

Test Date	05/04/2024
Test Time	3:00 PM - 6:00 PM
Subject	B. Tech

Section : **Mathematics Section A**

Q.1 Let ABCD and AEFB be squares of side 4 and 2 units, respectively. The point E is on the line segment AB and the point F is on the diagonal AC. Then the radius r of the circle passing through the point F and touching the line segments BC and CD satisfies :

- Options**
1. $2r^2 - 8r + 7 = 0$
 2. $2r^2 - 4r + 1 = 0$
 3. $r = 1$
 4. $r^2 - 8r + 8 = 0$

Question Type : **MCQ**Question ID : **87827055711**Option 1 ID : **878270219105**Option 2 ID : **878270219106**Option 3 ID : **878270219103**Option 4 ID : **878270219104**

Q.2 Let (α, β, γ) be the image of the point $(8, 5, 7)$ in the line $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-2}{5}$. Then $\alpha + \beta + \gamma$ is equal to :

- Options**
1. **16**
 2. **20**
 3. **18**
 4. **14**

Question Type : **MCQ**Question ID : **87827055714**Option 1 ID : **878270219117**Option 2 ID : **878270219115**Option 3 ID : **878270219116**Option 4 ID : **878270219118**

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

- Options**
1. 10
 2. 15
 3. 12
 4. 5

Question Type : **MCQ**

Question ID : **87827055715**

Option 1 ID : **878270219121**

Option 2 ID : **878270219119**

Option 3 ID : **878270219120**

Option 4 ID : **878270219122**

Q.4 Let $\beta(m, n) = \int_0^1 x^{m-1} (1-x)^{n-1} dx$, $m, n > 0$. If $\int_0^1 (1-x^{10})^{20} dx = a \times \beta(b, c)$, then $100(a+b+c)$ equals _____.

- Options**
1. 1120
 2. 2012
 3. 1021
 4. 2120

Question Type : **MCQ**

Question ID : **87827055708**

Option 1 ID : **878270219094**

Option 2 ID : **878270219092**

Option 3 ID : **878270219093**

Option 4 ID : **878270219091**

Q.5 Let A(-1, 1) and B(2, 3) be two points and P be a variable point above the line AB such that the area of ΔPAB is 10. If the locus of P is $ax + by = 15$, then $5a + 2b$ is :

Options

1. $-\frac{6}{5}$
2. 6
3. 4
4. $-\frac{12}{5}$

Question Type : MCQ

Question ID : 87827055713

Option 1 ID : 878270219113

Option 2 ID : 878270219112

Option 3 ID : 878270219111

Option 4 ID : 878270219114

Q.6 Consider three vectors $\vec{a}, \vec{b}, \vec{c}$. Let $|\vec{a}| = 2, |\vec{b}| = 3$ and $\vec{a} = \vec{b} \times \vec{c}$. If $\alpha \in \left[0, \frac{\pi}{3}\right]$ is the angle

between the vectors \vec{b} and \vec{c} , then the minimum value of $27|\vec{c} - \vec{a}|^2$ is equal to :

Options

1. 124
2. 105
3. 110
4. 121

Question Type : MCQ

Question ID : 87827055716

Option 1 ID : 878270219124

Option 2 ID : 878270219123

Option 3 ID : 878270219125

Option 4 ID : 878270219126

Q.7 Let $f, g : \mathbf{R} \rightarrow \mathbf{R}$ be defined as :

$$f(x) = |x - 1| \text{ and } g(x) = \begin{cases} e^x, & x \geq 0 \\ x + 1, & x \leq 0. \end{cases}$$

Then the function $f(g(x))$ is

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

Question Type : MCQ

Question ID : 87827055699

Option 1 ID : 878270219056

Option 2 ID : 878270219058

Option 3 ID : 878270219055

Option 4 ID : 878270219057

Q.8 If the constant term in the expansion of $\left(\frac{\sqrt[5]{3}}{x} + \frac{2x}{\sqrt[3]{5}}\right)^{12}$, $x \neq 0$, is $\alpha \times 2^8 \times \sqrt[5]{3}$, then 25α is equal to :

- Options
1. 724
 2. 639
 3. 693
 4. 742

Question Type : MCQ

Question ID : 87827055706

Option 1 ID : 878270219085

Option 2 ID : 878270219084

Option 3 ID : 878270219086

Option 4 ID : 878270219083

Q.9 The differential equation of the family of circles passing through the origin and having centre at the line $y=x$ is :

Options

1. $(x^2 - y^2 + 2xy)dx = (x^2 - y^2 - 2xy)dy$
2. $(x^2 + y^2 + 2xy)dx = (x^2 + y^2 - 2xy)dy$
3. $(x^2 + y^2 - 2xy)dx = (x^2 + y^2 + 2xy)dy$
4. $(x^2 - y^2 + 2xy)dx = (x^2 - y^2 + 2xy)dy$

Question Type : **MCQ**

Question ID : **87827055710**

Option 1 ID : **878270219099**

Option 2 ID : **878270219102**

Option 3 ID : **878270219100**

Option 4 ID : **878270219101**

Q.10 Let $f: [-1, 2] \rightarrow \mathbf{R}$ be given by $f(x) = 2x^2 + x + [x^2] - [x]$, where $[t]$ denotes the greatest integer less than or equal to t . The number of points, where f is not continuous, is :

Options

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

Question Type : **MCQ**

Question ID : **87827055707**

Option 1 ID : **878270219090**

Option 2 ID : **878270219088**

Option 3 ID : **878270219089**

Option 4 ID : **878270219087**

Q.11

Let $\alpha, \beta \neq 0$ and $A = \begin{bmatrix} \beta & \alpha & 3 \\ \alpha & \alpha & \beta \\ -\beta & \alpha & 2\alpha \end{bmatrix}$. If $B = \begin{bmatrix} 3\alpha & -9 & 3\alpha \\ -\alpha & 7 & -2\alpha \\ -2\alpha & 5 & -2\beta \end{bmatrix}$ is the matrix of cofactors of the elements of A, then $\det(AB)$ is equal to :

Options

1. 64
2. 216
3. 343
4. 125

Question Type : **MCQ**

Question ID : **87827055702**

Option 1 ID : **878270219068**

Option 2 ID : **878270219069**

Option 3 ID : **878270219070**

Option 4 ID : **878270219067**

Q.12

60 words can be made using all the letters of the word BHBJO, with or without meaning. If these words are written as in a dictionary, then the 50th word is :

Options

1. OBBHJ
2. OBBJH
3. HBBJO
4. JBBOH

Question Type : **MCQ**

Question ID : **87827055703**

Option 1 ID : **878270219071**

Option 2 ID : **878270219072**

Option 3 ID : **878270219073**

Option 4 ID : **878270219074**

Q.13

The values of m, n , for which the system of equations

$$x + y + z = 4,$$

$$2x + 5y + 5z = 17,$$

$$x + 2y + mz = n$$

has infinitely many solutions, satisfy the equation :

Options

1. $m^2 + n^2 - m - n = 46$
2. $m^2 + n^2 - mn = 39$
3. $m^2 + n^2 + mn = 68$
4. $m^2 + n^2 + m + n = 64$

Question Type : MCQ

Question ID : 87827055701

Option 1 ID : 878270219066

Option 2 ID : 878270219064

Option 3 ID : 878270219063

Option 4 ID : 878270219065

Q.14

Let the circle $C_1 : x^2 + y^2 - 2(x + y) + 1 = 0$ and C_2 be a circle having centre at $(-1, 0)$ and radius 2. If the line of the common chord of C_1 and C_2 intersects the y -axis at the point P , then the square of the distance of P from the centre of C_1 is :

Options

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

Question Type : MCQ

Question ID : 87827055712

Option 1 ID : 878270219110

Option 2 ID : 878270219109

Option 3 ID : 878270219107

Option 4 ID : 878270219108

Q.15 The coefficients a, b, c in the quadratic equation $ax^2 + bx + c = 0$ are from the set {1, 2, 3, 4, 5, 6}. If the probability of this equation having one real root bigger than the other is p, then 216p equals :

Options

1. 38
2. 19
3. 76
4. 57

Question Type : MCQ

Question ID : 87827055704

Option 1 ID : 878270219076

Option 2 ID : 878270219075

Option 3 ID : 878270219078

Option 4 ID : 878270219077

Q.16 For $x \geq 0$, the least value of K, for which $4^{1+x} + 4^{1-x}$, $\frac{K}{2}$, $16^x + 16^{-x}$ are three consecutive terms of an A.P., is equal to :

Options

1. 8
2. 16
3. 4
4. 10

Question Type : MCQ

Question ID : 87827055705

Option 1 ID : 878270219080

Option 2 ID : 878270219082

Option 3 ID : 878270219081

Option 4 ID : 878270219079

Q.17

Let $S_1 = \{z \in \mathbb{C} : |z| \leq 5\}$, $S_2 = \left\{z \in \mathbb{C} : \operatorname{Im} \left(\frac{z+1-\sqrt{3}i}{1-\sqrt{3}i} \right) \geq 0\right\}$ and $S_3 = \{z \in \mathbb{C} : \operatorname{Re}(z) \geq 0\}$. Then

the area of the region $S_1 \cap S_2 \cap S_3$ is :

Options

1. $\frac{125 \pi}{24}$

2. $\frac{125 \pi}{6}$

3. $\frac{125 \pi}{12}$

4. $\frac{125 \pi}{4}$

Question Type : **MCQ**

Question ID : **87827055700**

Option 1 ID : **878270219059**

Option 2 ID : **878270219061**

Option 3 ID : **878270219062**

Option 4 ID : **878270219060**

Q.18

If $y(\theta) = \frac{2 \cos \theta + \cos 2\theta}{\cos 3\theta + 4 \cos 2\theta + 5 \cos \theta + 2}$, then at $\theta = \frac{\pi}{2}$, $y'' + y' + y$ is equal to :

Options

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

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

3. **1**

4. **2**

Question Type : **MCQ**

Question ID : **87827055717**

Option 1 ID : **878270219129**

Option 2 ID : **878270219127**

Option 3 ID : **878270219128**

Option 4 ID : **878270219130**

Q.19 Let the set $S = \{2, 4, 8, 16, \dots, 512\}$ be partitioned into 3 sets A, B, C with equal number of elements such that $A \cup B \cup C = S$ and $A \cap B = B \cap C = A \cap C = \phi$. The maximum number of such possible partitions of S is equal to :

- Options
1. 1680
 2. 1710
 3. 1640
 4. 1520

Question Type : **MCQ**

Question ID : **87827055698**

Option 1 ID : **878270219053**

Option 2 ID : **878270219051**

Option 3 ID : **878270219054**

Option 4 ID : **878270219052**

Q.20 The area enclosed between the curves $y = x|x|$ and $y = x - |x|$ is :

- Options
1. $\frac{8}{3}$
 2. $\frac{2}{3}$
 3. 1
 4. $\frac{4}{3}$

Question Type : **MCQ**

Question ID : **87827055709**

Option 1 ID : **878270219098**

Option 2 ID : **878270219096**

Option 3 ID : **878270219095**

Option 4 ID : **878270219097**

Section : **Mathematics Section B**

Q.21 The number of real solutions of the equation $x|x+5| + 2|x+7| - 2 = 0$ is _____.

Question Type : **SA**

Question ID : **87827055727**

- Q.22** Let $a > 0$ be a root of the equation $2x^2 + x - 2 = 0$. If $\lim_{x \rightarrow \frac{1}{a}} \frac{16(1 - \cos(2 + x - 2x^2))}{(1 - ax)^2} = \alpha + \beta\sqrt{17}$, where $\alpha, \beta \in \mathbb{Z}$, then $\alpha + \beta$ is equal to _____.

Question Type : SA
Question ID : 87827055720

- Q.23** Let the maximum and minimum values of $(\sqrt{8x - x^2} - 12 - 4)^2 + (x - 7)^2$, $x \in \mathbb{R}$ be M and m , respectively. Then $M^2 - m^2$ is equal to _____.

Question Type : SA
Question ID : 87827055721

- Q.24** Let a line perpendicular to the line $2x - y = 10$ touch the parabola $y^2 = 4(x - 9)$ at the point P . The distance of the point P from the centre of the circle $x^2 + y^2 - 14x - 8y + 56 = 0$ is _____.

Question Type : SA
Question ID : 87827055724

- Q.25** If $1 + \frac{\sqrt{3} - \sqrt{2}}{2\sqrt{3}} + \frac{5 - 2\sqrt{6}}{18} + \frac{9\sqrt{3} - 11\sqrt{2}}{36\sqrt{3}} + \frac{49 - 20\sqrt{6}}{180} + \dots$ upto $\infty = 2 + \left(\sqrt{\frac{b}{a}} + 1\right) \log_e\left(\frac{a}{b}\right)$, where a and b are integers with $\gcd(a, b) = 1$, then $11a + 18b$ is equal to _____.

Question Type : SA
Question ID : 87827055719

- Q.26** If $f(t) = \int_0^{\pi} \frac{2x \, dx}{1 - \cos^2 t \sin^2 x}$, $0 < t < \pi$, then the value of $\int_0^{\frac{\pi}{2}} \frac{\pi^2 \, dt}{f(t)}$ equals _____.

Question Type : SA
Question ID : 87827055722

- Q.27** Let the point $(-1, \alpha, \beta)$ lie on the line of the shortest distance between the lines $\frac{x+2}{-3} = \frac{y-2}{4} = \frac{z-5}{2}$ and $\frac{x+2}{-1} = \frac{y+6}{2} = \frac{z-1}{0}$. Then $(\alpha - \beta)^2$ is equal to _____.

Question Type : SA
Question ID : 87827055725

- Q.28** Let $y = y(x)$ be the solution of the differential equation

$$\frac{dy}{dx} + \frac{2x}{(1+x^2)^2} y = x e^{\frac{1}{(1+x^2)}}; y(0) = 0.$$

Then the area enclosed by the curve $f(x) = y(x) e^{-\frac{1}{(1+x^2)}}$ and the line $y - x = 4$ is _____.

Question Type : SA
Question ID : 87827055723

Q.29 Let the mean and the standard deviation of the probability distribution

X	α	1	0	-3
P(X)	$\frac{1}{3}$	K	$\frac{1}{6}$	$\frac{1}{4}$

be μ and σ , respectively. If $\sigma - \mu = 2$, then $\sigma + \mu$ is equal to _____.

Question Type : SA
Question ID : 87827055726

Q.30 The number of solutions of $\sin^2 x + (2 + 2x - x^2) \sin x - 3(x - 1)^2 = 0$, where $-\pi \leq x \leq \pi$, is _____.

Question Type : SA
Question ID : 87827055718

Section : Physics Section A

Q.31 During an adiabatic process, if the pressure of a gas is found to be proportional to the cube of its absolute temperature, then the ratio of $\frac{C_P}{C_V}$ for the gas is :

Options 1.

1. $\frac{7}{5}$

2.

3. $\frac{9}{7}$

4.

5. $\frac{5}{3}$

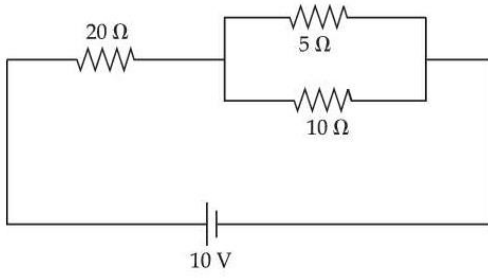
6.

7. $\frac{3}{2}$

Question Type : MCQ
Question ID : 87827055746
Option 1 ID : 878270219215
Option 2 ID : 878270219216
Option 3 ID : 878270219214
Option 4 ID : 878270219213

Q.32

The ratio of heat dissipated per second through the resistance $5\ \Omega$ and $10\ \Omega$ in the circuit given below is :



Options 1.

4 : 1

2.

1 : 1

3.

1 : 2

4.

2 : 1

Question Type : MCQ

Question ID : 87827055739

Option 1 ID : 878270219188

Option 2 ID : 878270219187

Option 3 ID : 878270219185

Option 4 ID : 878270219186

Q.33

Match List-I with List-II :

List-I	List-II
EM-Wave	Wavelength Range
(A) Infra-red	(I) $< 10^{-3}$ nm
(B) Ultraviolet	(II) 400 nm to 1 nm
(C) X-rays	(III) 1 mm to 700 nm
(D) Gamma rays	(IV) 1 nm to 10^{-3} nm

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

Options 1.

(A)-(II), (B)-(I), (C)-(IV), (D)-(III)

2.

(A)-(IV), (B)-(III), (C)-(II), (D)-(I)

3.

(A)-(III), (B)-(II), (C)-(IV), (D)-(I)

4.

(A)-(I), (B)-(III), (C)-(II), (D)-(IV)

Question Type : **MCQ**

Question ID : **87827055741**

Option 1 ID : **878270219193**

Option 2 ID : **878270219196**

Option 3 ID : **878270219194**

Option 4 ID : **878270219195**

Q.34

Given below are two statements :

Statement I : When the white light passed through a prism, the red light bends lesser than yellow and violet.

Statement II : The refractive indices are different for different wavelengths in dispersive medium.

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

Options 1.

Both **Statement I** and **Statement II** are true

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 false

Question Type : **MCQ**

Question ID : **87827055742**

Option 1 ID : **878270219197**

Option 2 ID : **878270219199**

Option 3 ID : **878270219200**

Option 4 ID : **878270219198**

Q.35

A particle moves in x - y plane under the influence of a force \vec{F} such that its linear momentum is

$\vec{p}(t) = \hat{i} \cos(kt) - \hat{j} \sin(kt)$. If k is constant, the angle between \vec{F} and \vec{P} will be :

Options 1.

1. $\frac{\pi}{6}$

2.

3. $\frac{\pi}{3}$

3.

4. $\frac{\pi}{2}$

4.

5. $\frac{\pi}{4}$

Question Type : MCQ

Question ID : 87827055731

Option 1 ID : 878270219156

Option 2 ID : 878270219154

Option 3 ID : 878270219153

Option 4 ID : 878270219155

Q.36

A heavy box of mass 50 kg is moving on a horizontal surface. If co-efficient of kinetic friction between the box and horizontal surface is 0.3 then force of kinetic friction is :

Options 1.

1. 147 N

2.

3. 1470 N

3.

4. 1.47 N

4.

5. 14.7 N

Question Type : MCQ

Question ID : 87827055730

Option 1 ID : 878270219151

Option 2 ID : 878270219152

Option 3 ID : 878270219149

Option 4 ID : 878270219150

Q.37

10. A galvanometer of resistance $100\ \Omega$ when connected in series with $400\ \Omega$ measures a voltage of upto $10\ \text{V}$. The value of resistance required to convert the galvanometer into ammeter to read upto $10\ \text{A}$ is $x \times 10^{-2}\ \Omega$. The value of x is :

Options 1.

1. 200

2.

800

3.

2

4.

20

Question Type : **MCQ**

Question ID : **87827055743**

Option 1 ID : **878270219203**

Option 2 ID : **878270219204**

Option 3 ID : **878270219202**

Option 4 ID : **878270219201**

Q.38

11. A series LCR circuit is subjected to an ac signal of $200\ \text{V}$, $50\ \text{Hz}$. If the voltage across the inductor ($L=10\ \text{mH}$) is $31.4\ \text{V}$, then the current in this circuit is _____.

Options 1.

1. 10 A

2.

63 A

3.

68 A

4.

10 mA

Question Type : **MCQ**

Question ID : **87827055738**

Option 1 ID : **878270219181**

Option 2 ID : **878270219183**

Option 3 ID : **878270219184**

Option 4 ID : **878270219182**

Q.39

The electrostatic force \vec{F}_1 and magnetic force \vec{F}_2 acting on a charge q moving with velocity v can be written :

Options 1.

(A) $\vec{F}_1 = q \vec{E}, \vec{F}_2 = q(\vec{V} \times \vec{B})$

2.

(B) $\vec{F}_1 = q \vec{E}, \vec{F}_2 = q(\vec{B} \times \vec{V})$

3.

(C) $\vec{F}_1 = q \vec{V} \cdot \vec{E}, \vec{F}_2 = q(\vec{B} \cdot \vec{V})$

4.

(D) $\vec{F}_1 = q \vec{B}, \vec{F}_2 = q(\vec{B} \times \vec{V})$

Question Type : MCQ

Question ID : 87827055740

Option 1 ID : 878270219190

Option 2 ID : 878270219189

Option 3 ID : 878270219192

Option 4 ID : 878270219191

Q.40

Match List-I with List-II :

List-I

- (A) A force that restores an elastic body of unit area to its original state
- (B) Two equal and opposite forces parallel to opposite faces
- (C) Forces perpendicular everywhere to the surface per unit area same everywhere
- (D) Two equal and opposite forces perpendicular to opposite faces

List-II

- (I) Bulk modulus
- (II) Young's modulus
- (III) Stress
- (IV) Shear modulus

Choose the correct answer from the options given below :

Options 1.

(A)-(IV), (B)-(II), (C)-(III), (D)-(I)

2.

(A)-(III), (B)-(I), (C)-(II), (D)-(IV)

3.

(A)-(III), (B)-(IV), (C)-(I), (D)-(II)

4.

(A)-(II), (B)-(IV), (C)-(I), (D)-(III)

Question Type : MCQ

Question ID : 87827055735

Option 1 ID : 878270219171

Option 2 ID : 878270219169

Option 3 ID : 878270219172

Option 4 ID : 878270219170

Q.41

What is the dimensional formula of ab^{-1} in the equation $\left(P + \frac{a}{v^2}\right)(V - b) = RT$, where letters have their usual meaning.

Options 1.

1. $[M^{-1}L^5T^3]$

2.

2. $[M^0L^3T^{-2}]$

3.

3. $[ML^2T^{-2}]$

4.

4. $[M^6L^7T^4]$

Question Type : **MCQ**

Question ID : **87827055728**

Option 1 ID : **878270219142**

Option 2 ID : **878270219143**

Option 3 ID : **878270219141**

Option 4 ID : **878270219144**

Q.42

A man carrying a monkey on his shoulder does cycling smoothly on a circular track of radius 9 m and completes 120 revolutions in 3 minutes. The magnitude of centripetal acceleration of monkey is (in m/s^2):

Options 1.

1. $57600\pi^2 \text{ ms}^{-2}$

2.

2. $16\pi^2 \text{ ms}^{-2}$

3.

3. Zero

4.

4. $4\pi^2 \text{ ms}^{-2}$

Question Type : **MCQ**

Question ID : **87827055729**

Option 1 ID : **878270219148**

Option 2 ID : **878270219147**

Option 3 ID : **878270219145**

Option 4 ID : **878270219146**

Q.43

A satellite revolving around a planet in stationary orbit has time period 6 hours. The mass of planet is one-fourth the mass of earth. The radius orbit of planet is :
(Given = Radius of geo-stationary orbit for earth is 4.2×10^4 km)

Options 1.

1. 1.05×10^4 km

2.

1. 1.4×10^4 km

3.

1. 8.4×10^4 km

4.

1. 1.68×10^5 km

Question Type : **MCQ**

Question ID : **87827055734**

Option 1 ID : **878270219167**

Option 2 ID : **878270219165**

Option 3 ID : **878270219166**

Option 4 ID : **878270219168**

Q.44

Which of the following statement is **not** true about stopping potential (V_0) ?

Options 1.

1. It increases with increase in intensity of the incident light.

2.

1. It is $1/e$ times the maximum kinetic energy of electrons emitted.

3.

1. It depends upon frequency of the incident light.

4.

1. It depends on the nature of emitter material.

Question Type : **MCQ**

Question ID : **87827055744**

Option 1 ID : **878270219207**

Option 2 ID : **878270219208**

Option 3 ID : **878270219205**

Option 4 ID : **878270219206**

Q.45

If n is the number density and d is the diameter of the molecule, then the average distance covered by a molecule between two successive collisions (i.e. mean free path) is represented by :

Options 1.

1. $\frac{1}{\sqrt{2} n^2 \pi^2 d^2}$

2.

2. $\frac{1}{\sqrt{2} n \pi d^2}$

3.

3. $\sqrt{2} n \pi d^2$

4.

4. $\frac{1}{\sqrt{2n\pi d^2}}$

Question Type : MCQ

Question ID : 87827055736

Option 1 ID : 878270219176

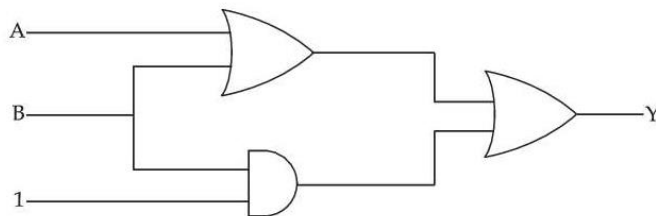
Option 2 ID : 878270219173

Option 3 ID : 878270219175

Option 4 ID : 878270219174

Q.46

The output (Y) of logic circuit given below is 0 only when :



Options 1.

1. A=1, B=0

2.

2. A=0, B=0

3.

3. A=0, B=1

4.

4. A=1, B=1

Question Type : MCQ

Question ID : 87827055747

Option 1 ID : 878270219218

Option 2 ID : 878270219217

Option 3 ID : 878270219219

Option 4 ID : 878270219220

Q.47

A body is moving unidirectionally under the influence of a constant power source. Its displacement in time t is proportional to :

Options 1.

1. $t^{3/2}$

2.

2. t^2

3.

3. t

4.

4. $t^{2/3}$

Question Type : MCQ

Question ID : 87827055732

Option 1 ID : 878270219158

Option 2 ID : 878270219160

Option 3 ID : 878270219157

Option 4 ID : 878270219159

Q.48

A vernier callipers has 20 divisions on the vernier scale, which coincides with 19th division on the main scale. The least count of the instrument is 0.1 mm. One main scale division is equal to _____ mm.

Options 1.

1. 1

2.

2. 5

3.

3. 2

4.

4. 0.5

Question Type : MCQ

Question ID : 87827055733

Option 1 ID : 878270219163

Option 2 ID : 878270219161

Option 3 ID : 878270219162

Option 4 ID : 878270219164

Q.49

The vehicles carrying inflammable fluids usually have metallic chains touching the ground :

Options 1.

To protect tyres from catching dirt from ground

2.

To alert other vehicles

3.

It is a custom

4.

To conduct excess charge due to air friction to ground and prevent sparking

Question Type : **MCQ**

Question ID : **87827055737**

Option 1 ID : **878270219177**

Option 2 ID : **878270219178**

Option 3 ID : **878270219180**

Option 4 ID : **878270219179**

Q.50

The angular momentum of an electron in a hydrogen atom is proportional to :
(Where r is the radius of orbit of electron)

Options 1.

\sqrt{r}

2.

$\frac{1}{r}$

3.

r

4.

$\frac{1}{\sqrt{r}}$

Question Type : **MCQ**

Question ID : **87827055745**

Option 1 ID : **878270219209**

Option 2 ID : **878270219212**

Option 3 ID : **878270219211**

Option 4 ID : **878270219210**

Section : Physics Section B

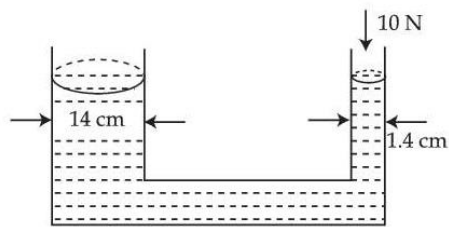
Q.51

The maximum height reached by a projectile is 64 m. If the initial velocity is halved, the new maximum height of the projectile is _____ m.

Question Type : **SA**

Question ID : **87827055748**

Q.52



A hydraulic press containing water has two arms with diameters as mentioned in the figure. A force of 10 N is applied on the surface of water in the thinner arm. The force required to be applied on the surface of water in the thicker arm to maintain equilibrium of water is _____ N.

Question Type : SA

Question ID : 87827055751

Q.53

The shortest wavelength of the spectral lines in the Lyman series of hydrogen spectrum is 915 Å. The longest wavelength of spectral lines in the Balmer series will be _____ Å.

Question Type : SA

Question ID : 87827055757

Q.54

A wire of resistance $20\ \Omega$ is divided into 10 equal parts, resulting pairs. A combination of two parts are connected in parallel and so on. Now resulting pairs of parallel combination are connected in series. The equivalent resistance of final combination is _____ Ω .

Question Type : SA

Question ID : 87827055753

Q.55

The current in an inductor is given by $I = (3t + 8)$ where t is in second. The magnitude of induced emf produced in the inductor is 12 mV. The self-inductance of the inductor _____ mH.

Question Type : SA

Question ID : 87827055756

Q.56

A solenoid of length 0.5 m has a radius of 1 cm and is made up of ' m ' number of turns. It carries a current of 5 A. If the magnitude of the magnetic field inside the solenoid is $6.28 \times 10^{-3}\text{T}$ then the value of m is _____.

Question Type : SA

Question ID : 87827055754

Q.57

A hollow sphere is rolling on a plane surface about its axis of symmetry. The ratio of rotational kinetic energy to its total kinetic energy is $\frac{x}{5}$. The value of x is _____.

Question Type : SA

Question ID : 87827055749

Q.58

MCQ

IB

Physics English

- 58 In a single slit experiment, a parallel beam of green light of wavelength 550 nm passes through a slit of width 0.20 mm. The transmitted light is collected on a screen 100 cm away. The distance of first order minima from the central maximum will be $x \times 10^{-5}$ m. The value of x is :

Question Type : SA

Question ID : 87827055750

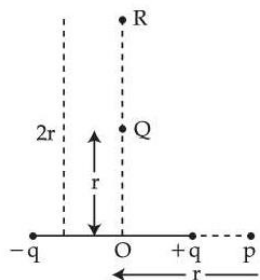
Q.59

MCQ

IB

Physics English

- 59 The electric field at point p due to an electric dipole is E. The electric field at point R on equatorial line will be $\frac{E}{x}$. The value of x :



Question Type : SA

Question ID : 87827055755

Q.60

MCQ

IB

Physics English

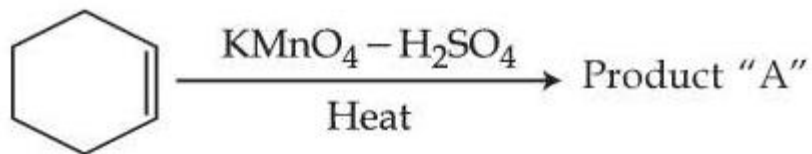
- 60 A sonometer wire of resonating length 90 cm has a fundamental frequency of 400 Hz when kept under some tension. The resonating length of the wire with fundamental frequency of 600 Hz under same tension _____ cm.

Question Type : SA

Question ID : 87827055752

Q.61

Consider the given chemical reaction :



Product "A" is :

Options

1. picric acid
2. adipic acid
3. acetic acid
4. oxalic acid

Question Type : MCQ

Question ID : 87827055776

Option 1 ID : 878270219306

Option 2 ID : 878270219305

Option 3 ID : 878270219303

Option 4 ID : 878270219304

Q.62 The number of complexes from the following with no electrons in the t_2 orbital is _____.

TiCl_4 , $[\text{MnO}_4]^-$, $[\text{FeO}_4]^{2-}$, $[\text{FeCl}_4]^-$, $[\text{CoCl}_4]^{2-}$

Options

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

Question Type : MCQ

Question ID : 87827055768

Option 1 ID : 878270219274

Option 2 ID : 878270219272

Option 3 ID : 878270219271

Option 4 ID : 878270219273

Q.63

Coagulation of egg, on heating is because of :

Options

1. Biological property of protein remains unchanged
2. Denaturation of protein occurs
3. Breaking of the peptide linkage in the primary structure of protein occurs
4. The secondary structure of protein remains unchanged

Question Type : **MCQ**

Question ID : **87827055777**

Option 1 ID : **878270219308**

Option 2 ID : **878270219310**

Option 3 ID : **878270219307**

Option 4 ID : **878270219309**

Q.64

While preparing crystals of Mohr's salt, dil H_2SO_4 is added to a mixture of ferrous sulphate and ammonium sulphate, before dissolving this mixture in water, dil H_2SO_4 is added here to :

Options

1. prevent the hydrolysis of ferrous sulphate
2. prevent the hydrolysis of ammonium sulphate
3. make the medium strongly acidic
4. increase the rate of formation of crystals

Question Type : **MCQ**

Question ID : **87827055769**

Option 1 ID : **878270219277**

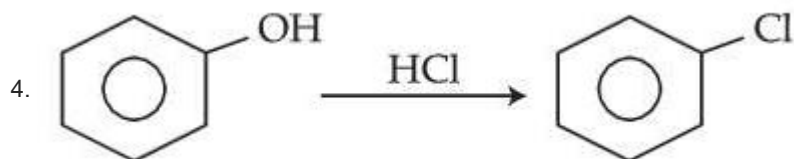
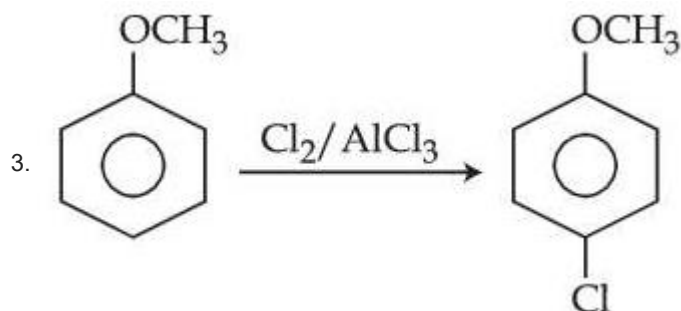
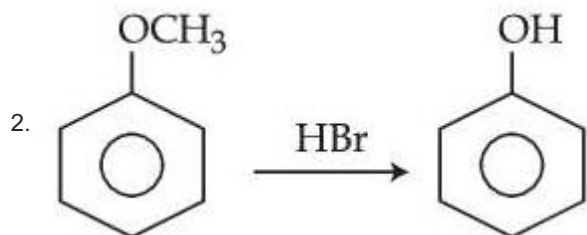
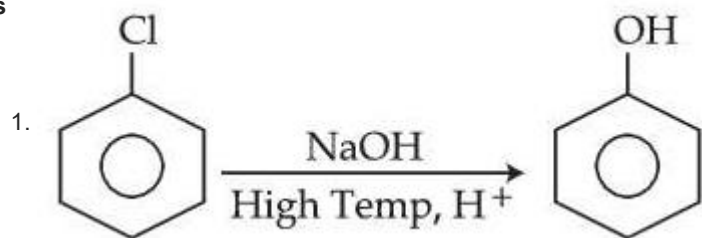
Option 2 ID : **878270219275**

Option 3 ID : **878270219276**

Option 4 ID : **878270219278**

Which one of the following reactions is NOT possible ?

Options



Question Type : MCQ

Question ID : 87827055773

Option 1 ID : 878270219292

Option 2 ID : 878270219294

Option 3 ID : 878270219293

Option 4 ID : 878270219291

Q.66 Match List - I with List - II.

List - I

(Pair of Compounds)

- (A) n-propanol and Isopropanol
- (B) Methoxypropane and ethoxyethane
- (C) Propanone and propanal
- (D) Neopentane and Isopentane

List - II

(Isomerism)

- (I) Metamerism
- (II) Chain Isomerism
- (III) Position Isomerism
- (IV) Functional Isomerism

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

Options

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

Question Type : **MCQ**

Question ID : **87827055771**

Option 1 ID : **878270219283**

Option 2 ID : **878270219284**

Option 3 ID : **878270219286**

Option 4 ID : **878270219285**

Q.67 The number of ions from the following that have the ability to liberate hydrogen from a dilute acid is _____.

Ti²⁺, Cr²⁺ and V²⁺

Options

1. **2**
2. **1**
3. **0**
4. **3**

Question Type : **MCQ**

Question ID : **87827055766**

Option 1 ID : **878270219265**

Option 2 ID : **878270219264**

Option 3 ID : **878270219263**

Option 4 ID : **878270219266**

Q.68 Given below are two statements :

Statement I : On passing $\text{HCl}_{(g)}$ through a saturated solution of BaCl_2 , at room temperature white turbidity appears.

Statement II : When HCl gas is passed through a saturated solution of NaCl , sodium chloride is precipitated due to common ion effect.

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

Question Type : **MCQ**

Question ID : **87827055760**

Option 1 ID : **878270219239**

Option 2 ID : **878270219242**

Option 3 ID : **878270219241**

Option 4 ID : **878270219240**

Q.69 The metal atom present in the complex MABXL (where A, B, X and L are unidentate ligands and M is metal) involves sp^3 hybridization. The number of geometrical isomers exhibited by the complex is :

Options

1. **3**
2. **0**
3. **4**
4. **2**

Question Type : **MCQ**

Question ID : **87827055767**

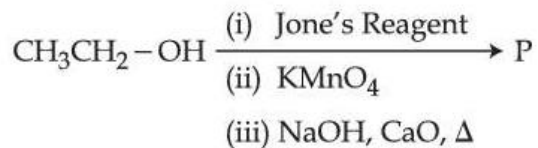
Option 1 ID : **878270219269**

Option 2 ID : **878270219267**

Option 3 ID : **878270219270**

Option 4 ID : **878270219268**

Q.70



Consider the above reaction sequence and identify the major product P.

Options

1. Methane
2. Methanal
3. Methanoic acid
4. Methoxymethane

Question Type : MCQ

Question ID : 87827055775

Option 1 ID : 878270219300

Option 2 ID : 878270219299

Option 3 ID : 878270219301

Option 4 ID : 878270219302

Q.71

The correct statements from the following are :

- (A) The decreasing order of atomic radii of group 13 elements is $\text{Tl} > \text{In} > \text{Ga} > \text{Al} > \text{B}$.
- (B) Down the group 13 electronegativity decreases from top to bottom.
- (C) Al dissolves in dil. HCl and liberates H_2 but conc. HNO_3 renders Al passive by forming a protective oxide layer on the surface.
- (D) All elements of group 13 exhibits highly stable +1 oxidation state.
- (E) Hybridisation of Al in $[\text{Al}(\text{H}_2\text{O})_6]^{3+}$ ion is sp^3d^2 .

Choose the correct answer from the options given below :

Options

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

Question Type : MCQ

Question ID : 87827055765

Option 1 ID : 878270219261

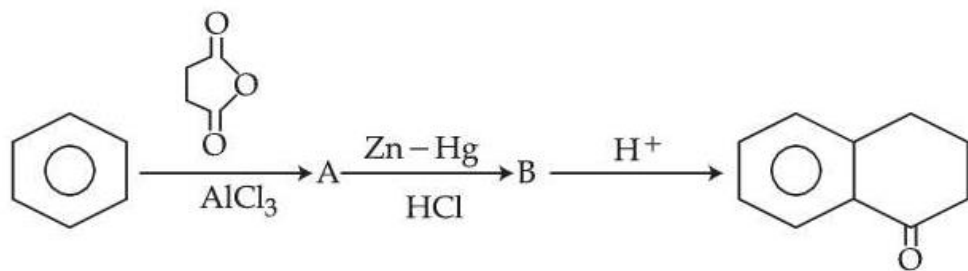
Option 2 ID : 878270219262

Option 3 ID : 878270219260

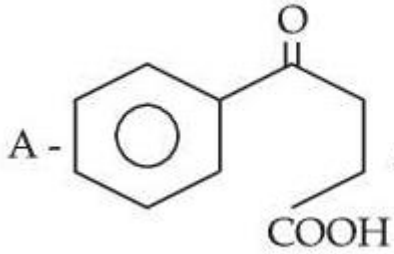
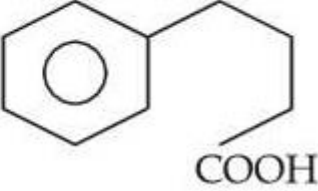
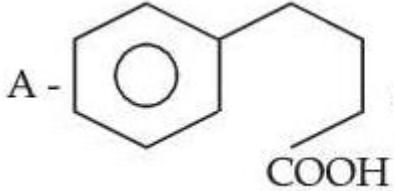
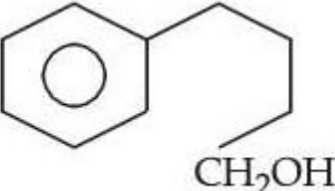
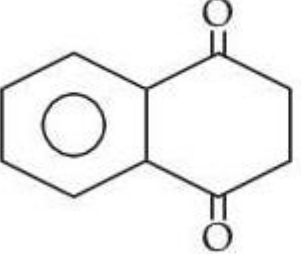
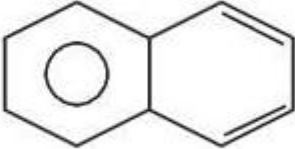
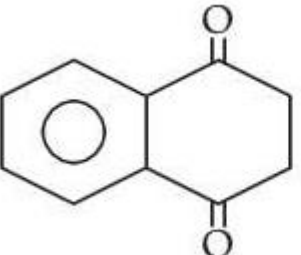
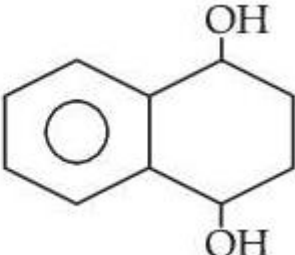
Option 4 ID : 878270219259

Q.72

Identify A and B in the given chemical reaction sequence :



Options

1. A -  , B - 
2. A -  , B - 
3. A -  , B - 
4. A -  , B - 

Question Type : MCQ

Question ID : 87827055772

Option 1 ID : 878270219287

Option 2 ID : 878270219288

Option 3 ID : 878270219290

Option 4 ID : 878270219289

Q.73 The quantity of silver deposited when one coulomb charge is passed through AgNO_3 solution :

Options

1. 1 electrochemical equivalent of silver
2. 1 g of silver
3. 1 chemical equivalent of silver
4. 0.1 g atom of silver

Question Type : MCQ

Question ID : 87827055762

Option 1 ID : 878270219249

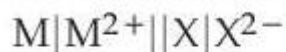
Option 2 ID : 878270219247

Option 3 ID : 878270219250

Option 4 ID : 878270219248

Q.74

For the electro chemical cell



If $E_{(\text{M}^{2+}/\text{M})}^0 = 0.46 \text{ V}$ and $E_{(\text{X}/\text{X}^{2-})}^0 = 0.34 \text{ V}$.

Which of the following is correct ?

Options

1. $E_{\text{cell}} = -0.80 \text{ V}$
2. $\text{M} + \text{X} \rightarrow \text{M}^{2+} + \text{X}^{2-}$ is a spontaneous reaction
3. $\text{M}^{2+} + \text{X}^{2-} \rightarrow \text{M} + \text{X}$ is a spontaneous reaction
4. $E_{\text{cell}} = 0.80 \text{ V}$

Question Type : MCQ

Question ID : 87827055761

Option 1 ID : 878270219246

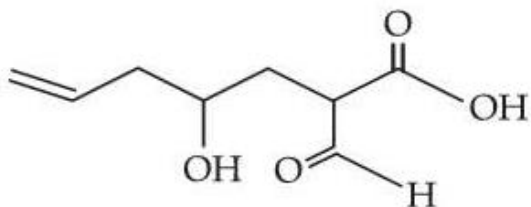
Option 2 ID : 878270219243

Option 3 ID : 878270219244

Option 4 ID : 878270219245

Q.75

The correct nomenclature for the following compound is :



Options

1. 2-formyl-4-hydroxyhept-7-enoic acid
2. 2-formyl-4-hydroxyhept-6-enoic acid
3. 2-carboxy-4-hydroxyhept-6-enal
4. 2-carboxy-4-hydroxyhept-7-enal

Question Type : MCQ

Question ID : 87827055770

Option 1 ID : 878270219282

Option 2 ID : 878270219281

Option 3 ID : 878270219280

Option 4 ID : 878270219279

Q.76

Given below are two statements :

Statement I : The metallic radius of Na is 1.86 \AA and the ionic radius of Na^+ is lesser than 1.86 \AA .

Statement II : Ions are always smaller in size than the corresponding elements.

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

Question Type : MCQ

Question ID : 87827055763

Option 1 ID : 878270219251

Option 2 ID : 878270219254

Option 3 ID : 878270219252

Option 4 ID : 878270219253

Q.77

Match List - I with List - II.

List - I	List - II
(A) ICl	(I) T - shape
(B) ICl ₃	(II) Square pyramidal
(C) ClF ₅	(III) Pentagonal bipyramidal
(D) IF ₇	(IV) Linear

Choose the correct answer from the options given below :

Options

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

Question Type : MCQ

Question ID : 87827055764

Option 1 ID : 878270219258

Option 2 ID : 878270219256

Option 3 ID : 878270219257

Option 4 ID : 878270219255

Q.78

The number of moles of methane required to produce 11 g CO₂(g) after complete combustion is :
(Given molar mass of methane in g mol⁻¹ : 16)

Options

1. 0.35
2. 0.5
3. 0.75
4. 0.25

Question Type : MCQ

Question ID : 87827055758

Option 1 ID : 878270219234

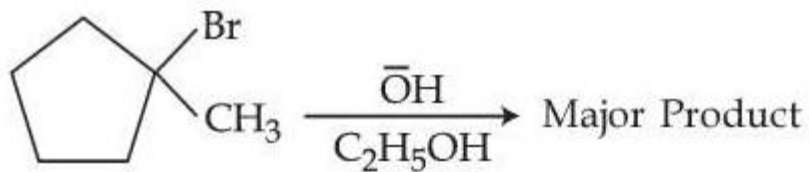
Option 2 ID : 878270219232

Option 3 ID : 878270219233

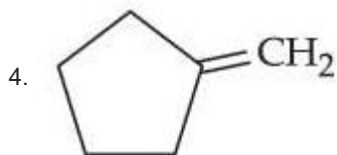
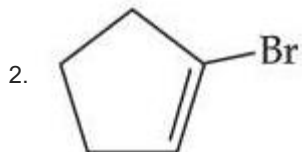
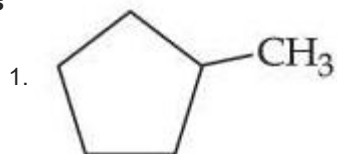
Option 4 ID : 878270219231

Q.79

Identify the major product in the following reaction.



Options



Question Type : MCQ

Question ID : 87827055774

Option 1 ID : 878270219298

Option 2 ID : 878270219297

Option 3 ID : 878270219296

Option 4 ID : 878270219295

Q.80 Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : NH_3 and NF_3 molecule have pyramidal shape with a lone pair of electrons on nitrogen atom. The resultant dipole moment of NH_3 is greater than that of NF_3 .

Reason (R) : In NH_3 , the orbital dipole due to lone pair is in the same direction as the resultant dipole moment of the N-H bonds. F is the most electronegative element.

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

Options

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

Question Type : **MCQ**

Question ID : **87827055759**

Option 1 ID : **878270219238**

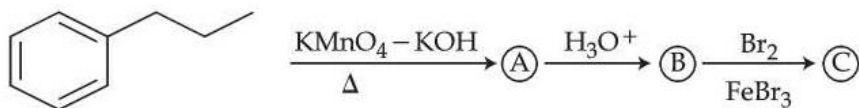
Option 2 ID : **878270219237**

Option 3 ID : **878270219236**

Option 4 ID : **878270219235**

Section : **Chemistry Section B**

Q.81 The product **(C)** in the following sequence of reactions has _____ π bonds.



Question Type : **SA**

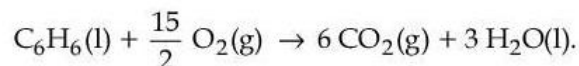
Question ID : **87827055786**

Q.82 In an atom, total number of electrons having quantum numbers $n=4$, $|m_l|=1$ and $m_s = -\frac{1}{2}$ is _____.

Question Type : **SA**

Question ID : **87827055778**

Q.83 Combustion of 1 mole of benzene is expressed at

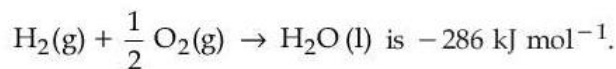


The standard enthalpy of combustion of 2 mol of benzene is $-x'$ kJ.

$x =$ _____.

Given :

1. standard Enthalpy of formation of 1 mol of $\text{C}_6\text{H}_6(\text{l})$, for the reaction $6 \text{C}(\text{graphite}) + 3 \text{H}_2(\text{g}) \rightarrow \text{C}_6\text{H}_6(\text{l})$ is 48.5 kJ mol^{-1} .
2. Standard Enthalpy of formation of 1 mol of $\text{CO}_2(\text{g})$, for the reaction $\text{C}(\text{graphite}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g})$ is $-393.5 \text{ kJ mol}^{-1}$.
3. Standard and Enthalpy of formation of 1 mol of $\text{H}_2\text{O}(\text{l})$, for the reaction



Question Type : SA

Question ID : 87827055780

Q.84 The fusion of chromite ore with sodium carbonate in the presence of air leads to the formation of products A and B along with the evolution of CO_2 . The sum of spin-only magnetic moment values of A and B is _____ B.M. (Nearest integer)

[Given atomic number : C : 6, Na : 11, O : 8, Fe : 26, Cr : 24]

Question Type : SA

Question ID : 87827055783

Q.85 Number of compounds from the following with zero dipole moment is _____.

HF, H_2 , H_2S , CO_2 , NH_3 , BF_3 , CH_4 , CHCl_3 , SiF_4 , H_2O , BeF_2

Question Type : SA

Question ID : 87827055779

Q.86 Using the given figure, the ratio of R_f values of sample A and sample C is $x \times 10^{-2}$. Value of x is _____.

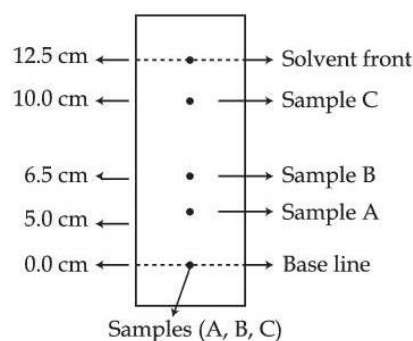


Fig : Paper chromatography of Samples

Question Type : SA

Question ID : 87827055785

Q.87 Considering acetic acid dissociates in water, its dissociation constant is 6.25×10^{-5} . If 5 mL of acetic acid is dissolved in 1 litre water, the solution will freeze at $-x \times 10^{-2} \text{ }^\circ\text{C}$, provided pure water freezes at $0 \text{ }^\circ\text{C}$.

$x =$ _____. (Nearest integer)

Given : $(K_f)_{\text{water}} = 1.86 \text{ K kg mol}^{-1}$.

density of acetic acid is 1.2 g mol^{-1} .

molar mass of water = 18 g mol^{-1} .

molar mass of acetic acid = 60 g mol^{-1} .

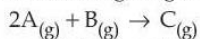
density of water = 1 g cm^{-3}

Acetic acid dissociates as $\text{CH}_3\text{COOH} \rightleftharpoons \text{CH}_3\text{COO}^\ominus + \text{H}^\oplus$

Question Type : SA

Question ID : 87827055781

Q.88 Consider the following single step reaction in gas phase at constant temperature.



The initial rate of the reaction is recorded as r_1 when the reaction starts with 1.5 atm pressure of A and 0.7 atm pressure of B. After some time, the rate r_2 is recorded when the pressure of C becomes 0.5 atm. The ratio $r_1 : r_2$ is _____ $\times 10^{-1}$. (Nearest integer)

Question Type : SA

Question ID : 87827055782

Q.89 X g of ethanamine was subjected to reaction with NaNO_2/HCl followed by hydrolysis to liberate N_2 and HCl. The HCl generated was completely neutralised by 0.2 moles of NaOH. X is _____ g.

Question Type : SA

Question ID : 87827055787

Q.90 In the Claisen-Schmidt reaction to prepare 351 g of dibenzalacetone using 87 g of acetone, the amount of benzaldehyde required is _____ g. (Nearest integer)

Question Type : SA

Question ID : 87827055784