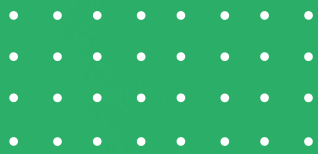




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Session 2

QUESTION PAPER

2023

JOINT ENTRANCE EXAMINATION - MAIN
PREVIOUS YEAR QUESTION PAPER

Test Date	08/04/2023
Test Time	9:00 AM - 12:00 PM
Subject	B TECH

Section: Mathematics Section A

Q.1 Let $S_k = \frac{1+2+\dots+k}{k}$ and $\sum_{j=1}^n S_j^2 = \frac{n}{A}(Bn^2 + Cn + D)$, where $A, B, C, D \in \mathbb{N}$ and A has least value. Then

- Options:
1. $A+B$ is divisible by 1
 2. $A+B=5(D-C)$
 3. $A+C+D$ is not divisible by 5
 4. $A+B+C+D$ is divisible by 5

Question Type: MCQ
 Question ID: 3666942939
 Option 1 ID: 3666949164
 Option 2 ID: 3666949195
 Option 3 ID: 3666949166
 Option 4 ID: 3666949193
 Status: Not Answered
 Chosen Option: --

Q.2 If for $z = a + ib$, $|z+2| = z + 4(\frac{1}{2} + i)$, then $a + \sqrt{b}$ and $2\sqrt{b}$ are the roots of the equation

- Options:
1. $x^2 + 7x + 12 = 0$
 2. $x^2 + 2x - 3 = 0$
 3. $x^2 + x - 12 = 0$
 4. $x^2 + 3x - 4 = 0$

Question Type: MCQ
 Question ID: 3666942932
 Option 1 ID: 3666949166
 Option 2 ID: 3666949167
 Option 3 ID: 3666949168
 Option 4 ID: 3666949165
 Status: Not Answered
 Chosen Option: --

Q.3 The area of the region $\{(x, y) : x^2 \leq y \leq 8 - x^2, y \leq 7\}$ is

- Options:
1. 20
 2. 18
 3. 21
 4. 24

Question Type: MCQ
 Question ID: 3666942942
 Option 1 ID: 3666949206
 Option 2 ID: 3666949205
 Option 3 ID: 3666949207
 Option 4 ID: 3666949208
 Status: Not Answered
 Chosen Option: --

Q.4 Let α, β, γ be the three roots of the equation $x^3 + 6x + c = 0$. If $\beta\gamma = 1 - \alpha^2$, then $6\alpha^3 + 9c^2 - 5\alpha^5 - 6\beta^3 - 8\gamma^5$ is equal to

- Options:
1. 10
 2. $\frac{169}{8}$
 3. $\frac{155}{8}$
 4. 21

Question Type: MCQ
 Question ID: 3666942933
 Option 1 ID: 3666949171
 Option 2 ID: 3666949169
 Option 3 ID: 3666949170
 Option 4 ID: 3666949172
 Status: Not Answered
 Chosen Option: --

Q.5 Let $I(x) = \int \frac{(x+1)}{x(1+x e^x)^2} dx$, $x > 0$. If $\lim_{x \rightarrow \infty} I(x) = 0$, then $I(1)$ is equal to

- Options:
1. $\frac{e+1}{e+2} + \log_e(e+1)$
 2. $\frac{e+2}{e+1} + \log_e(e+1)$
 3. $\frac{e+2}{e+1} - \log_e(e+1)$
 4. $\frac{e+1}{e+2} - \log_e(e+1)$

Question Type: MCQ

Q.6

Let $P = \begin{bmatrix} \frac{\sqrt{3}}{2} & \frac{1}{2} \\ -\frac{1}{2} & \frac{\sqrt{3}}{2} \end{bmatrix}$, $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ and $Q = PAP^T$. If $P^T Q^{2007} P = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$,

then $2a + b - 3c - 4d$ equal to

Options 1. 2005

2. 2007

3. 2006

4. 2004

Question Type : MCQ

Question ID : 3666942935

Option 1 ID : 3666949178

Option 2 ID : 3666949180

Option 3 ID : 3666949179

Option 4 ID : 3666949177

Status : Not Answered

Chosen Option : --

Q.7

The number of ways, in which 5 girls and 7 boys can be seated at a round table so that no two girls sit together, is

Options 1. 720

2. $7(360)^2$ 3. $7(720)^2$ 4. $126(5!)^2$

Question Type : MCQ

Question ID : 3666942937

Option 1 ID : 3666949188

Option 2 ID : 3666949186

Option 3 ID : 3666949187

Option 4 ID : 3666949185

Status : Answered

Chosen Option : 4

Q.8

Let R be the focus of the parabola $y^2 = 20x$ and the line $y = mx + c$ intersect the parabola at two points P and Q . Let the point $G(10, 10)$ be the centroid of the triangle PQR . If $c - m = 6$, then $(PQ)^2$ is

Options 1. 346

2. 317

3. 296

4. 325

Question Type : MCQ

Question ID : 3666942944

Option 1 ID : 3666949216

Option 2 ID : 3666949215

Option 3 ID : 3666949213

Option 4 ID : 3666949214

Status : Not Answered

Chosen Option : --

Q.9

The number of arrangements of the letters of the word "INDEPENDENCE" in which all the vowels always occur together is

Options 1. 16800

2. 14800

3. 33600

4. 18000

Question Type : MCQ

Question ID : 3666942936

Option 1 ID : 3666949183

Option 2 ID : 3666949181

Option 3 ID : 3666949182

Option 4 ID : 3666949184

Status : Answered

Chosen Option : 1

Q.10

Let $A = \begin{bmatrix} 2 & 1 & 0 \\ 1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$. If $|adj(adj(adj(2A)))| = (16)^n$, then n is equal to

Options 1. 12

2. 10

3. 8

4. 9

Question Type : MCQ

Question ID : 3666942934

Option 1 ID : 3666949175

Option 2 ID : 3666949173

Option 3 ID : 3666949174

Option 4 ID : 3666949176

Status : Not Answered

Chosen Option : --

Q.11 Let the number of elements in sets A and B be five and two respectively. Then the number of subsets of $A \times B$ each having at least 3 and at most 6 elements is :

- Options
1. 752
 2. 782
 3. 772
 4. 792

Question Type : MCQ
 Question ID : 3666942931
 Option 1 ID : 3666949163
 Option 2 ID : 3666949164
 Option 3 ID : 3666949162
 Option 4 ID : 3666949161
 Status : Answered
 Chosen Option : 4

Q.12 If the equation of the plane containing the line $x+2y+3z-4=0=2x+y-z+5$ and perpendicular to the plane $\vec{r} = (\hat{i} - \hat{j}) + \lambda(\hat{i} + \hat{j} + \hat{k}) + \mu(\hat{i} - 2\hat{j} + 3\hat{k})$ is $ax+by+cz=4$, then $(a-b+c)$ is equal to

- Options
1. 18
 2. 24
 3. 22
 4. 20

Question Type : MCQ
 Question ID : 3666942945
 Option 1 ID : 3666949217
 Option 2 ID : 3666949220
 Option 3 ID : 3666949219
 Option 4 ID : 3666949218
 Status : Not Answered
 Chosen Option : --

Q.13 The shortest distance between the lines $\frac{x-4}{4} = \frac{y+2}{5} = \frac{z+3}{3}$ and $\frac{x-1}{3} = \frac{y-3}{4} = \frac{z-4}{2}$ is

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

Question Type : MCQ
 Question ID : 3666942946
 Option 1 ID : 3666949221
 Option 2 ID : 3666949223
 Option 3 ID : 3666949224
 Option 4 ID : 3666949222
 Status : Answered
 Chosen Option : 4

Q.14 $\lim_{x \rightarrow 0} \left(\frac{(1 - \cos^2(3x))}{\cos^3(4x)} \right) \left(\frac{\sin^3(4x)}{(\log_e(2x+1))^5} \right)$ is equal to _____

- Options
1. 24
 2. 15
 3. 18
 4. 9

Question Type : MCQ
 Question ID : 3666942940
 Option 1 ID : 3666949200
 Option 2 ID : 3666949198
 Option 3 ID : 3666949199
 Option 4 ID : 3666949197
 Status : Not Answered
 Chosen Option : --

Q.15 In a bolt factory, machines A, B and C manufacture respectively 20%, 30% and 50% of the total bolts. Of their output 3, 4 and 2 percent are respectively defective bolts. A bolt is drawn at random from the product. If the bolt drawn is found the defective, then the probability that it is manufactured by the machine C is

- Options
1. $\frac{5}{14}$
 2. $\frac{3}{7}$
 3. $\frac{2}{7}$
 4. $\frac{9}{28}$

Q.16 If the coefficients of three consecutive terms in the expansion of $(1+x)^n$ are in the ratio 1:5:20, then the coefficient of the fourth term is

- Options
- 1827
 - 3654
 - 5481
 - 2436

Question Type : MCQ
 Question ID : 3666942938
 Option 1 ID : 3666949189
 Option 2 ID : 3666949190
 Option 3 ID : 3666949191
 Option 4 ID : 3666949192
 Status : Answered
 Chosen Option : 2

Q.17 Let $C(\alpha, \beta)$ be the circumcenter of the triangle formed by the lines
 $4x + 3y = 69$,
 $4y - 3x = 17$, and
 $x + 7y = 61$.
 Then $(\alpha - \beta)^2 + \alpha + \beta$ is equal to

- Options
- 17
 - 15
 - 16
 - 18

Question Type : MCQ
 Question ID : 3666942943
 Option 1 ID : 3666949211
 Option 2 ID : 3666949209
 Option 3 ID : 3666949210
 Option 4 ID : 3666949212
 Status : Not Answered
 Chosen Option : --

Q.18 Let $f(x) = \frac{\sin x + \cos x - \sqrt{2}}{\sin x - \cos x}$, $x \in [0, \pi] - \left\{\frac{\pi}{4}\right\}$. Then $f\left(\frac{7\pi}{12}\right) f^*\left(\frac{7\pi}{12}\right)$ is equal to

- Options
- $\frac{2}{9}$
 - $\frac{-2}{3}$
 - $\frac{-1}{3\sqrt{3}}$
 - $\frac{2}{3\sqrt{3}}$

Question Type : MCQ
 Question ID : 3666942949
 Option 1 ID : 3666949236
 Option 2 ID : 3666949233
 Option 3 ID : 3666949234
 Option 4 ID : 3666949235
 Status : Not Answered
 Chosen Option : --

Q.19 If the points with position vectors $a\hat{i} + 10\hat{j} + 13\hat{k}$, $6\hat{i} + 11\hat{j} + 11\hat{k}$, $\frac{9}{2}\hat{i} + \beta\hat{j} - 8\hat{k}$ are collinear, then $(19\alpha - 6\beta)^2$ is equal to

- Options
- 36
 - 49
 - 16
 - 25

Question Type : MCQ
 Question ID : 3666942947
 Option 1 ID : 3666949227
 Option 2 ID : 3666949228
 Option 3 ID : 3666949225
 Option 4 ID : 3666949226
 Status : Not Answered
 Chosen Option : --

Q.20 Negation of $(p \Rightarrow q) \Rightarrow (q \Rightarrow p)$ is

- Options
- $p \vee (\neg q)$
 - $(\neg p) \vee q$
 - $(\neg q) \wedge p$
 - $q \wedge (\neg p)$

Question Type : MCQ
 Question ID : 3666942950

Q.21 Let $[t]$ denote the greatest integer $\leq t$. Then $\frac{2}{\pi} \int_{\pi/6}^{5\pi/6} (8[\csc x] - 5[\cot x]) dx$ is equal to _____.

Given--
Answer :

Question Type : SA
Question ID : 3666942954
Status : Not Answered

Q.22 Let $A = \{0, 3, 4, 6, 7, 8, 9, 10\}$ and R be the relation defined on A such that $R = \{(x, y) \in A \times A : x - y \text{ is odd positive integer or } x - y = 2\}$. The minimum number of elements that must be added to the relation R , so that it is a symmetric relation, is equal to _____.

Given 17
Answer :

Question Type : SA
Question ID : 3666942951
Status : Answered

Q.23 If the solution curve of the differential equation $(y - 2\log_e x)dx + (x\log_e x^2)dy = 0, x > 1$ passes through the points $(e, \frac{4}{3})$ and (e^4, α) , then α is equal to _____.

Given--
Answer :

Question Type : SA
Question ID : 3666942955
Status : Not Answered

Q.24 Let the mean and variance of 8 numbers $x, y, 10, 12, 6, 12, 4, 8$ be 9 and 9.25 respectively. If $x > y$, then $3x - 2y$ is equal to _____.

Given--
Answer :

Question Type : SA
Question ID : 3666942960
Status : Not Answered

Q.25 Let $\vec{a} = 6\hat{i} + 9\hat{j} + 12\hat{k}$, $\vec{b} = \alpha\hat{i} + 11\hat{j} - 2\hat{k}$ and $\vec{c}$ be vectors such that $\vec{a} \times \vec{c} = \vec{a} \times \vec{b}$. If $\vec{a} \cdot \vec{c} = -12$, $\vec{c} \cdot (\hat{i} - 2\hat{j} + \hat{k}) = 5$, then $\vec{c} \cdot (\hat{i} + \hat{j} + \hat{k})$ is equal to _____.

Given--
Answer :

Question Type : SA
Question ID : 3666942959
Status : Not Answered

Q.26 Let λ_1, λ_2 be the values of λ for which the points $(\frac{5}{2}, 1, \lambda)$ and $(-2, 0, 1)$ are at equal distance from the plane $2x + 3y - 6z + 7 = 0$. If $\lambda_1 > \lambda_2$, then the distance of the point $(\lambda_1 - \lambda_2, \lambda_2, \lambda_1)$ from the line $\frac{x-5}{1} = \frac{y-1}{2} = \frac{z+7}{2}$ is _____.

Given--
Answer :

Question Type : SA
Question ID : 3666942958
Status : Not Answered

Q.27 If a_n is the greatest term in the sequence $a_n = \frac{n^3}{n^4 + 147}$, $n = 1, 2, 3, \dots$, then α is equal to _____.

Given--
Answer :

Question Type : SA
Question ID : 3666942953
Status : Not Answered

Q.28 Let $[t]$ denote the greatest integer $\leq t$. If the constant term in the expansion of $(3x^2 - \frac{1}{2x})^7$ is α , then $[\alpha]$ is equal to _____.

Given 1275
Answer :

Question Type : SA
Question ID : 3666942952
Status : Answered

Q.29 Consider a circle $C_1: x^2 + y^2 - 4x - 2y = \alpha - 5$. Let its mirror image in the line $y = 2x + 1$ be another circle $C_2: 5x^2 + 5y^2 - 10/x - 10/y + 36 = 0$. Let r be the radius of C_2 . Then $\alpha + r$ is equal to _____.

Given--
Answer :

Question Type : SA
Question ID : 3666942957
Status : Not Answered

Q.30 The largest natural number n such that 3^n divides $66!$ is _____.

Q.30 The largest natural number n such that 3^n divides $66!$ is _____.

Given --
Answer :

Question Type : SA
Question ID : 3666942956
Status : Not Answered

Section : Physics Section A

Q.31 Proton (P) and electron (e) will have same de-Broglie wavelength when the ratio of their momentum is (assume, $m_p = 1849 m_e$):

- Options
- 1 : 1849
 - 1 : 1
 - 43 : 1
 - 1 : 43

Question Type : MCQ
Question ID : 3666942974
Option 1 ID : 3666949303
Option 2 ID : 3666949306
Option 3 ID : 3666949305
Option 4 ID : 3666949304
Status : Answered
Chosen Option : 2

Q.32 Two forces having magnitude A and $\frac{A}{2}$ are perpendicular to each other. The magnitude of their resultant is:

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

Question Type : MCQ
Question ID : 3666942967
Option 1 ID : 3666949276
Option 2 ID : 3666949277
Option 3 ID : 3666949275
Option 4 ID : 3666949278
Status : Answered
Chosen Option : 1

Q.33 An air bubble of volume 1 cm^3 rises from the bottom of a lake 40 m deep to the surface at a temperature of 12°C . The atmospheric pressure is $1 \times 10^5 \text{ Pa}$, the density of water is 1000 kg/m^3 and $g = 10 \text{ m/s}^2$. There is no difference of the temperature of water at the depth of 40 m and on the surface. The volume of air bubble when it reaches the surface will be:

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

Question Type : MCQ
Question ID : 3666942962
Option 1 ID : 3666949256
Option 2 ID : 3666949257
Option 3 ID : 3666949255
Option 4 ID : 3666949258
Status : Not Answered
Chosen Option : --

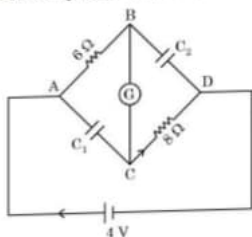
Q.34 Two projectiles A and B are thrown with initial velocities of 40 m/s and 60 m/s at angles 30° and 60° with the horizontal respectively. The ratio of their ranges respectively is ($g = 10 \text{ m/s}^2$)

- Options
1. $\sqrt{3} : 2$
 2. $2 : \sqrt{3}$
 3. $4 : 9$
 4. $1 : 1$

Question Type : MCQ
Question ID : 3666942969
Option 1 ID : 3666949286
Option 2 ID : 3666949284
Option 3 ID : 3666949285
Option 4 ID : 3666949283
Status : Answered
Chosen Option : 3

Q.35 In this figure the resistance of the coil of galvanometer G is 2Ω . The emf of

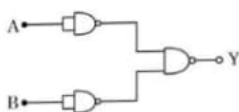
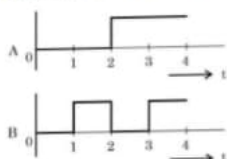
- Q.35 In this figure the resistance of the coil of galvanometer G is $2\ \Omega$. The emf of the cell is 4 V. The ratio of potential difference across C_1 and C_2 is:



- Options
- 1
 - $\frac{4}{5}$
 - $\frac{5}{4}$
 - $\frac{3}{4}$

Question Type: MCQ
 Question ID: 3666942979
 Option 1 ID: 3666949324
 Option 2 ID: 3666949323
 Option 3 ID: 3666949325
 Option 4 ID: 3666949326
 Status: Not Answered
 Chosen Option: --

- Q.36 For the logic circuit shown, the output waveform at Y is:



- Options
1. A square wave that is 0 from t=0 to t=2, and 1 from t=2 to t=4.
 2. A square wave that is 1 from t=0 to t=1, 0 from t=1 to t=2, 1 from t=2 to t=3, and 0 from t=3 to t=4.
 3. A square wave that is 0 from t=0 to t=1, 1 from t=1 to t=2, 0 from t=2 to t=3, and 1 from t=3 to t=4.
 4. A square wave that is 0 from t=0 to t=1, 1 from t=1 to t=2, 0 from t=2 to t=3, and 1 from t=3 to t=4.

Question Type: MCQ
 Question ID: 3666942972
 Option 1 ID: 3666949297
 Option 2 ID: 3666949296
 Option 3 ID: 3666949298
 Option 4 ID: 3666949295
 Status: Answered
 Chosen Option: 4

- Q.37 An aluminium rod with Young's modulus $Y = 7.0 \times 10^{10}\ \text{N/m}^2$ undergoes elastic strain of 0.04%. The energy per unit volume stored in the rod in SI unit is:

- Options
1. 8400
 2. 5600
 3. 2800
 4. 11200

Question Type: MCQ
 Question ID: 3666942964
 Option 1 ID: 3666949265
 Option 2 ID: 3666949264
 Option 3 ID: 3666949263
 Option 4 ID: 3666949266
 Status: Not Answered
 Chosen Option: --

- Q.38 Given below are two statements:

Statement I: If heat is added to a system, its temperature must

Q.38 Given below are two statements:

Statement I: If heat is added to a system, its temperature must increase.

Statement II: If positive work is done by a system in a thermodynamic process, its volume must increase.

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

Question Type : MCQ

Question ID : 3666942963

Option 1 ID : 3666949261

Option 2 ID : 3666949259

Option 3 ID : 3666949262

Option 4 ID : 3666949260

Status : Answered

Chosen Option : 3

Q.39 For a nucleus ${}^A_ZX$ having mass number A and atomic number Z

- A. The surface energy per nucleon (b_s) = $-a_1 A^{2/3}$.
- B. The Coulomb contribution to the binding energy $b_c = -a_2 \frac{Z(Z-1)}{A^{4/3}}$
- C. The volume energy $b_v = a_3 A$
- D. Decrease in the binding energy is proportional to surface area.
- E. While estimating the surface energy, it is assumed that each nucleon interacts with 12 nucleons. (a_1 , a_2 and a_3 are constants)

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

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

Question Type : MCQ

Question ID : 3666942973

Option 1 ID : 3666949301

Option 2 ID : 3666949302

Option 3 ID : 3666949300

Option 4 ID : 3666949299

Status : Not Answered

Chosen Option : --

Q.40 In a reflecting telescope, a secondary mirror is used to:

- Options
1. make chromatic aberration zero
 2. reduce the problem of mechanical support
 3. remove spherical aberration
 4. move the eyepiece outside the telescopic tube

Question Type : MCQ

Question ID : 3666942975

Option 1 ID : 3666949309

Option 2 ID : 3666949310

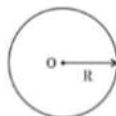
Option 3 ID : 3666949307

Option 4 ID : 3666949308

Status : Not Attempted and Marked For Review

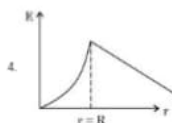
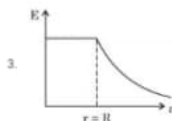
Chosen Option : --

Q.41 Graphical variation of electric field due to a uniformly charged insulating solid sphere of radius R, with distance r from the centre O is represented by:



- Options
- 1.
 - 2.

$$r = R$$



Question Type : MCQ

Question ID : 3666942980

Option 1 ID : 3666949329

Option 2 ID : 3666949327

Option 3 ID : 3666949328

Option 4 ID : 3666949330

Status : Answered

Chosen Option : 2

Q.42 Given below are two statements:

Statement I: If E be the total energy of a satellite moving around the earth, then its potential energy will be $\frac{E}{2}$.

Statement II: The kinetic energy of a satellite revolving in an orbit is equal to the half the magnitude of total energy E .

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

- Options
- Both Statement I and Statement II are incorrect
 - Both Statement I and Statement II are correct
 - Statement I is correct but Statement II is incorrect
 - Statement I is incorrect but Statement II is correct

Question Type : MCQ

Question ID : 3666942965

Option 1 ID : 3666949268

Option 2 ID : 3666949267

Option 3 ID : 3666949269

Option 4 ID : 3666949270

Status : Answered

Chosen Option : 1

Q.43 A TV transmitting antenna is 98 m high and the receiving antenna is at the ground level. If the radius of the earth is 6400 km, the surface area covered by the transmitting antenna is approximately:

- Options
- 3942 km²
 - 1240 km²
 - 4868 km²
 - 1549 km²

Question Type : MCQ

Question ID : 3666942971

Option 1 ID : 3666949293

Option 2 ID : 3666949294

Option 3 ID : 3666949291

Option 4 ID : 3666949292

Status : Answered

Chosen Option : 1

Q.44 At any instant the velocity of a particle of mass 500 g is $(2t\hat{i} + 3t^2\hat{j})$ ms⁻¹. If the force acting on the particle at $t = 1$ s is $(\hat{i} + x\hat{j})$ N. Then the value of x will be:

- Options
- 6
 - 2
 - 4
 - 3

Question Type : MCQ

Question ID : 3666942966

Option 1 ID : 3666949271

Option 2 ID : 3666949274

Option 3 ID : 3666949272

Option 4 ID : 3666949273

Status : Answered

Chosen Option : 4

Q.45 The engine of a train moving with speed 10 ms⁻¹ towards a platform sounds a whistle at frequency 400 Hz. The frequency heard by a passenger inside the train is: (neglect air speed. Speed of sound in air = 330 ms⁻¹)

- Options
- 400 Hz
 - 200 Hz
 - 388 Hz

Q.45 The engine of a train moving with speed 10 ms^{-1} towards a platform sounds a whistle at frequency 400 Hz. The frequency heard by a passenger inside the train is: (neglect air speed. Speed of sound in air = 330 ms^{-1})

- Options
1. 400 Hz
 2. 200 Hz
 3. 388 Hz
 4. 412 Hz

Question Type : MCQ
 Question ID : 3666942961
 Option 1 ID : 3666949254
 Option 2 ID : 3666949251
 Option 3 ID : 3666949252
 Option 4 ID : 3666949253
 Status : Answered
 Chosen Option : 4

Q.46 Dimension of $\frac{1}{\mu_0 \epsilon_0}$ should be equal to

- Options
1. T^2/L^2
 2. L^2/T^2
 3. L/T
 4. T/L

Question Type : MCQ
 Question ID : 3666942976
 Option 1 ID : 3666949314
 Option 2 ID : 3666949313
 Option 3 ID : 3666949311
 Option 4 ID : 3666949312
 Status : Answered
 Chosen Option : 2

Q.47 Certain galvanometers have a fixed core made of non magnetic metallic material. The function of this metallic material is

- Options
1. to oscillate the coil in magnetic field for longer period of time
 2. to produce large deflecting torque on the coil
 3. to make the magnetic field radial
 4. to bring the coil to rest quickly

Question Type : MCQ
 Question ID : 3666942977
 Option 1 ID : 3666949315
 Option 2 ID : 3666949316
 Option 3 ID : 3666949317
 Option 4 ID : 3666949318
 Status : Answered
 Chosen Option : 3

Q.48 A charge particle moving in magnetic field B, has the components of velocity along B as well as perpendicular to B. The path of the charge particle will be

- Options
1. helical path with the axis perpendicular to the direction of magnetic field B
 2. helical path with the axis along magnetic field B
 3. straight along the direction of magnetic field B
 4. circular path

Question Type : MCQ
 Question ID : 3666942978
 Option 1 ID : 3666949322
 Option 2 ID : 3666949321
 Option 3 ID : 3666949319
 Option 4 ID : 3666949320
 Status : Answered
 Chosen Option : 2

Q.49 The weight of a body on the earth is 400 N. Then weight of the body when taken to a depth half of the radius of the earth will be:

- Options
1. Zero
 2. 300 N
 3. 100 N
 4. 200 N

Question Type : MCQ
 Question ID : 3666942968
 Option 1 ID : 3666949279
 Option 2 ID : 3666949282
 Option 3 ID : 3666949280
 Option 4 ID : 3666949281
 Status : Answered
 Chosen Option : 4

Q.50 A cylindrical wire of mass $(0.4 \pm 0.01) \text{ g}$ has length $(8 \pm 0.04) \text{ cm}$ and radius $(6 \pm 0.03) \text{ mm}$. The maximum error in its density will be:

- Options
1. 4%
 2. 3.5%
 3. 5%
 4. 1%

Question Type : MCQ
Question ID : 3666942970
Option 1 ID : 3666949289
Option 2 ID : 3666949288
Option 3 ID : 3666949290
Option 4 ID : 3666949287
Status : Answered
Chosen Option : 1

Section : Physics Section B

Q.51 An oscillating LC circuit consists of a 75 mH inductor and a $1.2 \mu\text{F}$ capacitor. If the maximum charge to the capacitor is $2.7 \mu\text{C}$. The maximum current in the circuit will be _____ mA.

Given --
Answer :

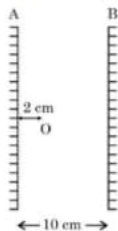
Question Type : SA
Question ID : 3666942987
Status : Not Answered

Q.52 An air bubble of diameter 6 mm rises steadily through a solution of density 1750 kg/m^3 at the rate of 0.35 cm/s . The co-efficient of viscosity of the solution (neglect density of air) is _____ Pas (given, $g = 10 \text{ ms}^{-2}$).

Given --
Answer :

Question Type : SA
Question ID : 3666942982
Status : Not Answered

Q.53 Two vertical parallel mirrors A and B are separated by 10 cm . A point object O is placed at a distance of 2 cm from mirror A. The distance of the second nearest image behind mirror A from the mirror A is _____ cm.



Given 18
Answer :

Question Type : SA
Question ID : 3666942986
Status : Answered

Q.54 An electric dipole of dipole moment is $6.0 \times 10^{-6} \text{ C m}$ placed in a uniform electric field of $1.5 \times 10^3 \text{ NC}^{-1}$ in such a way that dipole moment is along electric field. The work done in rotating dipole by 180° in this field will be _____ mJ.

Given 18
Answer :

Question Type : SA
Question ID : 3666942990
Status : Answered

Q.55 The momentum of a body is increased by 50% . The percentage increase in the kinetic energy of the body is _____ %.

Given 125
Answer :

Question Type : SA
Question ID : 3666942984
Status : Answered

Q.56 A current of 2 A flows through a wire of cross-sectional area 25.0 mm^2 . The number of free electrons in a cubic meter are 2.0×10^{28} . The drift velocity of the electrons is _____ $\times 10^{-6} \text{ ms}^{-1}$ (given, charge on electron $= 1.6 \times 10^{-19} \text{ C}$).

Given 25
Answer :

Question Type : SA
Question ID : 3666942989
Status : Answered

Q.57 An organ pipe 40 cm long is open at both ends. The speed of sound in air is 360 ms^{-1} . The frequency of the second harmonic is _____ Hz.

Q.57

An organ pipe 40 cm long is open at both ends. The speed of sound in air is 360 ms^{-1} . The frequency of the second harmonic is _____ Hz.

Given --
Answer :

Question Type : SA

Question ID : 3666942981

Status : Not Answered

Q.58

The moment of inertia of a semicircular ring about an axis, passing through the center and perpendicular to the plane of ring, is $\frac{1}{x}MR^2$, where R is the radius and M is the mass of the semicircular ring. The value of x will be _____.

Given --
Answer :

Question Type : SA

Question ID : 3666942983

Status : Not Answered

Q.59

The magnetic intensity at the center of a long current carrying solenoid is found to be $1.6 \times 10^3 \text{ Am}^{-1}$. If the number of turns is 8 per cm, then the current flowing through the solenoid is _____ A.

Given --
Answer :

Question Type : SA

Question ID : 3666942988

Status : Not Answered

Q.60

A nucleus with mass number 242 and binding energy per nucleon as 7.6 MeV breaks into two fragment each with mass number 121. If each fragment nucleus has binding energy per nucleon as 8.1 MeV, the total gain in binding energy is _____ MeV.

Given 121
Answer :

Question Type : SA

Question ID : 3666942985

Status : Answered

Section : Chemistry Section A

Q.61

The water gas on reacting with cobalt as a catalyst forms

- Options
1. Ethanol
 2. Methanoic acid
 3. Methanol
 4. Methanal

Question Type : MCQ

Question ID : 3666942996

Option 1 ID : 3666949364

Option 2 ID : 3666949363

Option 3 ID : 3666949362

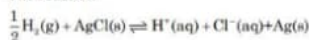
Option 4 ID : 3666949361

Status : Answered

Chosen Option : 3

Q.62

The reaction



occurs in which of the given galvanic cell.

Options

1. $\text{Pt} | \text{H}_2(\text{g}) | \text{KCl}(\text{sol}^n) | \text{AgCl}(\text{s}) | \text{Ag}$
2. $\text{Pt} | \text{H}_2(\text{g}) | \text{HCl}(\text{sol}^n) | \text{AgCl}(\text{s}) | \text{Ag}$
3. $\text{Ag} | \text{AgCl}(\text{s}) | \text{KCl}(\text{sol}^n) | \text{AgNO}_3 | \text{Ag}$
4. $\text{Pt} | \text{H}_2(\text{g}) | \text{HCl}(\text{sol}^n) | \text{AgNO}_3(\text{sol}^n) | \text{Ag}$

Question Type : MCQ

Question ID : 3666942992

Option 1 ID : 3666949348

Option 2 ID : 3666949347

Option 3 ID : 3666949345

Option 4 ID : 3666949346

Status : Answered

Chosen Option : 2

Q.63



What is the value of x?

Options

1. 2
2. 10
3. 12
4. 6

Question Type : MCQ

Question ID : 3666942991

Option 1 ID : 3666949341

Q.64

Given below are two statements: One is labelled as Assertion A and the other is labelled as Reason R.

Assertion A: Butan-1-ol has higher boiling point than ethoxyethane.

Reason R: Extensive hydrogen bonding leads to stronger association of molecules.

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

Options

- Both A and R are true and R is the correct explanation of A
- A is true but R is false
- Both A and R are true but R is not the correct explanation of A
- A is false but R is true

Question Type: MCQ

Question ID: 3666943005

Option 1 ID: 3666949397

Option 2 ID: 3666949399

Option 3 ID: 3666949398

Option 4 ID: 3666949400

Status: Answered

Chosen Option: 1

Q.65

In chromyl chloride, the number of d-electrons present on chromium is same as in (Given at no. of Ti : 22, V : 23, Cr : 24, Mn : 25, Fe : 26)

Options

- Ti (III)
- Fe (III)
- Mn (VII)
- V (IV)

Question Type: MCQ

Question ID: 3666943010

Option 1 ID: 3666949420

Option 2 ID: 3666949418

Option 3 ID: 3666949417

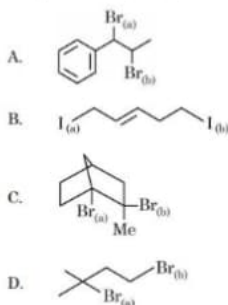
Option 4 ID: 3666949419

Status: Answered

Chosen Option: 2

Q.66

Choose the halogen which is most reactive towards S_N1 reaction in the given compounds (A, B, C & D)



Options

- A - $Br_{(a)}$; B - $I_{(b)}$; C - $Br_{(a)}$; D - $Br_{(b)}$
- A - $Br_{(b)}$; B - $I_{(a)}$; C - $Br_{(a)}$; D - $Br_{(b)}$
- A - $Br_{(a)}$; B - $I_{(a)}$; C - $Br_{(b)}$; D - $Br_{(a)}$
- A - $Br_{(a)}$; B - $I_{(a)}$; C - $Br_{(a)}$; D - $Br_{(a)}$

Question Type: MCQ

Question ID: 3666943003

Option 1 ID: 3666949392

Option 2 ID: 3666949391

Option 3 ID: 3666949389

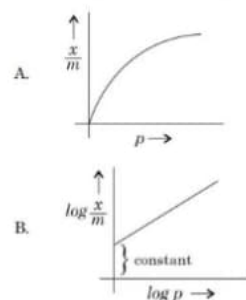
Option 4 ID: 3666949390

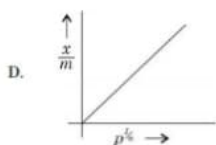
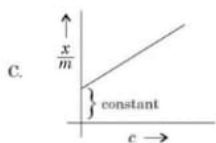
Status: Answered

Chosen Option: 3

Q.67

Which of the following represent the Freundlich adsorption isotherms?





Choose the correct answer from the options given below:

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

Question Type : MCQ
 Question ID : 3666942993
 Option 1 ID : 3666949352
 Option 2 ID : 3666949350
 Option 3 ID : 3666949349
 Option 4 ID : 3666949351
 Status : Answered
 Chosen Option : 4

Q.68 Which of the following complex is octahedral, diamagnetic and the most stable?

- Options
1. $\text{Na}_2[\text{CoCl}_6]$
 2. $\text{K}_3[\text{Co}(\text{CN})_6]$
 3. $[\text{Ni}(\text{NH}_3)_6]\text{Cl}_2$
 4. $[\text{Co}(\text{H}_2\text{O})_6]\text{Cl}_2$

Question Type : MCQ
 Question ID : 3666943000
 Option 1 ID : 3666949380
 Option 2 ID : 3666949377
 Option 3 ID : 3666949379
 Option 4 ID : 3666949378
 Status : Answered
 Chosen Option : 2

Q.69 Match List I with List II:

List I (Reagents used)	List II (Compound with Functional group detected)
A. Alkaline solution of copper sulphate and sodium citrate	I.
B. Neutral FeCl_3 solution	II.
C. Alkaline chloroform solution	III.
D. Potassium iodide and sodium hypochlorite	IV.

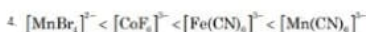
Choose the **correct** answer from the options given below:

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

Question Type : MCQ
 Question ID : 3666943009
 Option 1 ID : 3666949415
 Option 2 ID : 3666949414
 Option 3 ID : 3666949416
 Option 4 ID : 3666949413
 Status : Answered
 Chosen Option : 1

Q.70 The correct order of spin only magnetic moments for the following complex ions is

- Options
1. $[\text{CoF}_6]^{3-} < [\text{MnBr}_4]^{2-} < [\text{Fe}(\text{CN})_6]^{3-} < [\text{Mn}(\text{CN})_6]^{3-}$
 2. $[\text{Fe}(\text{CN})_6]^{3-} < [\text{Mn}(\text{CN})_6]^{3-} < [\text{CoF}_6]^{3-} < [\text{MnBr}_4]^{2-}$
 3. $[\text{Fe}(\text{CN})_6]^{3-} < [\text{CoF}_6]^{3-} < [\text{MnBr}_4]^{2-} < [\text{Mn}(\text{CN})_6]^{3-}$



Question Type : MCQ

Question ID : 3666943002

Option 1 ID : 3666949387

Option 2 ID : 3666949386

Option 3 ID : 3666949385

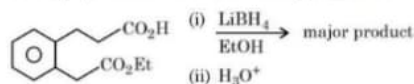
Option 4 ID : 3666949388

Status : Answered

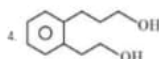
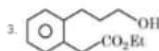
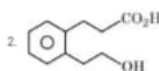
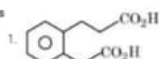
Chosen Option : 2

Q.71

The major product formed in the following reaction is:



Options



Question Type : MCQ

Question ID : 3666943004

Option 1 ID : 3666949396

Option 2 ID : 3666949395

Option 3 ID : 3666949394

Option 4 ID : 3666949393

Status : Not Answered

Chosen Option : --

Q.72

Match List I with List II:

List I (Species)	List II (Maximum allowed concentration in ppm in drinking water)
A. F^-	I. < 50 ppm
B. SO_4^{2-}	II. < 5 ppm
C. NO_3^-	III. < 2 ppm
D. Zn	IV. < 500 ppm

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

Options

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

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

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

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

Question Type : MCQ

Question ID : 3666943001

Option 1 ID : 3666949381

Option 2 ID : 3666949382

Option 3 ID : 3666949383

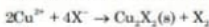
Option 4 ID : 3666949384

Status : Answered

Chosen Option : 4

Q.73

Which halogen is known to cause the reaction given below:



Options

1. All halogens

2. Only Iodine

3. Only Chlorine

4. Only Bromine

Question Type : MCQ

Question ID : 3666942999

Option 1 ID : 3666949373

Option 2 ID : 3666949374

Option 3 ID : 3666949376

Option 4 ID : 3666949375

Status : Answered

Chosen Option : 2

Q.74

Given below are two statements:

Statement I: Lithium and Magnesium do not form superoxide

Statement II: The ionic radius of Li^+ is larger than ionic radius of Mg^{2+}

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

Options

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

Question Type : MCQ
 Question ID : 3666942998
 Option 1 ID : 3666949372
 Option 2 ID : 3666949370
 Option 3 ID : 3666949369
 Option 4 ID : 3666949371
 Status : Answered
 Chosen Option : 4

Q.75 Match List I with List II:

List I	List II
A. Saccharin	I. High potency sweetener
B. Aspartame	II. First artificial sweetening agent
C. Alitame	III. Stable at cooking temperature
D. Sucralose	IV. Unstable at cooking temperature

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

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

Question Type : MCQ
 Question ID : 3666943008
 Option 1 ID : 3666949411
 Option 2 ID : 3666949410
 Option 3 ID : 3666949412
 Option 4 ID : 3666949409
 Status : Answered
 Chosen Option : 2

Q.76 What is the purpose of adding gypsum to cement?

- Options
1. To give a hard mass
 2. To slow down the process of setting
 3. To speed up the process of setting
 4. To facilitate the hydration of cement

Question Type : MCQ
 Question ID : 3666942997
 Option 1 ID : 3666949365
 Option 2 ID : 3666949367
 Option 3 ID : 3666949368
 Option 4 ID : 3666949366
 Status : Answered
 Chosen Option : 2

Q.77 The correct order of electronegativity for given elements is:

- Options
1. $C > P > At > Br$
 2. $Br > P > At > C$
 3. $Br > C > At > P$
 4. $P > Br > C > At$

Question Type : MCQ
 Question ID : 3666942994
 Option 1 ID : 3666949353
 Option 2 ID : 3666949356
 Option 3 ID : 3666949354
 Option 4 ID : 3666949355
 Status : Not Answered
 Chosen Option : --

Q.78 Sulphur (S) containing amino acids from the following are:
 (a) isoleucine (b) cysteine (c) lysine (d) methionine (e) glutamic acid

- Options
1. a, b, c
 2. a, d
 3. b, c, e
 4. b, d

Question Type : MCQ
 Question ID : 3666943007
 Option 1 ID : 3666949405
 Option 2 ID : 3666949408
 Option 3 ID : 3666949407
 Option 4 ID : 3666949406
 Status : Not Answered
 Chosen Option : --

Q.79 Which of the following metals can be extracted through alkali leaching

Q.79 Which of the following metals can be extracted through alkali leaching technique?

- Options
1. Pb
 2. Sn
 3. Au
 4. Cu

Question Type : MCQ

Question ID : 3666942995

Option 1 ID : 3666949359

Option 2 ID : 3666949360

Option 3 ID : 3666949357

Option 4 ID : 3666949358

Status : Answered

Chosen Option : 3

Q.80 Match List I with List II:

c1ccccc1[N+]#N is reacted with reagents in List I to form products in List II.

List I (Reagent)	List II (Product)
A. <chem>c1ccccc1N</chem>	I. <chem>c1ccccc1F</chem>
B. HBF_4, Δ	II. <chem>c1ccccc1C#N</chem>
C. Cu, HCl	III. <chem>c1ccc(cc1)/N=N/c2ccc(N)cc2</chem>
D. CuCN / KCN	IV. <chem>c1ccccc1Cl</chem>

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

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

Question Type : MCQ

Question ID : 3666943006

Option 1 ID : 3666949403

Option 2 ID : 3666949401

Option 3 ID : 3666949402

Option 4 ID : 3666949404

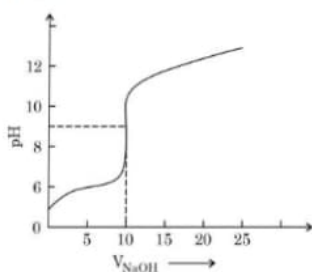
Status : Answered

Chosen Option : 3

Section : Chemistry Section B

Q.81 The titration curve of weak acid vs. strong base with phenolphthalein as indicator) is shown below. The $K_{\text{phenolphthalein}} = 4 \times 10^{-10}$.

Given: $\log 2 = 0.3$



The number of following statement/s which is/are correct about phenolphthalein is _____

- It can be used as an indicator for the titration of weak acid with weak base.
- It begins to change colour at $\text{pH} = 8.4$
- It is a weak organic base
- It is colourless in acidic medium

Given --
Answer :

Question Type : SA

Question ID : 3666943016

Status : Not Answered

Q.82 The number of following statement/s which is/are incorrect is _____

- Line emission spectra are used to study the electronic structure
- The emission spectra of atoms in the gas phase show a continuous spread of wavelength from red to violet
- An absorption spectrum is like the photographic negative of an emission spectrum
- The element helium was discovered in the sun by spectroscopic method

- Q.82 The number of following statement/s which is/are incorrect is _____
- (A) Line emission spectra are used to study the electronic structure
- (B) The emission spectra of atoms in the gas phase show a continuous spread of wavelength from red to violet
- (C) An absorption spectrum is like the photographic negative of an emission spectrum
- (D) The element helium was discovered in the sun by spectroscopic method

Given--
Answer :

Question Type : SA
Question ID : 3666943012
Status : Not Answered

- Q.83 XeF_4 reacts with SbF_5 to form



$$m + n + y + z = \underline{\hspace{2cm}}$$

Given--
Answer :

Question Type : SA
Question ID : 3666943018
Status : Not Answered

- Q.84 The number of following factors which affect the percent covalent character of the ionic bond is _____

- (A) Polarising power of cation
- (B) Extent of distortion of anion
- (C) Polarisability of the anion
- (D) Polarising power of anion

Given--
Answer :

Question Type : SA
Question ID : 3666943013
Status : Answered

- Q.85 0.5 g of an organic compound (X) with 60% carbon will produce $\times 10^{-1}$ g of CO_2 on complete combustion.

Given--
Answer :

Question Type : SA
Question ID : 3666943020
Status : Answered

- Q.86 When a 60 W electric heater is immersed in a gas for 100s in a constant volume container with adiabatic walls, the temperature of the gas rises by 5°C . The heat capacity of the given gas is _____ J K^{-1} (Nearest integer)

Given--
Answer :

Question Type : SA
Question ID : 3666943014
Status : Not Answered

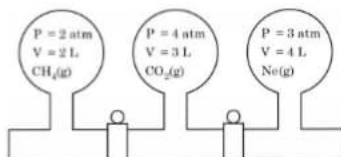
- Q.87 The number of given statement/s which is/are correct is _____

- (A) The stronger the temperature dependence of the rate constant, the higher is the activation energy.
- (B) If a reaction has zero activation energy, its rate is independent of temperature.
- (C) The stronger the temperature dependence of the rate constant, the smaller is the activation energy.
- (D) If there is no correlation between the temperature and the rate constant then it means that the reaction has negative activation energy.

Given--
Answer :

Question Type : SA
Question ID : 3666943017
Status : Not Answered

- Q.88



Three bulbs are filled with CH_4 , CO_2 and Ne as shown in the picture. The bulbs are connected through pipes of zero volume. When the stopcocks are opened and the temperature is kept constant throughout, the pressure of the system is found to be _____ atm. (Nearest integer)

Given--
Answer :

Question Type : SA
Question ID : 3666943011

Q.85

0.5 g of an organic compound (X) with 60% carbon will produce $\times 10^{-1}$ g of CO_2 on complete combustion.

Given 11
Answer :

Question Type : SA
Question ID : 3666943020
Status : Answered

Q.86

When a 60 W electric heater is immersed in a gas for 100s in a constant volume container with adiabatic walls, the temperature of the gas rises by 5°C . The heat capacity of the given gas is J K^{-1} (Nearest integer)

Given --
Answer :

Question Type : SA
Question ID : 3666943014
Status : Not Answered

Q.87

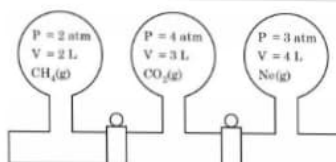
The number of given statement/s which is/are correct is _____

- (A) The stronger the temperature dependence of the rate constant, the higher is the activation energy.
- (B) If a reaction has zero activation energy, its rate is independent of temperature.
- (C) The stronger the temperature dependence of the rate constant, the smaller is the activation energy.
- (D) If there is no correlation between the temperature and the rate constant then it means that the reaction has negative activation energy.

Given --
Answer :

Question Type : SA
Question ID : 3666943017
Status : Not Answered

Q.88



Three bulbs are filled with CH_4 , CO_2 and Ne as shown in the picture. The bulbs are connected through pipes of zero volume. When the stopcocks are opened and the temperature is kept constant throughout, the pressure of the system is found to be _____ atm. (Nearest integer)

Given --
Answer :

Question Type : SA
Question ID : 3666943011
Status : Not Answered

Q.89

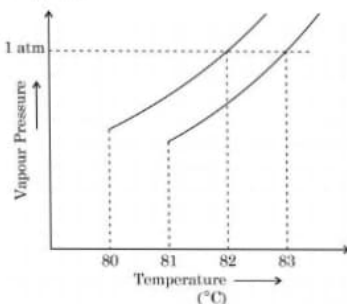
Molar mass of the hydrocarbon (X) which on ozonolysis consumes one mole of O_3 per mole of (X) and gives one mole each of ethanal and propanone is _____ g mol^{-1} (Molar mass of C : 12 g mol^{-1} , H : 1 g mol^{-1})

Given 70
Answer :

Question Type : SA
Question ID : 3666943019
Status : Answered

Q.90

The vapour pressure vs. temperature curve for a solution solvent system is shown below.



The boiling point of the solvent is _____ $^\circ\text{C}$.

Given --
Answer :

Question Type : SA
Question ID : 3666943015
Status : Not Answered