2-}$

Options 1. 1
2. 3
3. 2
4. 4

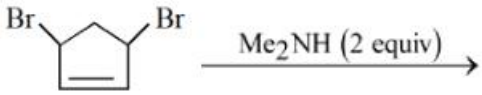
Question Type : **MCQ**
Question ID : **68019113861**
Option 1 ID : **68019154579**
Option 2 ID : **68019154581**
Option 3 ID : **68019154580**
Option 4 ID : **68019154582**
Status : **Answered**
Chosen Option : **1**

Q.77 If an iron (III) complex with the formula $\left[Fe(NH_3)_x\ (CN)_y\right]^-$ has no electron in its e_g orbital, then the value of x + y is

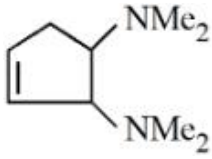
Options 1. 5
2. 3
3. 4
4. 6

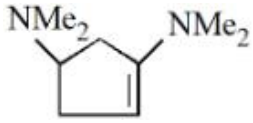
Question Type : **MCQ**
Question ID : **68019113864**
Option 1 ID : **68019154593**
Option 2 ID : **68019154591**
Option 3 ID : **68019154592**
Option 4 ID : **68019154594**
Status : **Not Answered**
Chosen Option : **--**

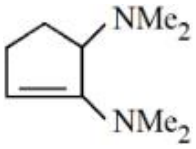
Q.78 Find out the major product formed from the following reaction. [Me : $-CH_3$]

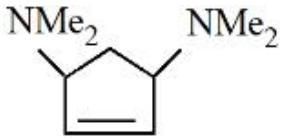


Options

1. 

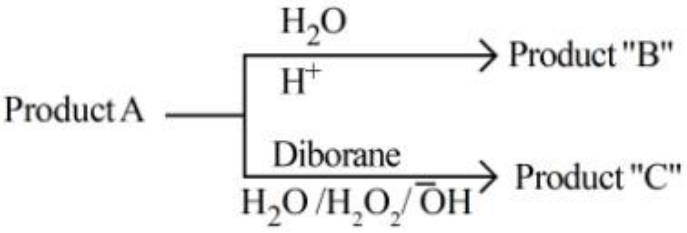
2. 

3. 

4. 

Question Type : **MCQ**
Question ID : **68019113869**
Option 1 ID : **68019154612**
Option 2 ID : **68019154613**
Option 3 ID : **68019154614**
Option 4 ID : **68019154611**
Status : **Answered**
Chosen Option : **4**

Q.79 $CH_3 - CH_2 - CH_2 - Br + NaOH \xrightarrow{C_2H_5OH}$ Product 'A'



Consider the above reactions, identify product B and product C.

Options
1. B = 2-Propanol C = 1-Propanol
2. B = 1-Propanol C = 2-Propanol
3. B = C = 1-Propanol
4. B = C = 2-Propanol

Question Type : **MCQ**
Question ID : **68019113872**
Option 1 ID : **68019154623**
Option 2 ID : **68019154624**
Option 3 ID : **68019154626**
Option 4 ID : **68019154625**
Status : **Answered**
Chosen Option : **1**

Q.80 The adsorbent used in adsorption chromatography is/are -

A. silica gel
B. alumina
C. quick lime
D. magnesia

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

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

Question Type : **MCQ**
Question ID : **68019113866**
Option 1 ID : **68019154600**
Option 2 ID : **68019154599**
Option 3 ID : **68019154601**
Option 4 ID : **68019154602**
Status : **Not Answered**
Chosen Option : **--**

Section : **Chemistry Section B**

Q.81 Three moles of an ideal gas are compressed isothermally from 60 L to 20 L using constant pressure of 5 atm. Heat exchange Q for the compression is – _____ Lit. atm.

Given --
Answer :

Question Type : **SA**
Question ID : **68019113876**
Status : **Not Answered**

Q.82 The maximum number of orbitals which can be identified with n = 4 and $m_l = 0$ is _____.

Given --
Answer :

Question Type : **SA**
Question ID : **68019113874**
Status : **Not Attempted and Marked For Review**

Q.83 Vanillin compound obtained from vanilla beans, has total sum of oxygen atoms and π electrons is _____.

Given --
Answer :

Question Type : **SA**
Question ID : **68019113882**
Status : **Not Answered**

Q.84 A first row transition metal with highest enthalpy of atomisation, upon reaction with oxygen at high temperature forms oxides of formula M_2O_n (where n = 3, 4, 5). The 'spin-only' magnetic moment value of the amphoteric oxide from the above oxides is _____ BM (near integer)

(Given atomic number : Sc : 21, Ti : 22, V : 23, Cr : 24, Mn : 25, Fe : 26, Co : 27, Ni : 28, Cu : 29, Zn : 30)

Given --
Answer :

Question Type : **SA**
Question ID : **68019113879**
Status : **Not Answered**

Q.85 From 6.55 g of aniline, the maximum amount of acetanilide that can be prepared will be _____ $\times 10^{-1}$ g.

Given --
Answer :

Question Type : **SA**
Question ID : **68019113880**
Status : **Not Answered**

Q.86 2.7 kg of each of water and acetic acid are mixed. The freezing point of the solution will be -x °C. Consider the acetic acid does not dimerise in water, nor dissociates in water. x = _____ (nearest integer)

[Given: Molar mass of water = 18 g mol^{-1}, acetic acid = 60 g mol^{-1}

K_f H_2O : 1.86 K kg mol^{-1}

K_f acetic acid: 3.90 K kg mol^{-1}

freezing point: H_2O = 273 K, acetic acid = 290 K]

Given --
Answer :

Question Type : **SA**
Question ID : **68019113877**
Status : **Not Answered**

Q.87 Phthalimide is made to undergo following sequence of reactions.

$$\text{Phthalimide} \xrightarrow[\text{(ii) Benzylchloride}]{\text{(i) KOH}} \text{'P'}$$

Total number of π bonds present in product 'P' is/are _____.

Given --
Answer :

Question Type : **SA**
Question ID : **68019113883**
Status : **Not Answered**

Q.88 Number of compounds / species from the following with non-zero dipole moment is _____.

$BeCl_2$, BCl_3, NF_3, XeF_4, CCl_4, H_2O, H_2S, HBr, CO_2, H_2, HCl

Given --
Answer :

Question Type : **SA**
Question ID : **68019113875**
Status : **Not Answered**

Q.89 Consider the following reaction, the rate expression of which is given below

$A + B \rightarrow C$

$\text{rate} = k [A]^{1/2} [B]^{1/2}$

The reaction is initiated by taking 1 M concentration of A and B each. If the rate constant (k) is $4.6 \times 10^{-2}\ s^{-1}$, then the time taken for A to become 0.1 M is _____ sec.
(nearest integer)

Given --
Answer :

Question Type : **SA**
Question ID : **68019113878**
Status : **Not Answered**

Q.90 The total number of 'sigma' and 'Pi' bonds in 2-oxohex-4-ynoic acid is _____.

Given --
Answer :

Question Type : **SA**
Question ID : **68019113881**
Status : **Not Answered**