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Test Date	06/04/2024
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Subject	B. Tech

Section : Mathematics Section A

Q.1 Let a variable line of slope $m > 0$ passing through the point $(4, -9)$ intersect the coordinate axes at the points A and B . The minimum value of the sum of the distances of A and B from the origin is

- Options 1. 30
2. 10
3. 15
4. 25

Question Type : MCQ
 Question ID : 68019114073
 Option 1 ID : 68019155220
 Option 2 ID : 68019155217
 Option 3 ID : 68019155219
 Option 4 ID : 68019155218
 Status : Not Answered
 Chosen Option : –

Q.2 The number of triangles whose vertices are at the vertices of a regular octagon but none of whose sides is a side of the octagon is

- Options 1. 24
2. 16
3. 48
4. 56

Question Type : MCQ
 Question ID : 68019114066
 Option 1 ID : 68019155190
 Option 2 ID : 68019155189
 Option 3 ID : 68019155192
 Option 4 ID : 68019155191
 Status : Answered
 Chosen Option : 3

Q.3
If $f(x) = \begin{cases} x^3 \sin\left(\frac{1}{x}\right), & x \neq 0 \\ 0, & x = 0 \end{cases}$, then

Options 1. $f''(0) = 0$

2. $f''(0) = 1$

3. $f''\left(\frac{2}{\pi}\right) = \frac{24 - \pi^2}{2\pi}$

4. $f''\left(\frac{2}{\pi}\right) = \frac{12 - \pi^2}{2\pi}$

Question Type : MCQ

Question ID : 68019114071

Option 1 ID : 68019155209

Option 2 ID : 68019155211

Option 3 ID : 68019155210

Option 4 ID : 68019155212

Status : Answered

Chosen Option : 1

Q.4 Let $A = \{n \in [100, 700] \cap \mathbb{N} : n \text{ is neither a multiple of } 3 \text{ nor a multiple of } 4\}$. Then
the number of elements in A is

Options 1. 290

2. 300

3. 280

4. 310

Question Type : MCQ

Question ID : 68019114070

Option 1 ID : 68019155206

Option 2 ID : 68019155207

Option 3 ID : 68019155205

Option 4 ID : 68019155208

Status : Answered

Chosen Option : 3

Q.5

For $\alpha, \beta \in \mathbb{R}$ and a natural number n , let $A_r = \begin{vmatrix} r & 1 & \frac{n^2 + \alpha}{2} \\ 2r & 2 & n^2 - \beta \\ 3r - 2 & 3 & \frac{n(3n-1)}{2} \end{vmatrix}$. Then

$2A_{10} - A_8$ is

Options 1. 0

2. $2\alpha + 4\beta$

3. $2n$

4. $4\alpha + 2\beta$

Question Type : MCQ

Question ID : 68019114068

Option 1 ID : 68019155197

Option 2 ID : 68019155199

Option 3 ID : 68019155198

Option 4 ID : 68019155200

Status : Not Answered

Chosen Option : –

Q.6

Let $f: (-\infty, \infty) - \{0\} \rightarrow \mathbb{R}$ be a differentiable function such that $f'(1) = \lim_{a \rightarrow \infty} a^2 f\left(\frac{1}{a}\right)$.

Then $\lim_{a \rightarrow \infty} \frac{a(a+1)}{2} \tan^{-1}\left(\frac{1}{a}\right) + a^2 - 2 \log_e a$ is equal to

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

2. $\frac{3}{8} + \frac{\pi}{4}$

3. $\frac{3}{4} + \frac{\pi}{8}$

4. $\frac{5}{2} + \frac{\pi}{8}$

Question Type : MCQ

Question ID : 68019114069

Option 1 ID : 68019155202

Option 2 ID : 68019155203

Option 3 ID : 68019155204

Option 4 ID : 68019155201

Status : Not Answered

Chosen Option : –

Q.7 Let C be the circle of minimum area touching the parabola $y = 6 - x^2$ and the lines $y = \sqrt{3}|x|$. Then, which one of the following points lies on the circle C ?

Options 1. (1, 2)

2. (2, 2)

3. (2, 4)

4. (1, 1)

Question Type : MCQ

Question ID : 68019114079

Option 1 ID : 68019155242

Option 2 ID : 68019155243

Option 3 ID : 68019155241

Option 4 ID : 68019155244

Status : Not Answered

Chosen Option : –

Q.8 Let the relations R_1 and R_2 on the set $X = \{1, 2, 3, \dots, 20\}$ be given by

$R_1 = \{(x, y) : 2x - 3y = 2\}$ and $R_2 = \{(x, y) : -5x + 4y = 0\}$. If M and N be the minimum number of elements required to be added in R_1 and R_2 , respectively, in order to make the relations symmetric, then $M+N$ equals

Options 1. 8

2. 10

3. 12

4. 16

Question Type : MCQ

Question ID : 68019114064

Option 1 ID : 68019155181

Option 2 ID : 68019155182

Option 3 ID : 68019155183

Option 4 ID : 68019155184

Status : Not Answered

Chosen Option : –

Q.9 Let $y = y(x)$ be the solution of the differential equation $(1+x^2)\frac{dy}{dx} + y = e^{\tan^{-1}x}$,
 $y(1) = 0$. Then $y(0)$ is

- Options
1. $\frac{1}{2}(e^{\pi/2} - 1)$
 2. $\frac{1}{2}(1 - e^{\pi/2})$
 3. $\frac{1}{4}(e^{\pi/2} - 1)$
 4. $\frac{1}{4}(1 - e^{\pi/2})$

Question Type : MCQ

Question ID : 68019114076

Option 1 ID : 68019155229

Option 2 ID : 68019155231

Option 3 ID : 68019155230

Option 4 ID : 68019155232

Status : Not Attempted and
Marked For Review

Chosen Option : –

Q.10 If $A(3, 1, -1)$, $B\left(\frac{5}{3}, \frac{7}{3}, \frac{1}{3}\right)$, $C(2, 2, 1)$ and $D\left(\frac{10}{3}, \frac{2}{3}, \frac{-1}{3}\right)$ are the vertices of a quadrilateral $ABCD$, then its area is

- Options
1. $\frac{2\sqrt{2}}{3}$
 2. $\frac{4\sqrt{2}}{3}$
 3. $2\sqrt{2}$
 4. $\frac{5\sqrt{2}}{3}$

Question Type : MCQ

Question ID : 68019114082

Option 1 ID : 68019155255

Option 2 ID : 68019155256

Option 3 ID : 68019155253

Option 4 ID : 68019155254

Status : Answered

Chosen Option : 1

Q.11 The function $f(x) = \frac{x^2 + 2x - 15}{x^2 - 4x + 9}$, $x \in \mathbb{R}$ is

- Options
1. onto but not one-one.
 2. neither one-one nor onto.
 3. both one-one and onto.
 4. one-one but not onto.

Question Type : MCQ

Question ID : 68019114065

Option 1 ID : 68019155187

Option 2 ID : 68019155188

Option 3 ID : 68019155185

Option 4 ID : 68019155186

Status : Not Attempted and
Marked For Review

Chosen Option : –

Q.12 The interval in which the function $f(x) = x^x$, $x > 0$, is strictly increasing is

- Options
1. $\left[0, \frac{1}{e}\right]$
 2. $\left[\frac{1}{e}, \infty\right)$
 3. $(0, \infty)$
 4. $\left[\frac{1}{e^2}, 1\right)$

Question Type : MCQ

Question ID : 68019114072

Option 1 ID : 68019155214

Option 2 ID : 68019155213

Option 3 ID : 68019155216

Option 4 ID : 68019155215

Status : Marked For Review

Chosen Option : 2

Q.13 Let α, β be the distinct roots of the equation $x^2 - (t^2 - 5t + 6)x + 1 = 0$, $t \in \mathbb{R}$ and

$a_n = \alpha^n + \beta^n$. Then the minimum value of $\frac{a_{2023} + a_{2025}}{a_{2024}}$ is

- Options
1. 1/4
 2. 1/2
 3. -1/4
 4. -1/2

Question Type : MCQ

Question ID : 68019114067

Option 1 ID : 68019155194

Option 2 ID : 68019155196

Option 3 ID : 68019155193

Option 4 ID : 68019155195

Status : Not Answered

Chosen Option : –

Q.14 A company has two plants A and B to manufacture motorcycles. 60% motorcycles are manufactured at plant A and the remaining are manufactured at plant B . 80% of the motorcycles manufactured at plant A are rated of the standard quality, while 90% of the motorcycles manufactured at plant B are rated of the standard quality. A motorcycle picked up randomly from the total production is found to be of the standard quality. If p is the probability that it was manufactured at plant B , then $126p$ is

- Options 1. 56
2. 54
3. 64
4. 66

Question Type : MCQ
Question ID : 68019114083
Option 1 ID : 68019155257
Option 2 ID : 68019155260
Option 3 ID : 68019155258
Option 4 ID : 68019155259
Status : Answered
Chosen Option : 3

Q.15 The shortest distance between the lines $\frac{x-3}{2} = \frac{y+15}{-7} = \frac{z-9}{5}$ and $\frac{x+1}{2} = \frac{y-1}{1} = \frac{z-9}{-3}$ is

- Options 1. $4\sqrt{3}$
2. $5\sqrt{3}$
3. $8\sqrt{3}$
4. $6\sqrt{3}$

Question Type : MCQ
Question ID : 68019114080
Option 1 ID : 68019155247
Option 2 ID : 68019155246
Option 3 ID : 68019155248
Option 4 ID : 68019155245
Status : Answered
Chosen Option : 3

Q.16 $\int_0^{\pi/4} \frac{\cos^2 x \sin^2 x}{(\cos^3 x + \sin^3 x)^2} dx$ is equal to

- Options 1. 1/6
 2. 1/9
 3. 1/3
 4. 1/12

Question Type : MCQ
 Question ID : 68019114074
 Option 1 ID : 68019155222
 Option 2 ID : 68019155223
 Option 3 ID : 68019155221
 Option 4 ID : 68019155224
 Status : Answered
 Chosen Option : 2

Q.17 Let the area of the region enclosed by the curves $y = 3x$, $2y = 27 - 3x$ and $y = 3x - x\sqrt{x}$ be A . Then $10A$ is equal to

- Options 1. 184
 2. 172
 3. 154
 4. 162

Question Type : MCQ
 Question ID : 68019114075
 Option 1 ID : 68019155228
 Option 2 ID : 68019155227
 Option 3 ID : 68019155225
 Option 4 ID : 68019155226
 Status : Not Answered
 Chosen Option : –

Q.18 A circle is inscribed in an equilateral triangle of side of length 12. If the area and perimeter of any square inscribed in this circle are m and n , respectively, then $m + n^2$ is equal to

- Options 1. 414
 2. 408
 3. 312
 4. 396

Question Type : MCQ
 Question ID : 68019114078
 Option 1 ID : 68019155239
 Option 2 ID : 68019155237
 Option 3 ID : 68019155238
 Option 4 ID : 68019155240
 Status : Not Answered
 Chosen Option : –

Q.19 Let $y = y(x)$ be the solution of the differential equation

$$(2x \log_e x) \frac{dy}{dx} + 2y = \frac{3}{x} \log_e x, x > 0 \text{ and } y(e^{-1}) = 0. \text{ Then, } y(e) \text{ is equal to}$$

Options

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

Question Type : MCQ

Question ID : 68019114077

Option 1 ID : 68019155233

Option 2 ID : 68019155236

Option 3 ID : 68019155235

Option 4 ID : 68019155234

Status : Answered

Chosen Option : 2

Q.20 The mean and standard deviation of 20 observations are found to be 10 and 2, respectively. On rechecking, it was found that an observation by mistake was taken 8 instead of 12. The correct standard deviation is

Options

1. $\sqrt{3.86}$
2. 1.8
3. $\sqrt{3.96}$
4. 1.94

Question Type : MCQ

Question ID : 68019114081

Option 1 ID : 68019155251

Option 2 ID : 68019155249

Option 3 ID : 68019155250

Option 4 ID : 68019155252

Status : Not Answered

Chosen Option : –

Section : Mathematics Section B

Q.21 Let L_1, L_2 be the lines passing through the point $P(0, 1)$ and touching the parabola $9x^2 + 12x + 18y - 14 = 0$. Let Q and R be the points on the lines L_1 and L_2 such that the ΔPQR is an isosceles triangle with base QR . If the slopes of the lines QR are m_1 and m_2 , then $16(m_1^2 + m_2^2)$ is equal to _____.

Given –
Answer :

Question Type : SA

Question ID : 68019114089

Status : Not Answered

- Q.22** Let the first term of a series be $T_1 = 6$ and its r^{th} term $T_r = 3 T_{r-1} + 6^r$, $r = 2, 3, \dots, n$. If the sum of the first n terms of this series is $\frac{1}{5}(n^2 - 12n + 39)(4 \cdot 6^n - 5 \cdot 3^n + 1)$, then n is equal to _____.

Given –
Answer :

Question Type : SA
Question ID : 68019114087
Status : Not Answered

- Q.23** Let a conic C pass through the point $(4, -2)$ and $P(x, y)$, $x \geq 3$, be any point on C . Let the slope of the line touching the conic C only at a single point P be half the slope of the line joining the points P and $(3, -5)$. If the focal distance of the point $(7, 1)$ on C is d , then $12d$ equals _____.

Given –
Answer :

Question Type : SA
Question ID : 68019114090
Status : Not Answered

- Q.24** Let $r_k = \frac{\int_0^1 (1-x^7)^k dx}{\int_0^1 (1-x^7)^{k+1} dx}$, $k \in \mathbb{N}$. Then the value of $\sum_{k=1}^{10} \frac{1}{7(r_k - 1)}$ is equal to _____.

Given –
Answer :

Question Type : SA
Question ID : 68019114088
Status : Not Answered

- Q.25** Let P be the point $(10, -2, -1)$ and Q be the foot of the perpendicular drawn from the point $R(1, 7, 6)$ on the line passing through the points $(2, -5, 11)$ and $(-6, 7, -5)$. Then the length of the line segment PQ is equal to _____.

Given –
Answer :

Question Type : SA
Question ID : 68019114091
Status : Not Answered

- Q.26** Let x_1, x_2, x_3, x_4 be the solution of the equation $4x^4 + 8x^3 - 17x^2 - 12x + 9 = 0$ and $(4+x_1^2)(4+x_2^2)(4+x_3^2)(4+x_4^2) = \frac{125}{16}m$. Then the value of m is _____.

Given –
Answer :

Question Type : SA
Question ID : 68019114084
Status : Not Answered

Q.27 If the second, third and fourth terms in the expansion of $(x+y)^n$ are 135, 30 and $\frac{10}{3}$, respectively, then $6(n^3 + x^2 + y)$ is equal to _____

Given –
Answer :

Question Type : SA
Question ID : 68019114086
Status : Not Answered

Q.28 Let $\alpha\beta\gamma = 45$; $\alpha, \beta, \gamma \in \mathbb{R}$. If $x(\alpha, 1, 2) + y(1, \beta, 2) + z(2, 3, \gamma) = (0, 0, 0)$ for some $x, y, z \in \mathbb{R}$, $xyz \neq 0$, then $6\alpha + 4\beta + \gamma$ is equal to _____

Given –
Answer :

Question Type : SA
Question ID : 68019114085
Status : Not Answered

Q.29 Let $\vec{a} = 2\hat{i} - 3\hat{j} + 4\hat{k}$, $\vec{b} = 3\hat{i} + 4\hat{j} - 5\hat{k}$ and a vector \vec{c} be such that $\vec{a} \times (\vec{b} + \vec{c}) + \vec{b} \times \vec{c} = \hat{i} + 8\hat{j} + 13\hat{k}$. If $\vec{a} \cdot \vec{c} = 13$, then $(24 - \vec{b} \cdot \vec{c})$ is equal to _____.

Given 12
Answer :

Question Type : SA
Question ID : 68019114092
Status : Answered

Q.30 For $n \in \mathbb{N}$, if $\cot^{-1}3 + \cot^{-1}4 + \cot^{-1}5 + \cot^{-1}n = \frac{\pi}{4}$, then n is equal to _____.

Given –
Answer :

Question Type : SA
Question ID : 68019114093
Status : Not Answered

Section : Physics Section A

Q.31 Electromagnetic waves travel in a medium with speed of $1.5 \times 10^8 \text{ m s}^{-1}$. The relative permeability of the medium is 2.0. The relative permittivity will be:

- Options 1. 4
2. 1
3. 5
4. 2

Question Type : MCQ
Question ID : 68019114102
Option 1 ID : 68019155305
Option 2 ID : 68019155303
Option 3 ID : 68019155306
Option 4 ID : 68019155304
Status : Answered
Chosen Option : 2

Q.32 A train starting from rest first accelerates uniformly up to a speed of 80 km/h for time t , then it moves with a constant speed for time $3t$. The average speed of the train for this duration of journey will be (in km/h) :

- Options 1. 40
2. 70
3. 30
4. 80

Question Type : MCQ
Question ID : 68019114097
Option 1 ID : 68019155285
Option 2 ID : 68019155283
Option 3 ID : 68019155284
Option 4 ID : 68019155286
Status : Answered
Chosen Option : 4

Q.33 The specific heat at constant pressure of a real gas obeying $PV^2 = RT$ equation is:

- Options 1. R
2. $C_V + \frac{R}{2V}$
3. $C_V + R$
4. $\frac{R}{3} + C_V$

Question Type : MCQ
Question ID : 68019114099
Option 1 ID : 68019155293
Option 2 ID : 68019155291
Option 3 ID : 68019155292
Option 4 ID : 68019155294
Status : Answered
Chosen Option : 3

Q.34 A light string passing over a smooth light pulley connects two blocks of masses m_1 and m_2 (where $m_2 > m_1$). If the acceleration of the system is $\frac{g}{\sqrt{2}}$, then the ratio of the masses $\frac{m_1}{m_2}$ is:

Options

1. $\frac{1+\sqrt{5}}{\sqrt{5}-1}$
2. $\frac{1+\sqrt{5}}{\sqrt{2}-1}$
3. $\frac{\sqrt{2}-1}{\sqrt{2}+1}$
4. $\frac{\sqrt{3}+1}{\sqrt{2}-1}$

Question Type : MCQ

Question ID : 68019114095

Option 1 ID : 68019155278

Option 2 ID : 68019155277

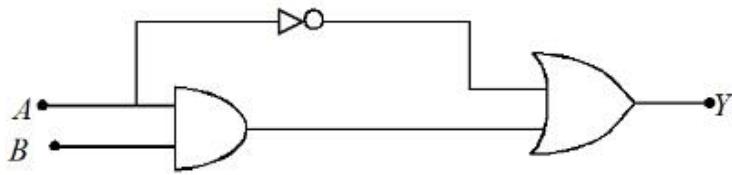
Option 3 ID : 68019155275

Option 4 ID : 68019155276

Status : Answered

Chosen Option : 3

Q.35 The correct truth table for the following logic circuit is :



Options

A	B	Y
0	0	1
0	1	1
1	0	0
1	1	0

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

A	B	Y
0	0	1
0	1	1
1	0	0
1	1	1

A	B	Y
0	0	0
0	1	1
1	0	0
1	1	1

Question Type : MCQ

Question ID : 68019114112

Option 1 ID : 68019155343

Option 2 ID : 68019155346

Option 3 ID : 68019155344

Option 4 ID : 68019155345

Status : Answered

Chosen Option : 3

Q.36 Which of the following phenomena does not explain by wave nature of light.

- A. reflection
- B. diffraction
- C. photoelectric effect
- D. interference
- E. polarization

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

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

Question Type : MCQ
Question ID : 68019114109
Option 1 ID : 68019155332
Option 2 ID : 68019155333
Option 3 ID : 68019155331
Option 4 ID : 68019155334
Status : Answered
Chosen Option : 2

Q.37 To find the spring constant (k) of a spring experimentally, a student commits 2% positive error in the measurement of time and 1% negative error in measurement of mass. The percentage error in determining value of k is :

- Options
- 1. 3%
 - 2. 4%
 - 3. 5%
 - 4. 1%

Question Type : MCQ
Question ID : 68019114108
Option 1 ID : 68019155327
Option 2 ID : 68019155330
Option 3 ID : 68019155328
Option 4 ID : 68019155329
Status : Answered
Chosen Option : 3

Q.38 The ratio of the shortest wavelength of Balmer series to the shortest wavelength of Lyman series for hydrogen atom is :

- Options
- 1. 2 : 1
 - 2. 1 : 2
 - 3. 4 : 1
 - 4. 1 : 4

Question Type : MCQ
Question ID : 68019114111
Option 1 ID : 68019155340
Option 2 ID : 68019155339
Option 3 ID : 68019155342
Option 4 ID : 68019155341
Status : Answered
Chosen Option : 3

Q.39 Match List I with List II

LIST I		LIST II	
A.	Torque	I.	$[M^4 L^1 T^{-2} A^{-2}]$
B.	Magnetic field	II.	$[L^2 A^1]$
C.	Magnetic moment	III.	$[M^4 T^{-2} A^{-1}]$
D.	Permeability of free space	IV.	$[M^4 L^2 T^{-2}]$

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

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

Question Type : MCQ

Question ID : 68019114105

Option 1 ID : 68019155317

Option 2 ID : 68019155316

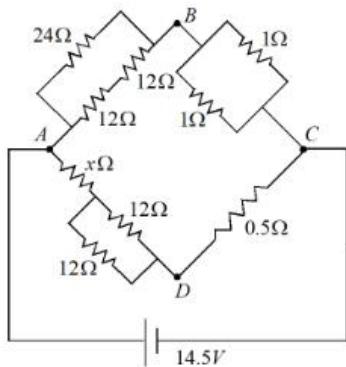
Option 3 ID : 68019155315

Option 4 ID : 68019155318

Status : Answered

Chosen Option : 1

Q.40 The value of unknown resistance (x) for which the potential difference between B and D will be zero in the arrangement shown, is :



- Options 1. 3Ω
 2. 6Ω
 3. 42Ω
 4. 9Ω

Question Type : MCQ

Question ID : 68019114103

Option 1 ID : 68019155309

Option 2 ID : 68019155308

Option 3 ID : 68019155307

Option 4 ID : 68019155310

Status : Answered

Chosen Option : 2

Q.41 A bullet of mass 50g is fired with a speed 100 m/s on a plywood and emerges with 40 m/s. The percentage loss of kinetic energy is :

- Options 1. 44%
2. 32%
3. 16%
4. 84%

Question Type : MCQ
Question ID : 68019114113
Option 1 ID : 68019155349
Option 2 ID : 68019155350
Option 3 ID : 68019155347
Option 4 ID : 68019155348
Status : Not Answered
Chosen Option : –

Q.42 While measuring diameter of wire using screw gauge the following readings were noted. Main scale reading is 1 mm and circular scale reading is equal to 42 divisions. Pitch of screw gauge is 1 mm and it has 100 divisions on circular scale.

The diameter of the wire is $\frac{x}{50}$ mm. The value of x is :

- Options 1. 42
2. 142
3. 21
4. 71

Question Type : MCQ
Question ID : 68019114104
Option 1 ID : 68019155311
Option 2 ID : 68019155314
Option 3 ID : 68019155312
Option 4 ID : 68019155313
Status : Not Answered
Chosen Option : –

Q.43 A sample contains mixture of helium and oxygen gas. The ratio of root mean square speed of helium and oxygen in the sample, is :

- Options 1. $\frac{2\sqrt{2}}{1}$
2. $\frac{1}{4}$
3. $\frac{1}{2\sqrt{2}}$
4. $\frac{1}{32}$

Question Type : MCQ
Question ID : 68019114100
Option 1 ID : 68019155295
Option 2 ID : 68019155298
Option 3 ID : 68019155296
Option 4 ID : 68019155297
Status : Answered
Chosen Option : 1

Q.44 Given below are two statements :

Statement I : In an LCR series circuit, current is maximum at resonance.

Statement II : Current in a purely resistive circuit can never be less than that in a series LCR circuit when connected to same voltage source.

In the light of the above statements, choose the *correct* 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 : 68019114107

Option 1 ID : 68019155324

Option 2 ID : 68019155325

Option 3 ID : 68019155326

Option 4 ID : 68019155323

Status : Marked For Review

Chosen Option : 2

Q.45 To project a body of mass m from earth's surface to infinity, the required kinetic energy is (assume, the radius of earth is R_E , g = acceleration due to gravity on the surface of earth):

- Options
- 1. $1/2mgR_E$
 - 2. $4mgR_E$
 - 3. $2mgR_E$
 - 4. mgR_E

Question Type : MCQ

Question ID : 68019114096

Option 1 ID : 68019155281

Option 2 ID : 68019155280

Option 3 ID : 68019155279

Option 4 ID : 68019155282

Status : Answered

Chosen Option : 4

Q.46 Four particles A, B, C, D of mass $\frac{m}{2}, m, 2m, 4m$, have same momentum, respectively. The particle with maximum kinetic energy is :

- Options 1. C
2. D
3. B
4. A

Question Type : MCQ

Question ID : 68019114094

Option 1 ID : 68019155273

Option 2 ID : 68019155274

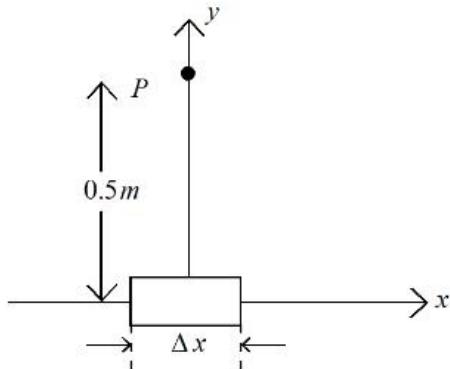
Option 3 ID : 68019155272

Option 4 ID : 68019155271

Status : Answered

Chosen Option : 4

Q.47 An element $\Delta l = \Delta x \hat{i}$ is placed at the origin and carries a large current $I = 10A$. The magnetic field on the y -axis at a distance of 0.5m from the elements Δx of 1cm length is :



- Options 1. $8 \times 10^{-8} T$
2. $4 \times 10^{-8} T$
3. $10 \times 10^{-8} T$
4. $12 \times 10^{-8} T$

Question Type : MCQ

Question ID : 68019114106

Option 1 ID : 68019155320

Option 2 ID : 68019155319

Option 3 ID : 68019155321

Option 4 ID : 68019155322

Status : Answered

Chosen Option : 2

Q.48 σ is the uniform surface charge density of a thin spherical shell of radius R . The electric field at any point on the surface of the spherical shell is :

- Options
- 1. σ/ϵ_0
 - 2. $\sigma/2\epsilon_0$
 - 3. $\sigma/4\epsilon_0$
 - 4. $\sigma/\epsilon_0 R$

Question Type : MCQ

Question ID : 68019114101

Option 1 ID : 68019155299

Option 2 ID : 68019155300

Option 3 ID : 68019155302

Option 4 ID : 68019155301

Status : Answered

Chosen Option : 1

Q.49 A small ball of mass m and density ρ is dropped in a viscous liquid of density ρ_0 .

After sometime, the ball falls with constant velocity. The viscous force on the ball is :

- Options
- 1. $mg\left(1 + \frac{\rho}{\rho_0}\right)$
 - 2. $mg(1 - \rho\rho_0)$
 - 3. $mg\left(1 - \frac{\rho_0}{\rho}\right)$
 - 4. $mg\left(\frac{\rho_0}{\rho} - 1\right)$

Question Type : MCQ

Question ID : 68019114098

Option 1 ID : 68019155290

Option 2 ID : 68019155289

Option 3 ID : 68019155287

Option 4 ID : 68019155288

Status : Answered

Chosen Option : 4

Q.50 In photoelectric experiment energy of 2.48 eV irradiates a photo sensitive material. The stopping potential was measured to be 0.5 V. Work function of the photo sensitive material is :

- Options
- 1. 1.98 eV
 - 2. 2.48 eV
 - 3. 0.5 eV
 - 4. 1.68 eV

Question Type : MCQ

Question ID : 68019114110

Option 1 ID : 68019155335

Option 2 ID : 68019155337

Option 3 ID : 68019155338

Option 4 ID : 68019155336

Status : Not Attempted and
Marked For Review

Chosen Option : –

Section : Physics Section B

Q.51 Radius of a certain orbit of hydrogen atom is 8.48 Å. If energy of electron in this orbit is E/x , then $x = \underline{\hspace{2cm}}$.

(Given $a_0 = 0.529 \text{ \AA}$, $E = \text{energy of electron in ground state}$).

Given –

Answer :

Question Type : SA

Question ID : 68019114123

Status : Not Answered

Q.52 If the radius of earth is reduced to three-fourth of its present value without change in its mass then value of duration of the day of earth will be $\underline{\hspace{2cm}}$ hours 30 minutes.

Given 24

Answer :

Question Type : SA

Question ID : 68019114119

Status : Answered

Q.53 A big drop is formed by coalescing 1000 small droplets of water. The ratio of surface energy of 1000 droplets to that of energy of big drop is $\frac{10}{x}$. The value of x is $\underline{\hspace{2cm}}$.

Given 1000

Answer :

Question Type : SA

Question ID : 68019114117

Status : Answered

- Q.54 A particle is doing simple harmonic motion of amplitude 0.06 m and time period 3.14 s. The maximum velocity of the particle is _____ cm/s.

Given –

Answer :

Question Type : SA

Question ID : 68019114115

Status : Not Answered

- Q.55 A circular coil having 200 turns, 2.5×10^{-4} m² area and carrying 100 μ A current is placed in a uniform magnetic field of 1T. Initially the magnetic dipole moment (\vec{M}) was directed along \vec{B} . Amount of work, required to rotate the coil through 90° from its initial orientation such that \vec{M} becomes perpendicular to \vec{B} , is _____ μ J.

Given –

Answer :

Question Type : SA

Question ID : 68019114120

Status : Not Answered

- Q.56 The refractive index of prism is $\mu = \sqrt{3}$ and the ratio of the angle of minimum deviation to the angle of prism is one. The value of angle of prism is _____ °.

Given –

Answer :

Question Type : SA

Question ID : 68019114114

Status : Not Answered

- Q.57 For three vectors $\vec{A} = (-x\hat{i} - 6\hat{j} - 2\hat{k})$, $\vec{B} = (-\hat{i} + 4\hat{j} + 3\hat{k})$ and $\vec{C} = (-8\hat{i} - \hat{j} + 3\hat{k})$, if $\vec{A} \cdot (\vec{B} \times \vec{C}) = 0$, then value of x is _____ .

Given 04

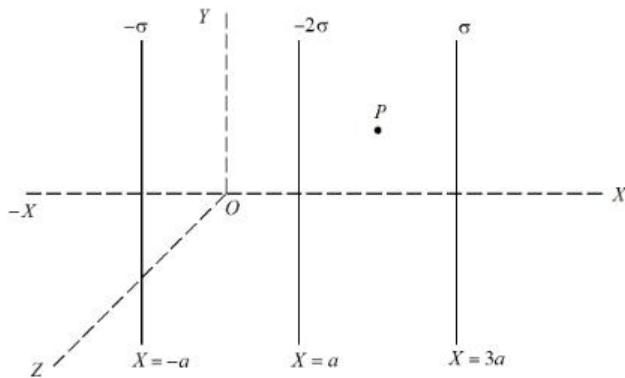
Answer :

Question Type : SA

Question ID : 68019114116

Status : Answered

- Q.58 Three infinitely long charged thin sheets are placed as shown in figure. The magnitude of electric field at the point P is $\frac{x\sigma}{\epsilon_0}$. The value of x is _____ (all quantities are measured in SI units).



Given –
Answer :

Question Type : SA
Question ID : 68019114122
Status : Not Attempted and
Marked For Review

- Q.59 A wire of resistance R and radius r is stretched till its radius became $r/2$. If new resistance of the stretched wire is $x R$, then value of x is _____.

Given 4
Answer :

Question Type : SA
Question ID : 68019114121
Status : Answered

- Q.60 When a *dc* voltage of 100V is applied to an inductor, a *dc* current of 5A flows through it. When an *ac* voltage of 200V peak value is connected to inductor, its inductive reactance is found to be $20\sqrt{3}\Omega$. The power dissipated in the circuit is _____ W.

Given 500
Answer :

Question Type : SA
Question ID : 68019114118
Status : Answered

Section : Chemistry Section A

Q.61 Given below are two statements :

Statement I : Gallium is used in the manufacturing of thermometers.

Statement II : A thermometer containing gallium is useful for measuring the freezing point (256 K) of brine solution.

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

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

Question Type : MCQ

Question ID : 68019114130

Option 1 ID : 68019155387

Option 2 ID : 68019155388

Option 3 ID : 68019155385

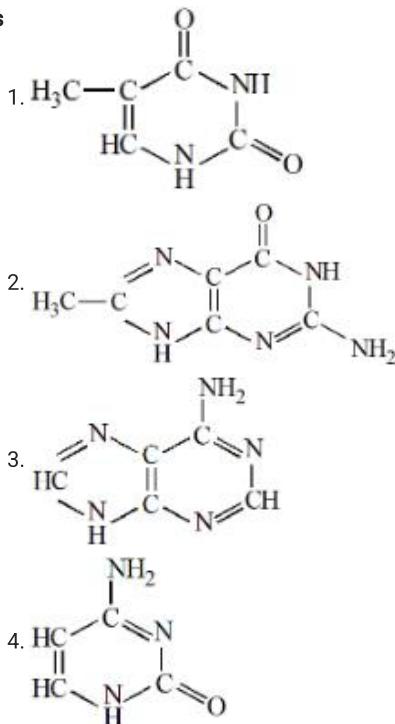
Option 4 ID : 68019155386

Status : Answered

Chosen Option : 3

Q.62 DNA molecule contains 4 bases whose structure are shown below. One of the structures is not correct, identify the **incorrect** base structure.

Options



Question Type : MCQ

Question ID : 68019114143

Option 1 ID : 68019155440

Option 2 ID : 68019155438

Option 3 ID : 68019155437

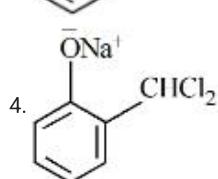
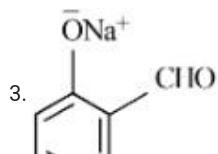
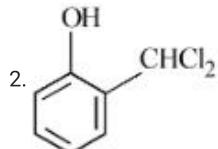
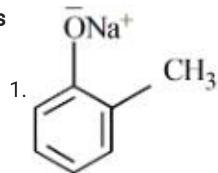
Option 4 ID : 68019155439

Status : Not Answered

Chosen Option : –

Q.63 In Reimer - Tiemann reaction, phenol is converted into salicylaldehyde through an intermediate. The structure of intermediate is _____.

Options



Question Type : MCQ

Question ID : 68019114141

Option 1 ID : 68019155431

Option 2 ID : 68019155429

Option 3 ID : 68019155430

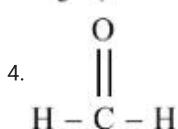
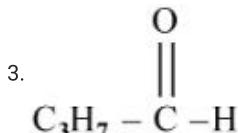
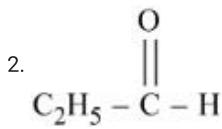
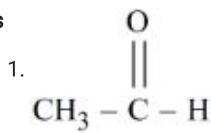
Option 4 ID : 68019155432

Status : Answered

Chosen Option : 3

Q.64 Which among the following aldehydes is most reactive towards nucleophilic addition reactions?

Options



Question Type : MCQ

Question ID : 68019114142

Option 1 ID : 68019155434

Option 2 ID : 68019155435

Option 3 ID : 68019155436

Option 4 ID : 68019155433

Status : Answered

Chosen Option : 3

Q.65 Match List I with List II

LIST I		LIST II	
(Compound/Species)		(Shape/Geometry)	
A. SF_4	I.	Tetrahedral	
B. BrF_3	II.	Pyramidal	
C. BrO_3^-	III.	See saw	
D. NH_4^+	IV.	Bent T-Shape	

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

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

Question Type : MCQ

Question ID : 68019114131

Option 1 ID : 68019155391

Option 2 ID : 68019155390

Option 3 ID : 68019155389

Option 4 ID : 68019155392

Status : Answered

Chosen Option : 1

Q.66 Functional group present in sulphonic acids is :

- Options
- 1. SO_3H
 - 2. SO_2
 - 3. $\begin{array}{c} \text{-- S -- OH} \\ || \\ \text{O} \end{array}$
 - 4. SO_4H

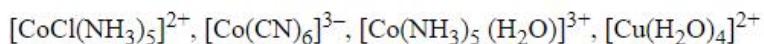
Question Type : MCQ
Question ID : 68019114138
Option 1 ID : 68019155419
Option 2 ID : 68019155417
Option 3 ID : 68019155420
Option 4 ID : 68019155418
Status : Answered
Chosen Option : 3

Q.67 Which of the following material is not a semiconductor.

- Options
- 1. Silicon
 - 2. Graphite
 - 3. Copper oxide
 - 4. Germanium

Question Type : MCQ
Question ID : 68019114127
Option 1 ID : 68019155376
Option 2 ID : 68019155374
Option 3 ID : 68019155373
Option 4 ID : 68019155375
Status : Answered
Chosen Option : 3

Q.68 Consider the following complexes



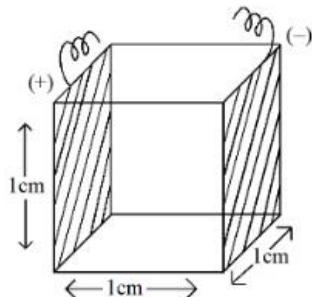
- (A) (B) (C) (D)

The correct order of A, B, C and D in terms of *wavenumber* of light absorbed is :

- Options
- 1. D < A < C < B
 - 2. C < D < A < B
 - 3. B < C < A < D
 - 4. A < C < B < D

Question Type : MCQ
Question ID : 68019114134
Option 1 ID : 68019155401
Option 2 ID : 68019155403
Option 3 ID : 68019155402
Option 4 ID : 68019155404
Status : Answered
Chosen Option : 1

Q.69 A conductivity cell with two electrodes (dark side) are half filled with infinitely dilute aqueous solution of a weak electrolyte. If volume is doubled by adding more water at constant temperature, the molar conductivity of the cell will -



- Options
1. depend upon type of electrolyte
 2. remain same or can not be measured accurately
 3. increase sharply
 4. decrease sharply

Question Type : MCQ
Question ID : 68019114128
Option 1 ID : 68019155380
Option 2 ID : 68019155379
Option 3 ID : 68019155377
Option 4 ID : 68019155378
Status : Marked For Review
Chosen Option : 3

Q.70 Match List I with List II

LIST I		LIST II	
(Hybridization)		(Orientation in Space)	
A.	sp^3	I.	Trigonal bipyramidal
B.	dsp^2	II.	Octahedral
C.	sp^3d	III.	Tetrahedral
D.	sp^3d^2	IV.	Square planar

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

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

Question Type : MCQ
Question ID : 68019114133
Option 1 ID : 68019155397
Option 2 ID : 68019155398
Option 3 ID : 68019155399
Option 4 ID : 68019155400
Status : Answered
Chosen Option : 1

Q.71 The number of element from the following that do not belong to lanthanoids is

Eu, Cm, Er, Tb, Yb and Lu

Options 1. 3

2. 5

3. 4

4. 1

Question Type : MCQ

Question ID : 68019114132

Option 1 ID : 68019155395

Option 2 ID : 68019155393

Option 3 ID : 68019155396

Option 4 ID : 68019155394

Status : Not Attempted and
Marked For Review

Chosen Option : –

Q.72 Given below are two statements :

Statement I : Picric acid is 2,4,6 - trinitrotoluene.

Statement II : Phenol - 2,4 - disulphonic acid is treated with Conc. HNO_3 to get picric acid.

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 : 68019114140

Option 1 ID : 68019155425

Option 2 ID : 68019155426

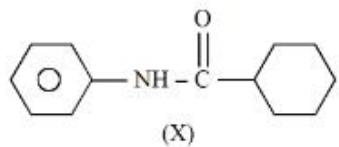
Option 3 ID : 68019155428

Option 4 ID : 68019155427

Status : Answered

Chosen Option : 4

Q.73 Which of the following is metamer of the given compound (X)?



Options

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

Question Type : MCQ

Question ID : 68019114137

Option 1 ID : 68019155413

Option 2 ID : 68019155416

Option 3 ID : 68019155415

Option 4 ID : 68019155414

Status : Answered

Chosen Option : 1

Q.74 The electron affinity value are negative for

- A. $\text{Be} \rightarrow \text{Be}^-$
- B. $\text{N} \rightarrow \text{N}^-$
- C. $\text{O} \rightarrow \text{O}^{2-}$
- D. $\text{Na} \rightarrow \text{Na}^-$
- E. $\text{Al} \rightarrow \text{Al}^-$

Choose the most appropriate answer from the options given below :

Options 1. A, B, D and E only

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

Question Type : MCQ

Question ID : 68019114129

Option 1 ID : 68019155384

Option 2 ID : 68019155382

Option 3 ID : 68019155381

Option 4 ID : 68019155383

Status : Answered

Chosen Option : 2

Q.75 Which of the following statements are correct?

- A. Glycerol is purified by vacuum distillation because it decomposes at its normal boiling point.
- B. Aniline can be purified by steam distillation as aniline is miscible in water.
- C. Ethanol can be separated from ethanol water mixture by azeotropic distillation because it forms azeotrope.
- D. An organic compound is pure, if mixed M.P. is remained same.

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

Options 1. A, B, C only

- 2. A, B, D only
- 3. A, C, D only
- 4. B, C, D only

Question Type : MCQ

Question ID : 68019114136

Option 1 ID : 68019155409

Option 2 ID : 68019155410

Option 3 ID : 68019155411

Option 4 ID : 68019155412

Status : Answered

Chosen Option : 3

Q.76 Match List I with List II

LIST I (Precipitating reagent and conditions)		LIST II (Cation)	
A.	$\text{NH}_4\text{Cl} + \text{NH}_4\text{OH}$	I.	Mn^{2+}
B.	$\text{NH}_4\text{OH} + \text{Na}_2\text{CO}_3$	II.	Pb^{2+}
C.	$\text{NH}_4\text{OH} + \text{NH}_4\text{Cl} + \text{H}_2\text{S}$ gas	III.	Al^{3+}
D.	dilute HCl	IV.	Sr^{2+}

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

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

Question Type : MCQ

Question ID : 68019114135

Option 1 ID : 68019155408

Option 2 ID : 68019155405

Option 3 ID : 68019155406

Option 4 ID : 68019155407

Status : Not Attempted and
Marked For Review

Chosen Option : –

Q.77 Match List I with List II

LIST I (Molecule / Species)		LIST II (Property / Shape)	
A.	SO_2Cl_2	I.	Paramagnetic
B.	NO	II.	Diamagnetic
C.	NO_2^-	III.	Tetrahedral
D.	I_3^-	IV.	Linear

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

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

Question Type : MCQ

Question ID : 68019114125

Option 1 ID : 68019155366

Option 2 ID : 68019155368

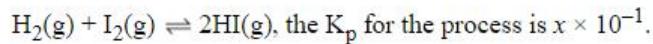
Option 3 ID : 68019155367

Option 4 ID : 68019155365

Status : Answered

Chosen Option : 1

Q.78 At -20°C and 1 atm pressure, a cylinder is filled with equal number of H_2 , I_2 and HI molecules for the reaction



$$x = \underline{\hspace{2cm}}.$$

[Given : $R = 0.082 \text{ L atm K}^{-1} \text{ mol}^{-1}$]

Options 1. 1

2. 2

3. 0.01

4. 10

Question Type : MCQ

Question ID : 68019114126

Option 1 ID : 68019155369

Option 2 ID : 68019155372

Option 3 ID : 68019155371

Option 4 ID : 68019155370

Status : Answered

Chosen Option : 4

Q.79 The density of 'x' M solution ('x' molar) of NaOH is 1.12 g mL^{-1} , while in molality, the concentration of the solution is 3 m (3 molal). Then x is

(Given : Molar mass of NaOH is 40 g/mol)

Options 1. 3.8

2. 3.0

3. 3.5

4. 2.8

Question Type : MCQ

Question ID : 68019114124

Option 1 ID : 68019155362

Option 2 ID : 68019155363

Option 3 ID : 68019155361

Option 4 ID : 68019155364

Status : Not Attempted and
Marked For Review

Chosen Option : –

Q.80 Match List I with List II

LIST I (Compound)		LIST II (Uses)	
A.	Iodoform	I.	Fire extinguisher
B.	Carbon tetrachloride	II.	Insecticide
C.	CFC	III.	Antiseptic
D.	DDT	IV.	Refrigerants

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

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

Question Type : MCQ
 Question ID : 68019114139
 Option 1 ID : 68019155421
 Option 2 ID : 68019155424
 Option 3 ID : 68019155422
 Option 4 ID : 68019155423
 Status : Marked For Review
 Chosen Option : 4

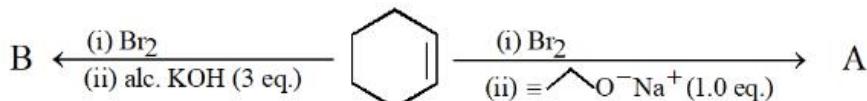
Section : Chemistry Section B

- Q.81** The difference in the 'spin-only' magnetic moment values of KMnO_4 and the manganese product formed during titration of KMnO_4 against oxalic acid in acidic medium is _____ BM. (nearest integer)

Given –
 Answer :

Question Type : SA
 Question ID : 68019114150
 Status : Not Answered

- Q.82** The major products from the following reaction sequence are product A and product B.



The total sum of π electrons in product A and product B are _____
 (nearest integer)

Given –
 Answer :

Question Type : SA
 Question ID : 68019114152
 Status : Not Attempted and
 Marked For Review

- Q.83 Among CrO , Cr_2O_3 and CrO_3 , the sum of spin-only magnetic moment values of basic and amphoteric oxides is _____ 10^{-2} BM (nearest integer).

(Given atomic number of Cr is 24)

Given 900

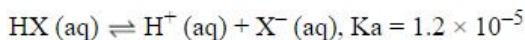
Answer :

Question Type : SA

Question ID : 68019114149

Status : Answered

- Q.84 Consider the dissociation of the weak acid HX as given below



[K_a : dissociation constant]

The osmotic pressure of 0.03 M aqueous solution of HX at 300 K is _____ $\times 10^{-2}$ bar (nearest integer).

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

Given –
Answer :

Question Type : SA

Question ID : 68019114147

Status : Not Answered

- Q.85 An ideal gas, $\bar{C}_v = \frac{5}{2} R$, is expanded adiabatically against a constant pressure of 1 atm until it doubles in volume. If the initial temperature and pressure is 298 K and 5 atm, respectively then the final temperature is _____ K (nearest integer).

[\bar{C}_v is the molar heat capacity at constant volume]

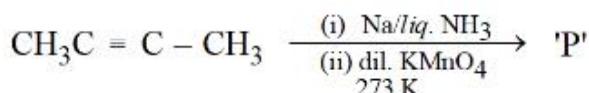
Given –
Answer :

Question Type : SA

Question ID : 68019114146

Status : Not Attempted and
Marked For Review

- Q.86 The major product of the following reaction is P.



Number of oxygen atoms present in product 'P' is _____.
(nearest integer)

Given –
Answer :

Question Type : SA

Question ID : 68019114151

Status : Not Answered

- Q.87** 9.3 g of pure aniline upon diazotisation followed by coupling with phenol gives an orange dye. The mass of orange dye produced (assume 100% yield/conversion) is _____ g. (nearest integer)

Given –

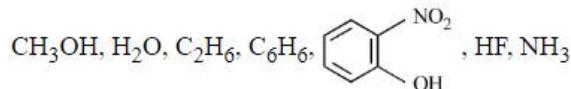
Answer :

Question Type : SA

Question ID : 68019114153

Status : Not Answered

- Q.88** Number of molecules from the following which can exhibit hydrogen bonding is _____ . (nearest integer)



Given 5

Answer :

Question Type : SA

Question ID : 68019114145

Status : Answered

- Q.89** Time required for 99.9% completion of a first order reaction is _____ times the time required for completion of 90% reaction.(nearest integer)

Given 3

Answer :

Question Type : SA

Question ID : 68019114148

Status : Answered

- Q.90** Frequency of the de-Broglie wave of electron in Bohr's first orbit of hydrogen atom is _____ $\times 10^{13}$ Hz (nearest integer).

[Given : R_H (Rydberg constant) = 2.18×10^{-18} J, h (Plank's constant) = 6.6×10^{-34} J.s.]

Given –

Answer :

Question Type : SA

Question ID : 68019114144

Status : Not Attempted and
Marked For Review