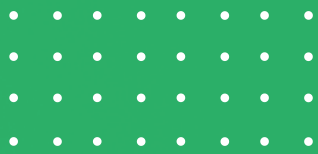




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Session 2

QUESTION PAPER

2023

JOINT ENTRANCE EXAMINATION - MAIN
PREVIOUS YEAR QUESTION PAPER

JEE MAINS Session 2_6 to 12 April 2023

Application No	
Candidate Name	
Roll No	
Test Date	
Test Time	
Subject	

Section : Mathematics Section A

Q.1 Let $A = \left\{ \theta \in (0, 2\pi) : \frac{1+2i\sin\theta}{1-i\sin\theta} \text{ is purely imaginary} \right\}$. Then the sum of the elements in A is

- Options
1. 3π
 2. 2π
 3. 4π
 4. π

Question Type : MCQ

Question ID : 7155054223

Option 1 ID : 71550513346

Option 2 ID : 71550513345

Option 3 ID : 71550513347

Option 4 ID : 71550513348

Status : Answered

Chosen Option : 3

Q.2 $25^{190} - 19^{190} - 8^{190} + 2^{190}$ is divisible by

- Options
1. neither 14 nor 34
 2. both 14 and 34
 3. 34 but not by 14
 4. 14 but not by 34

Question Type : MCQ

Question ID : 7155054227

Option 1 ID : 71550513364

Option 2 ID : 71550513361

Option 3 ID : 71550513363

Option 4 ID : 71550513362

Status : Not Answered

Chosen Option : --

Q.3 Let P be the plane passing through the line $\frac{x-1}{1} = \frac{y-2}{-3} = \frac{z+5}{7}$ and the point (2, 4, -3). If the image of the point (-1, 3, 4) in the plane P is (α , β , γ) then $\alpha + \beta + \gamma$ is equal to

- Options 1. 11
2. 9
3. 10
4. 12

Question Type : MCQ

Question ID : 7155054234

Option 1 ID : 71550513391

Option 2 ID : 71550513389

Option 3 ID : 71550513390

Option 4 ID : 71550513392

Status : Not Answered

Chosen Option : --

Q.4 If $\alpha > \beta > 0$ are the roots of the equation $ax^2 + bx + 1 = 0$, and

$$\lim_{x \rightarrow \frac{1}{\alpha}} \left(\frac{1 - \cos(x^2 + bx + a)}{2(1 - \alpha x)^2} \right)^{\frac{1}{2}} = \frac{1}{k} \left(\frac{1}{\beta} - \frac{1}{\alpha} \right), \text{ then } k \text{ is equal to}$$

- Options 1. 2β
2. 2α
3. α
4. β

Question Type : MCQ

Question ID : 7155054230

Option 1 ID : 71550513376

Option 2 ID : 71550513375

Option 3 ID : 71550513373

Option 4 ID : 71550513374

Status : Not Answered

Chosen Option : --

Q.5 Let the mean and variance of 12 observations be $\frac{9}{2}$ and 4 respectively. Later on, it was observed that two observations were considered as 9 and 10 instead of 7 and 14 respectively. If the correct variance is $\frac{m}{n}$, where m and n are coprime, then m + n is equal to

- Options 1. 315
2. 314
3. 317
4. 316

Question Type : MCQ

Question ID : 7155054239

Option 1 ID : 71550513410

Option 2 ID : 71550513409

Option 3 ID : 71550513412

Option 4 ID : 71550513411

Status : Not Answered

Chosen Option : --

Q.6

The integral $\int \left(\left(\frac{x}{2} \right)^x + \left(\frac{2}{x} \right)^x \right) \log_2 x \, dx$ is equal to

Options

1. $\left(\frac{x}{2} \right)^x \log_2 \left(\frac{2}{x} \right) + C$
2. $\left(\frac{x}{2} \right)^x \log_2 \left(\frac{x}{2} \right) + C$
3. $\left(\frac{x}{2} \right)^x - \left(\frac{2}{x} \right)^x + C$
4. $\left(\frac{x}{2} \right)^x + \left(\frac{2}{x} \right)^x + C$

Question Type : MCQ

Question ID : 7155054231

Option 1 ID : 71550513380

Option 2 ID : 71550513379

Option 3 ID : 71550513378

Option 4 ID : 71550513377

Status : Not Answered

Chosen Option : --

Q.7 The value of $36(4 \cos^2 9^\circ - 1)(4 \cos^2 27^\circ - 1)(4 \cos^2 81^\circ - 1)(4 \cos^2 243^\circ - 1)$ is

Options 1. 54

2. 27

3. 36

4. 18

Question Type : MCQ

Question ID : 7155054240

Option 1 ID : 71550513416

Option 2 ID : 71550513414

Option 3 ID : 71550513415

Option 4 ID : 71550513413

Status : Answered

Chosen Option : 3

Q.8 Let the vectors $\vec{u}_1 = \hat{i} + \hat{j} + a\hat{k}$, $\vec{u}_2 = \hat{i} + b\hat{j} + \hat{k}$ and $\vec{u}_3 = c\hat{i} + \hat{j} + \hat{k}$ be coplanar. If the vectors $\vec{v}_1 = (a+b)\hat{i} + c\hat{j} + c\hat{k}$, $\vec{v}_2 = a\hat{i} + (b+c)\hat{j} + a\hat{k}$ and $\vec{v}_3 = b\hat{i} + b\hat{j} + (c+a)\hat{k}$ are also coplanar, then $6(a+b+c)$ is equal to

- Options 1. 4
2. 6
3. 12
4. 0

Question Type : MCQ

Question ID : 7155054237

Option 1 ID : 71550513402

Option 2 ID : 71550513403

Option 3 ID : 71550513404

Option 4 ID : 71550513401

Status : Not Answered

Chosen Option : --

Q.9 The absolute difference of the coefficients of x^{10} and x^7 in the expansion of $\left(2x^2 + \frac{1}{2x}\right)^{11}$ is equal to

- Options 1. $10^3 - 10$
2. $13^3 - 13$
3. $11^3 - 11$
4. $12^3 - 12$

Question Type : MCQ

Question ID : 7155054228

Option 1 ID : 71550513367

Option 2 ID : 71550513368

Option 3 ID : 71550513365

Option 4 ID : 71550513366

Status : Not Answered

Chosen Option : --

Q.10 Let a_n be the n^{th} term of the series $5 + 8 + 14 + 23 + 35 + 50 + \dots$ and $S_n = \sum_{k=1}^n a_k$. Then $S_{30} - a_{40}$ is equal to

- Options 1. 11310
2. 11260
3. 11280
4. 11290

Question Type : MCQ

Question ID : 7155054229

Option 1 ID : 71550513372

Option 2 ID : 71550513369

Option 3 ID : 71550513370

Option 4 ID : 71550513371

Status : Not Answered

Chosen Option : --

Q.11 For $a, b \in \mathbb{Z}$ and $|a - b| \leq 10$, let the angle between the plane $P: ax + y - z = b$ and the line $l: x - 1 = a - y = z + 1$ be $\cos^{-1}\left(\frac{1}{3}\right)$. If the distance of the point $(6, -6, 4)$ from the plane P is $3\sqrt{6}$, then $a^4 + b^2$ is equal to

- Options**
1. 48
 2. 25
 3. 85
 4. 32

Question Type : **MCQ**

Question ID : **7155054235**

Option 1 ID : **71550513395**

Option 2 ID : **71550513393**

Option 3 ID : **71550513396**

Option 4 ID : **71550513394**

Status : **Not Answered**

Chosen Option : --

Q.12 Let $A = \{1, 2, 3, 4, 5, 6, 7\}$. Then the relation $R = \{(x, y) \in A \times A : x + y = 7\}$ is

- Options**
1. transitive but neither symmetric nor reflexive
 2. reflexive but neither symmetric nor transitive
 3. symmetric but neither reflexive nor transitive
 4. an equivalence relation

Question Type : **MCQ**

Question ID : **7155054222**

Option 1 ID : **71550513343**

Option 2 ID : **71550513341**

Option 3 ID : **71550513342**

Option 4 ID : **71550513344**

Status : **Answered**

Chosen Option : 2

Q.13 If the probability that the random variable X takes values x is given by $P(X = x) = k(x+1)3^{-x}$, $x = 0, 1, 2, 3, \dots$, where k is a constant, then $P(X \geq 2)$ is equal to

- Options
1. $\frac{20}{27}$
 2. $\frac{7}{18}$
 3. $\frac{11}{18}$
 4. $\frac{7}{27}$

Question Type : **MCQ**

Question ID : **7155054238**

Option 1 ID : **71550513408**

Option 2 ID : **71550513405**

Option 3 ID : **71550513406**

Option 4 ID : **71550513407**

Status : **Not Answered**

Chosen Option : --

Q.14 The area of the quadrilateral ABCD with vertices A (2, 1, 1), B (1, 2, 5), C (-2, -3, 5) and D (1, -6, -7) is equal to

- Options
1. $8\sqrt{38}$
 2. 54
 3. $9\sqrt{38}$
 4. 48

Question Type : **MCQ**

Question ID : **7155054236**

Option 1 ID : **71550513398**

Option 2 ID : **71550513400**

Option 3 ID : **71550513399**

Option 4 ID : **71550513397**

Status : **Not Answered**

Chosen Option : --

Q.15 Let S be the set of all values of $\theta \in [-\pi, \pi]$ for which the system of linear equations

$$x + y + \sqrt{3}z = 0$$

$$-x + (\tan \theta)y + \sqrt{7}z = 0$$

$$x + y + (\tan \theta)z = 0$$

has non-trivial solution. Then $\frac{120}{\pi} \sum_{\theta \in S} \theta$ is equal to

Options 1. 40

2. 30

3. 10

4. 20

Question Type : MCQ

Question ID : 7155054224

Option 1 ID : 71550513352

Option 2 ID : 71550513351

Option 3 ID : 71550513349

Option 4 ID : 71550513350

Status : Not Answered

Chosen Option : --

Q.16 Let A (0, 1), B(1, 1) and C (1, 0) be the mid-points of the sides of a triangle with incentre at the point D. If the focus of the parabola $y^2 = 4ax$ passing through D is $(\alpha + \beta\sqrt{2}, 0)$, where α and β are rational numbers, then $\frac{\alpha}{\beta^2}$ is equal to

Options 1. 6

2. 12

3. 8

4. $\frac{9}{2}$

Question Type : MCQ

Question ID : 7155054233

Option 1 ID : 71550513386

Option 2 ID : 71550513388

Option 3 ID : 71550513387

Option 4 ID : 71550513385

Status : Not Answered

Chosen Option : --

Q.17 Let O be the origin and OP and OQ be the tangents to the circle $x^2 + y^2 - 6x + 4y + 8 = 0$ at the points P and Q on it. If the circumcircle of the triangle OPQ passes through the point $\left(\alpha, \frac{1}{2}\right)$, then a value of α is

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

Question Type : MCQ

Question ID : 7155054232

Option 1 ID : 71550513381

Option 2 ID : 71550513382

Option 3 ID : 71550513384

Option 4 ID : 71550513383

Status : Not Answered

Chosen Option : --

Q.18 If $A = \begin{bmatrix} 1 & 5 \\ \lambda & 10 \end{bmatrix}$, $A^{-1} = \alpha A + \beta I$ and $\alpha + \beta = -2$, then $4\alpha^2 + \beta^2 + \lambda^2$ is equal to :

- Options
1. 14
 2. 10
 3. 12
 4. 19

Question Type : MCQ

Question ID : 7155054225

Option 1 ID : 71550513355

Option 2 ID : 71550513353

Option 3 ID : 71550513354

Option 4 ID : 71550513356

Status : Not Answered

Chosen Option : --

Q.19 The negation of $(p \wedge (\sim q)) \vee (\sim p)$ is equivalent to

- Options
1. $p \vee (q \vee (\sim p))$
 2. $p \wedge (q \wedge (\sim p))$
 3. $p \wedge (\sim q)$
 4. $p \wedge q$

Question Type : MCQ

Question ID : 7155054241

Option 1 ID : 71550513417

Option 2 ID : 71550513420

Option 3 ID : 71550513419

Option 4 ID : 71550513418

Status : Answered

Chosen Option : 4

Q.20 If the number of words, with or without meaning, which can be made using all the letters of the word MATHEMATICS in which C and S do not come together, is $(6!)^k$, then k is equal to

- Options 1. 5670
2. 2835
3. 945
4. 1890

Question Type : MCQ

Question ID : 7155054226

Option 1 ID : 71550513360

Option 2 ID : 71550513359

Option 3 ID : 71550513357

Option 4 ID : 71550513358

Status : Answered

Chosen Option : 1

Section : Mathematics Section B

Q.21 If domain of the function $\log_e \left(\frac{6x^2 + 5x + 1}{2x - 1} \right) + \cos^{-1} \left(\frac{2x^2 - 3x + 4}{3x - 5} \right)$ is $(\alpha, \beta) \cup (\gamma, \delta]$, then $18(a^2 + \beta^2 + \gamma^2 + \delta^2)$ is equal to _____.

Given --

Answer :

Question Type : SA

Question ID : 7155054242

Status : Not Answered

Q.22 Let $R = \{a, b, c, d, e\}$ and $S = \{1, 2, 3, 4\}$. Total number of onto functions $f: R \rightarrow S$ such that $f(a) \neq 1$, is equal to _____.

Given 15

Answer :

Question Type : SA

Question ID : 7155054244

Status : Answered

Q.23 Let P_1 be the plane $3x - y - 7z = 11$ and P_2 be the plane passing through the points $(2, -1, 0)$, $(2, 0, -1)$, and $(5, 1, 1)$. If the foot of the perpendicular drawn from the point $(7, 4, -1)$ on the line of intersection of the planes P_1 and P_2 is (α, β, γ) , then $\alpha + \beta + \gamma$ is equal to _____.

Given --

Answer :

Question Type : SA

Question ID : 7155054251

Status : Not Answered

Q.24 Let the solution curve $x = x(y)$, $0 < y < \frac{\pi}{2}$, of the differential equation

$$(\log_e (\cos y))^2 \cos y \, dx - (1 + 3x \log_e (\cos y)) \sin y \, dy = 0 \text{ satisfy } x\left(\frac{\pi}{3}\right) = \frac{1}{2 \log_e 2}.$$

If $x\left(\frac{\pi}{6}\right) = \frac{1}{\log_e m - \log_e n}$, where m and n are coprime, then mn is equal to

Given --
Answer :

Question Type : SA
Question ID : 7155054249
Status : Not Answered

Q.25 The ordinates of the points P and Q on the parabola with focus (3, 0) and directrix $x = -3$ are in the ratio 3:1. If R (α , β) is the point of intersection of the tangents to the parabola at P and Q, then $\frac{\beta^2}{\alpha}$ is equal to _____:

Given --
Answer :

Question Type : SA
Question ID : 7155054250
Status : Not Answered

Q.26 Let $0 < z < y < x$ be three real numbers such that $\frac{1}{x}, \frac{1}{y}, \frac{1}{z}$ are in an arithmetic progression and $x, \sqrt{2}y, z$ are in a geometric progression. If $xy + yz + zx = \frac{3}{\sqrt{2}}xyz$, then $3(x + y + z)^2$ is equal to _____

Given 32
Answer :

Question Type : SA
Question ID : 7155054245
Status : Answered

Q.27 Let m and n be the numbers of real roots of the quadratic equations $x^2 - 12x + [x] + 31 = 0$ and $x^2 - 5|x + 2| - 4 = 0$ respectively, where $[x]$ denotes the greatest integer $\leq x$. Then $m^2 + mn + n^2$ is equal to _____.

Given 19
Answer :

Question Type : SA
Question ID : 7155054243
Status : Answered

Q.28 Let the area enclosed by the lines $x + y = 2$, $y = 0$, $x = 0$ and the curve $f(x) = \min\left\{x^2 + \frac{3}{4}, 1 + [x]\right\}$ where $[x]$ denotes the greatest integer $\leq x$, be A. Then the value of $12A$ is _____

Given --
Answer :

Question Type : SA
Question ID : 7155054248
Status : Not Answered

Q.29 Let $[t]$ denote the greatest integer function. If $\int_0^{2.4} [x^2] dx = \alpha + \beta\sqrt{2} + \gamma\sqrt{3} + \delta\sqrt{5}$, then $\alpha + \beta + \gamma + \delta$ is equal to _____.

Given **16**
Answer :

Question Type : **SA**

Question ID : **7155054247**

Status : **Marked For Review**

Q.30 Let k and m be positive real numbers such that the function

$f(x) = \begin{cases} 3x^2 + k\sqrt{x+1}, & 0 < x < 1 \\ mx^2 + k^2, & x \geq 1 \end{cases}$ is differentiable for all $x > 0$. Then $\frac{8f'(8)}{f'\left(\frac{1}{8}\right)}$ is equal to _____.

Given --
Answer :

Question Type : **SA**

Question ID : **7155054246**

Status : **Not Answered**

Section : **Physics Section A**

Q.31 The power radiated from a linear antenna of length l is proportional to

(Given, λ = Wavelength of wave):

Options

1. $\frac{l}{\lambda^2}$

2. $\left(\frac{l}{\lambda}\right)^2$

3. $\frac{l^2}{\lambda}$

4. $\frac{l}{\lambda}$

Question Type : **MCQ**

Question ID : **7155054263**

Option 1 ID : **71550513476**

Option 2 ID : **71550513477**

Option 3 ID : **71550513478**

Option 4 ID : **71550513475**

Status : **Not Answered**

Chosen Option : --

Q.32 Given below are two statements:

Statement I : Area under velocity- time graph gives the distance travelled by the body in a given time.

Statement II : Area under acceleration- time graph is equal to the change in velocity- in the given time.

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

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

Question Type : **MCQ**

Question ID : **7155054259**

Option 1 ID : **71550513461**

Option 2 ID : **71550513460**

Option 3 ID : **71550513462**

Option 4 ID : **71550513459**

Status : **Answered**

Chosen Option : **1**

Q.33 The width of fringe is 2 mm on the screen in a double slits experiment for the light of wavelength of 400 nm. The width of the fringe for the light of wavelength 600 nm will be:

- Options**
1. 4 mm
 2. 2 mm
 3. 1.33 mm
 4. 3 mm

Question Type : **MCQ**

Question ID : **7155054267**

Option 1 ID : **71550513493**

Option 2 ID : **71550513491**

Option 3 ID : **71550513494**

Option 4 ID : **71550513492**

Status : **Answered**

Chosen Option : **4**

Q.34 The trajectory of projectile, projected from the ground is given by $y = x - \frac{x^2}{20}$. Where x and y are measured in meter. The maximum height attained by the projectile will be.

- Options**
1. 10 m
 2. 200 m
 3. 5 m
 4. $10\sqrt{2}$ m

Question Type : **MCQ**

Question ID : **7155054260**

Option 1 ID : **71550513465**

Option 2 ID : **71550513466**

Option 3 ID : **71550513463**

Option 4 ID : **71550513464**

Status : **Answered**

Chosen Option : **3**

Q.35 A radio active material is reduced to $1/8$ of its original amount in 3 days.
If 8×10^{-3} kg of the material is left after 5 days the initial amount of the material is

- Options 1. 40 g
2. 32 g
3. 256 g
4. 64 g

Question Type : MCQ

Question ID : 7155054265

Option 1 ID : 71550513484

Option 2 ID : 71550513483

Option 3 ID : 71550513485

Option 4 ID : 71550513486

Status : Answered

Chosen Option : 3

Q.36 The temperature at which the kinetic energy of oxygen molecules becomes double than its value at 27°C is

- Options 1. 627°C
2. 327°C
3. 927°C
4. 1227°C

Question Type : MCQ

Question ID : 7155054254

Option 1 ID : 71550513440

Option 2 ID : 71550513439

Option 3 ID : 71550513441

Option 4 ID : 71550513442

Status : Answered

Chosen Option : 2

Q.37 A hydraulic automobile lift is designed to lift vehicles of mass 5000 kg. The area of cross section of the cylinder carrying the load is 250 cm^2 . The maximum pressure the smaller piston would have to bear is
[Assume $g = 10 \text{ m/s}^2$]:

- Options 1. $200 \times 10^{+6} \text{ Pa}$
2. $2 \times 10^{+6} \text{ Pa}$
3. $20 \times 10^{+6} \text{ Pa}$
4. $2 \times 10^{+5} \text{ Pa}$

Question Type : MCQ

Question ID : 7155054256

Option 1 ID : 71550513449

Option 2 ID : 71550513450

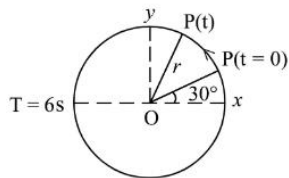
Option 3 ID : 71550513447

Option 4 ID : 71550513448

Status : Not Answered

Chosen Option : --

Q.38 For particle P revolving round the centre O with radius of circular path r and angular velocity ω , as shown in below figure, the projection of OP on the x-axis at time t is



Options

1. $x(t) = r \cos\left(\omega t - \frac{\pi}{6}\omega\right)$
2. $x(t) = r \cos(\omega t)$
3. $x(t) = r \cos\left(\omega t + \frac{\pi}{6}\right)$
4. $x(t) = r \sin\left(\omega t + \frac{\pi}{6}\right)$

Question Type : **MCQ**

Question ID : **7155054253**

Option 1 ID : **71550513436**

Option 2 ID : **71550513435**

Option 3 ID : **71550513437**

Option 4 ID : **71550513438**

Status : **Answered**

Chosen Option : **3**

Q.39 The acceleration due to gravity at height h above the earth if $h \ll R$ (Radius of earth) is given by

Options

1. $g' = g \left(1 - \frac{2h^2}{R^2}\right)$
2. $g' = g \left(1 - \frac{2h}{R}\right)$
3. $g' = g \left(1 - \frac{h}{2R}\right)$
4. $g' = g \left(1 - \frac{h^2}{2R^2}\right)$

Question Type : **MCQ**

Question ID : **7155054257**

Option 1 ID : **71550513454**

Option 2 ID : **71550513451**

Option 3 ID : **71550513452**

Option 4 ID : **71550513453**

Status : **Marked For Review**

Chosen Option : **2**

Q.40 Match List I with List II

LIST I		LIST II	
A.	Torque	I.	$ML^{-2}T^{-2}$
B.	Stress	II.	ML^2T^{-2}
C.	Pressure gradient	III.	$ML^{-1}T^{-1}$
D.	Coefficient of viscosity	IV.	$ML^{-1}T^{-2}$

Choose the correct answer from the options given below:

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

Question Type : MCQ

Question ID : 7155054252

Option 1 ID : 71550513432

Option 2 ID : 71550513431

Option 3 ID : 71550513434

Option 4 ID : 71550513433

Status : Answered

Chosen Option : 4

Q.41 Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R**

Assertion A : Electromagnets are made of soft iron.

Reason R : Soft iron has high permeability and low retentivity.

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

Options 1.

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

Question Type : MCQ

Question ID : 7155054270

Option 1 ID : 71550513504

Option 2 ID : 71550513506

Option 3 ID : 71550513505

Option 4 ID : 71550513503

Status : Answered

Chosen Option : 3

Q.42 In photo electric effect

- A. The photocurrent is proportional to the intensity of the incident radiation.
- B. Maximum Kinetic energy with which photoelectrons are emitted depends on the intensity of incident light.
- C. Max. K.E with which photoelectrons are emitted depends on the frequency of incident light.
- D. The emission of photoelectrons require a minimum threshold intensity of incident radiation.
- E. Max. K.E of the photoelectrons is independent of the frequency of the incident light.

Choose the correct answer from the options given below:

- Options 1. **A and B only**
2. A and C only
3. B and C only
4. A and E only

Question Type : **MCQ**

Question ID : **7155054266**

Option 1 ID : **71550513487**

Option 2 ID : **71550513489**

Option 3 ID : **71550513488**

Option 4 ID : **71550513490**

Status : **Answered**

Chosen Option : **2**

Q.43 An emf of 0.08 V is induced in a metal rod of length 10 cm held normal to a uniform magnetic field of 0.4 T, when moves with a velocity of:

- Options 1. **3.2 ms^{-1}**
2. 0.5 ms^{-1}
3. 20 ms^{-1}
4. 2 ms^{-1}

Question Type : **MCQ**

Question ID : **7155054269**

Option 1 ID : **71550513502**

Option 2 ID : **71550513501**

Option 3 ID : **71550513499**

Option 4 ID : **71550513500**

Status : **Answered**

Chosen Option : **1**

Q.44 The orbital angular momentum of a satellite is L, when it is revolving in a circular orbit at height h from earth surface. If the distance of satellite from the earth centre is increased by eight times to its initial value, then the new angular momentum will be-

- Options 1. **4L**
2. 9L
3. 8L
4. 3L

Question Type : **MCQ**

Question ID : **7155054258**

Option 1 ID : **71550513456**

Option 2 ID : **71550513458**

Option 3 ID : **71550513457**

Option 4 ID : **71550513455**

Status : **Answered**

Chosen Option : **3**

Q.45 The waves emitted when a metal target is bombarded with high energy electrons are

- Options
1. Infrared rays
 2. Microwaves
 3. X-rays
 4. Radio Waves

Question Type : MCQ

Question ID : 7155054268

Option 1 ID : 71550513496

Option 2 ID : 71550513497

Option 3 ID : 71550513498

Option 4 ID : 71550513495

Status : Answered

Chosen Option : 3

Q.46 Work done by a Carnot engine operating between temperatures 127°C and 27°C is 2 kJ. The amount of heat transferred to the engine by the reservoir is :

- Options
1. 4 kJ
 2. 8 kJ
 3. 2 kJ
 4. 2.67 kJ

Question Type : MCQ

Question ID : 7155054255

Option 1 ID : 71550513446

Option 2 ID : 71550513445

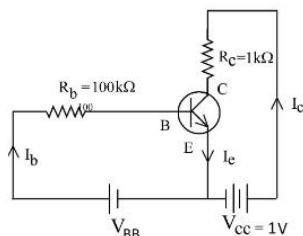
Option 3 ID : 71550513443

Option 4 ID : 71550513444

Status : Answered

Chosen Option : 3

Q.47 For a given transistor amplifier circuit in CE configuration $V_{CC} = 1\text{ V}$, $R_C = 1\text{ k}\Omega$, $R_B = 100\text{ k}\Omega$ and $\beta = 100$.
Value of base current I_b is



- Options
1. $I_b = 100\text{ }\mu\text{A}$
 2. $I_b = 0.1\text{ }\mu\text{A}$
 3. $I_b = 1.0\text{ }\mu\text{A}$
 4. $I_b = 10\text{ }\mu\text{A}$

Question Type : **MCQ**

Question ID : **7155054264**

Option 1 ID : **71550513482**

Option 2 ID : **71550513479**

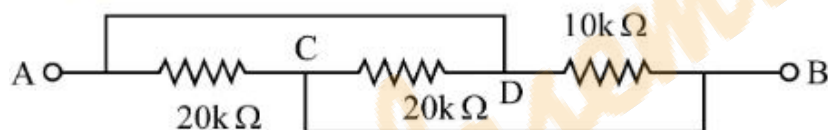
Option 3 ID : **71550513481**

Option 4 ID : **71550513480**

Status : **Not Answered**

Chosen Option : --

Q.48 The equivalent resistance between A and B as shown in figure is:



- Options
1. $5\text{ k}\Omega$
 2. $20\text{ k}\Omega$
 3. $10\text{ k}\Omega$
 4. $30\text{ k}\Omega$

Question Type : **MCQ**

Question ID : **7155054271**

Option 1 ID : **71550513507**

Option 2 ID : **71550513509**

Option 3 ID : **71550513508**

Option 4 ID : **71550513510**

Status : **Answered**

Chosen Option : **1**

Q.49 A bullet of mass 0.1 kg moving horizontally with speed 400 ms^{-1} hits a wooden block of mass 3.9 kg kept on a horizontal rough surface. The bullet gets embedded into the block and moves 20 m before coming to rest. The coefficient of friction between the block and the surface is _____.

(Given $g = 10 \text{ m/s}^2$)

- Options
1. 0.65
 2. 0.90
 3. 0.50
 4. 0.25

Question Type : **MCQ**

Question ID : **7155054261**

Option 1 ID : **71550513469**

Option 2 ID : **71550513470**

Option 3 ID : **71550513468**

Option 4 ID : **71550513467**

Status : **Answered**

Chosen Option : **4**

Q.50 Electric potential at a point 'P' due to a point charge of $5 \times 10^{-9} \text{ C}$ is 50 V. The distance of 'P' from the point charge is:

(Assume, $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ Nm}^2\text{C}^{-2}$)

- Options
1. 90 cm
 2. 9 cm
 3. 0.9 cm
 4. 3 cm

Question Type : **MCQ**

Question ID : **7155054262**

Option 1 ID : **71550513471**

Option 2 ID : **71550513473**

Option 3 ID : **71550513474**

Option 4 ID : **71550513472**

Status : **Answered**

Chosen Option : **1**

Section : Physics Section B

Q.51 A steel rod of length 1 m and cross sectional area 10^{-4} m^2 is heated from 0°C to 200°C without being allowed to extend or bend. The compressive tension produced in the rod is _____ $\times 10^4 \text{ N}$. (Given Young's modulus of steel = $2 \times 10^{11} \text{ Nm}^{-2}$, coefficient of linear expansion = 10^{-5} K^{-1})

Given --

Answer :

Question Type : **SA**

Question ID : **7155054273**

Status : **Not Answered**

Q.52 The ratio of wavelength of spectral lines H_α and H_β in the Balmer series is $\frac{x}{20}$. The value of x is _____

Given --
Answer :

Question Type : SA
Question ID : 7155054277
Status : Not Answered

Q.53 The ratio of magnetic field at the centre of a current carrying coil of radius r to the magnetic field at distance r from the centre of coil on its axis is $\sqrt{x}:1$. The value of x is _____

Given --
Answer :

Question Type : SA
Question ID : 7155054280
Status : Not Answered

Q.54 A series combination of resistor of resistance $100\ \Omega$, inductor of inductance $1\ \text{H}$ and capacitor of capacitance $6.25\ \mu\text{F}$ is connected to an ac source. The quality factor of the circuit will be _____

Given --
Answer :

Question Type : SA
Question ID : 7155054279
Status : Not Answered

Q.55 Two transparent media having refractive indices 1.0 and 1.5 are separated by a spherical refracting surface of radius of curvature $30\ \text{cm}$. The centre of curvature of surface is towards denser medium and a point object is placed on the principle axis in rarer medium at a distance of $15\ \text{cm}$ from the pole of the surface. The distance of image from the pole of the surface is _____ cm.

Given --
Answer :

Question Type : SA
Question ID : 7155054278
Status : Not Answered

Q.56 A body of mass $5\ \text{kg}$ is moving with a momentum of $10\ \text{kg ms}^{-1}$. Now a force of $2\ \text{N}$ acts on the body in the direction of its motion for $5\ \text{s}$. The increase in the Kinetic energy of the body is _____ J.

Given 30
Answer :

Question Type : SA
Question ID : 7155054275
Status : Answered

Q.57 The number density of free electrons in copper is nearly $8 \times 10^{28} \text{ m}^{-3}$. A copper wire has its area of cross section $= 2 \times 10^{-6} \text{ m}^2$ and is carrying a current of 3.2 A. The drift speed of the electrons is _____ $\times 10^{-6} \text{ ms}^{-1}$

Given --
Answer :

Question Type : SA
Question ID : 7155054281
Status : Not Answered

Q.58 A 600 pF capacitor is charged by 200 V supply. It is then disconnected from the supply and is connected to another uncharged 600 pF capacitor. Electrostatic energy lost in the process is _____ μJ

Given --
Answer :

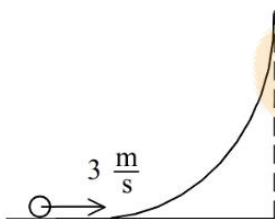
Question Type : SA
Question ID : 7155054276
Status : Not Answered

Q.59 A guitar string of length 90 cm vibrates with a fundamental frequency of 120 Hz. The length of the string producing a fundamental frequency of 180 Hz will be _____ cm.

Given 60
Answer :

Question Type : SA
Question ID : 7155054272
Status : Answered

Q.60 A hollow spherical ball of uniform density rolls up a curved surface with an initial velocity 3 m/s (as shown in figure). Maximum height with respect to the initial position covered by it will be _____ cm (take, $g = 10 \text{ m/s}^2$)



Given 45
Answer :

Question Type : SA
Question ID : 7155054274
Status : Answered

Q.61 Which of the following have same number of significant figures?

- A. 0.00253
- B. 1.0003
- C. 15.0
- D. 163

Choose the correct answer from the options given below

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

Question Type : MCQ

Question ID : 7155054282

Option 1 ID : 71550513522

Option 2 ID : 71550513524

Option 3 ID : 71550513521

Option 4 ID : 71550513523

Status : Answered

Chosen Option : 1

Q.62 A compound 'X' when treated with phthalic anhydride in presence of concentrated H_2SO_4 yields 'Y'. 'Y' is used as an acid/base indicator. 'X' and 'Y' are respectively

- Options
- 1. Anisole, methyl orange
 - 2. Carboic acid, Phenolphthalein
 - 3. Salicylaldehyde, Phenolphthalein
 - 4. Toluidine, Phenolphthalein

Question Type : MCQ

Question ID : 7155054296

Option 1 ID : 71550513577

Option 2 ID : 71550513580

Option 3 ID : 71550513579

Option 4 ID : 71550513578

Status : Not Answered

Chosen Option : --

Q.63 In Hall - Heroult process, the following is used for reducing Al_2O_3 :-

- Options
- 1. Magnesium
 - 2. Graphite
 - 3. CaF_2
 - 4. Na_3AlF_6

Question Type : MCQ

Question ID : 7155054286

Option 1 ID : 71550513539

Option 2 ID : 71550513538

Option 3 ID : 71550513540

Option 4 ID : 71550513537

Status : Not Answered

Chosen Option : --

Q.64 Match List I with List II

LIST I		LIST II	
Coordination Complex		Number of unpaired electrons	
A.	$[\text{Cr}(\text{CN})_6]^{3-}$	I.	0
B.	$[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$	II.	3
C.	$[\text{Co}(\text{NH}_3)_6]^{3+}$	III.	2
D.	$[\text{Ni}(\text{NH}_3)_6]^{2+}$	IV.	4

Choose the correct answer from the options given below:

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

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

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

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

Question Type : MCQ

Question ID : 7155054290

Option 1 ID : 71550513553

Option 2 ID : 71550513556

Option 3 ID : 71550513555

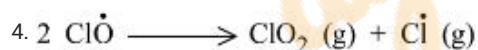
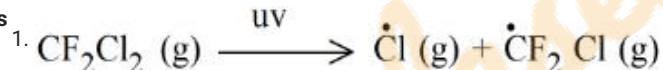
Option 4 ID : 71550513554

Status : Answered

Chosen Option : 3

Q.65 Which of these reactions is **not** a part of breakdown of ozone in stratosphere?

Options



Question Type : MCQ

Question ID : 7155054291

Option 1 ID : 71550513557

Option 2 ID : 71550513559

Option 3 ID : 71550513558

Option 4 ID : 71550513560

Status : Answered

Chosen Option : 2

Q.66 Given below are two statements:

Statement I : Methyl orange is a weak acid.

Statement II : The benzenoid form of methyl orange is more intense/deeply coloured than the quinonoid form.

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

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

Question Type : **MCQ**

Question ID : **7155054300**

Option 1 ID : **71550513594**

Option 2 ID : **71550513593**

Option 3 ID : **71550513595**

Option 4 ID : **71550513596**

Status : **Not Answered**

Chosen Option : --

Q.67 Which of the following can reduce decomposition of H_2O_2 on exposure to light

- Options
1. **Alkali**
 2. Dust
 3. Glass containers
 4. Urea

Question Type : **MCQ**

Question ID : **7155054287**

Option 1 ID : **71550513541**

Option 2 ID : **71550513543**

Option 3 ID : **71550513544**

Option 4 ID : **71550513542**

Status : **Marked For Review**

Chosen Option : **1**

Q.68 The statement/s which are true about antagonists from the following is/are:

- A. They bind to the receptor site.
- B. Get transferred inside the cell for their action.
- C. Inhibit the natural communication of the body.
- D. Mimic the natural messenger.

Choose the correct answer from the options given below:

Options 1. A, C and D

- 2. A and B
- 3. A and C
- 4. B only

Question Type : MCQ

Question ID : 7155054298

Option 1 ID : 71550513586

Option 2 ID : 71550513585

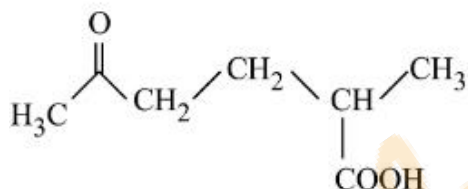
Option 3 ID : 71550513588

Option 4 ID : 71550513587

Status : Answered

Chosen Option : 1

Q.69 The correct IUPAC nomenclature for the following compound is:



Options 1. 5-Formyl -2-methylhexanoic acid

- 2. 2 - Formyl -5-methylhexan-6-oic acid
- 3. 2-Methyl-5-oxohexanoic acid
- 4. 5-Methyl-2-oxohexan-6-oic acid

Question Type : MCQ

Question ID : 7155054293

Option 1 ID : 71550513566

Option 2 ID : 71550513565

Option 3 ID : 71550513568

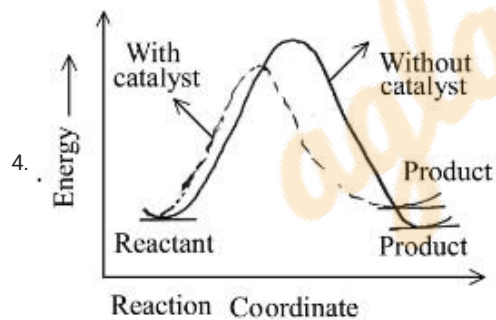
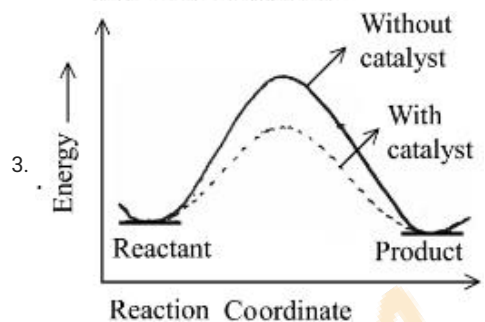
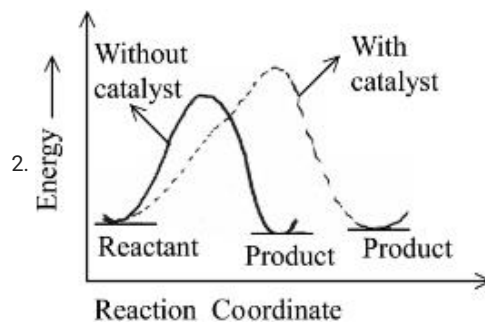
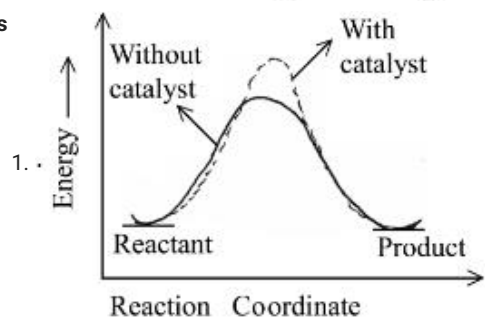
Option 4 ID : 71550513567

Status : Answered

Chosen Option : 3

Q.70 The correct reaction profile diagram for a positive catalyst reaction.

Options



Question Type : MCQ

Question ID : 7155054284

Option 1 ID : 71550513530

Option 2 ID : 71550513529

Option 3 ID : 71550513531

Option 4 ID : 71550513532

Status : Answered

Chosen Option : 3

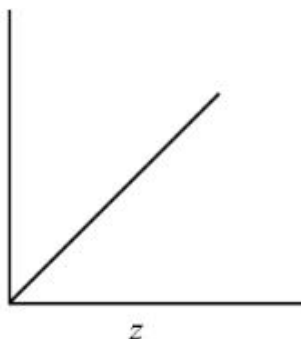
Q.71 Henry Moseley studied characteristic X-ray spectra of elements. The graph which represents his observation correctly is

Given ν = frequency of X-ray emitted

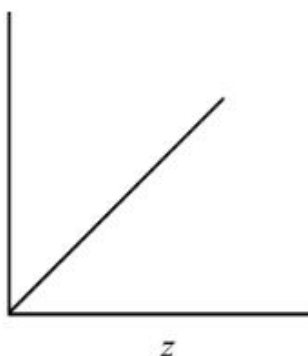
Z = atomic number

Options

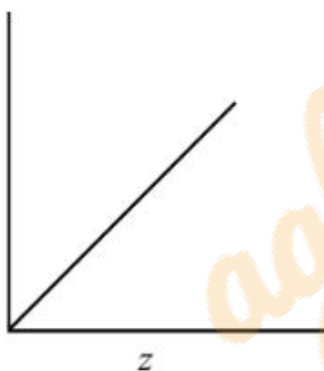
1. $\sqrt{\nu}$



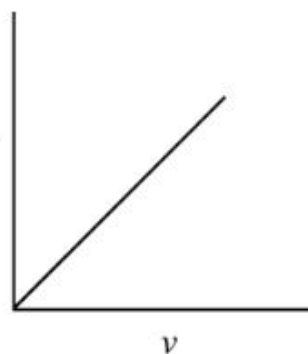
2. ν^2



3. ν



4. $\sqrt{Z}$



Question Type : **MCQ**

Question ID : **7155054285**

Option 1 ID : **71550513533**

Option 2 ID : **71550513536**

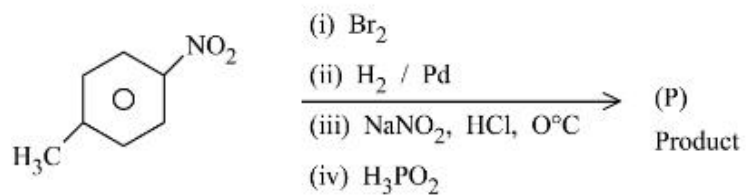
Option 3 ID : **71550513535**

Option 4 ID : **71550513534**

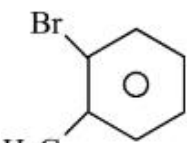
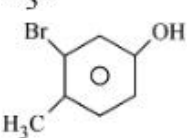
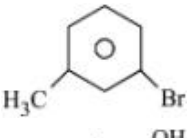
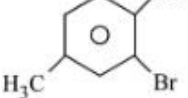
Status : **Marked For Review**

Chosen Option : **1**

Q.72 The product (P) formed from the following multistep reaction is:



Options

1. 
2. 
3. 
4. 

Question Type : MCQ

Question ID : 7155054297

Option 1 ID : 71550513581

Option 2 ID : 71550513584

Option 3 ID : 71550513582

Option 4 ID : 71550513583

Status : Not Answered

Chosen Option : --

Q.73 The descending order of acidity for the following carboxylic acid is-

- A. CH_3COOH
- B. $\text{F}_3\text{C}-\text{COOH}$
- C. $\text{ClCH}_2-\text{COOH}$
- D. FCH_2-COOH
- E. $\text{BrCH}_2-\text{COOH}$

Choose the correct answer from the options given below:

- Options
1. $\text{B} > \text{D} > \text{C} > \text{E} > \text{A}$
 2. $\text{B} > \text{C} > \text{D} > \text{E} > \text{A}$
 3. $\text{D} > \text{B} > \text{A} > \text{E} > \text{C}$
 4. $\text{E} > \text{D} > \text{B} > \text{A} > \text{C}$

Question Type : MCQ

Question ID : 7155054295

Option 1 ID : 71550513576

Option 2 ID : 71550513574

Option 3 ID : 71550513575

Option 4 ID : 71550513573

Status : Answered

Chosen Option : 1

Q.74 For a good quality cement, the ratio of lime to the total of the oxides of Si, Al and Fe should be as close as to

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

Question Type : MCQ

Question ID : 7155054289

Option 1 ID : 71550513550

Option 2 ID : 71550513551

Option 3 ID : 71550513552

Option 4 ID : 71550513549

Status : Not Attempted and
Marked For Review

Chosen Option : --

Q.75 Arrange the following gases in increasing order of van der Waals constant 'a'

- A. Ar
- B. CH₄
- C. H₂O
- D. C₆H₆

Choose the correct option from the following.

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

Question Type : MCQ

Question ID : 7155054283

Option 1 ID : 71550513528

Option 2 ID : 71550513525

Option 3 ID : 71550513526

Option 4 ID : 71550513527

Status : Marked For Review

Chosen Option : 3

Q.76 Given below are two statements:

Statement I : In redox titration, the indicators used are sensitive to change in pH of the solution.

Statement II : In acid-base titration, the indicators used are sensitive to change in oxidation potential.

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

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

Question Type : MCQ

Question ID : 7155054301

Option 1 ID : 71550513598

Option 2 ID : 71550513599

Option 3 ID : 71550513597

Option 4 ID : 71550513600

Status : Not Answered

Chosen Option : --

Q.77 Given below are two statements: One is labelled as **Assertion A** and the other is labelled as **Reason R**

Assertion A : Sodium is about 30 times as abundant as potassium in the oceans.

Reason R : Potassium is bigger in size than sodium.

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

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

Question Type : **MCQ**

Question ID : **7155054288**

Option 1 ID : **71550513546**

Option 2 ID : **71550513547**

Option 3 ID : **71550513548**

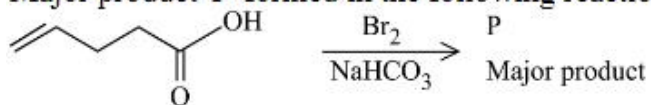
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Status : **Answered**

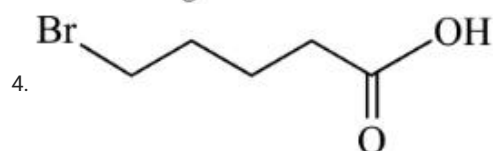
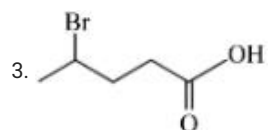
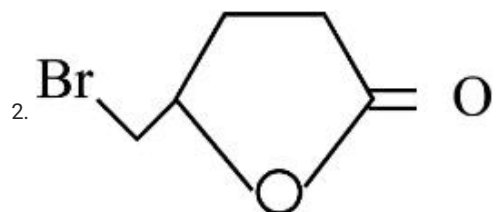
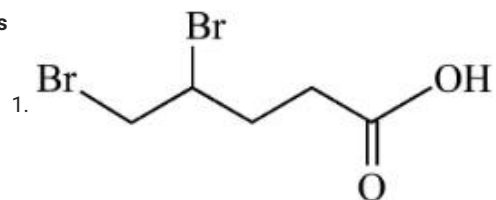
Chosen Option : **1**

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Q.78 Major product 'P' formed in the following reaction is:



Options



Question Type : MCQ

Question ID : 7155054292

Option 1 ID : 71550513563

Option 2 ID : 71550513564

Option 3 ID : 71550513562

Option 4 ID : 71550513561

Status : Answered

Chosen Option : 2

Q.79 Match List I with List II

LIST I Natural amino acid		LIST II One letter code	
A.	Glutamic acid	I.	Q
B.	Glutamine	II.	W
C.	Tyrosine	III.	E
D.	Tryptophan	IV.	Y

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

Question Type : MCQ

Question ID : 7155054299

Option 1 ID : 71550513591

Option 2 ID : 71550513589

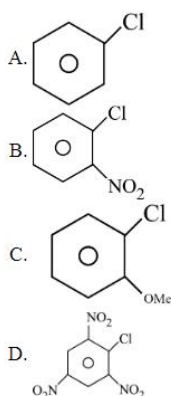
Option 3 ID : 71550513592

Option 4 ID : 71550513590

Status : Marked For Review

Chosen Option : 2

Q.80 The correct order of reactivity of following haloarenes towards nucleophilic substitution with aqueous NaOH is :



Choose the correct answer from the options given below:

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

Question Type : MCQ

Question ID : 7155054294

Option 1 ID : 71550513570

Option 2 ID : 71550513569

Option 3 ID : 71550513572

Option 4 ID : 71550513571

Status : Marked For Review

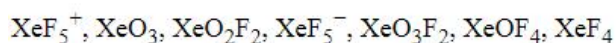
Chosen Option : 4

Q.81 The observed magnetic moment of the complex $[\text{Mn}(\text{NCS})_6]^{x-}$ is 6.06 BM. The numerical value of x is _____.

Given --
Answer :

Question Type : SA
Question ID : 7155054311
Status : Not Answered

Q.82 The number of species from the following carrying a single lone pair on central atom Xenon is _____.



Given 4
Answer :

Question Type : SA
Question ID : 7155054303
Status : Answered

Q.83 The ratio of sigma and π bonds present in pyrophosphoric acid is _____.

Given --
Answer :

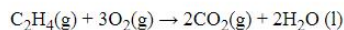
Question Type : SA
Question ID : 7155054309
Status : Not Answered

Q.84 The sum of oxidation state of the metals in $\text{Fe}(\text{CO})_5$, VO^{2+} and WO_3 is _____.

Given 15
Answer :

Question Type : SA
Question ID : 7155054310
Status : Answered

Q.85 For complete combustion of ethene,



the amount of heat produced as measured in bomb calorimeter is 1406 kJ mol^{-1} at 300K. The minimum value of $T\Delta S$ needed to reach equilibrium is (-) _____ kJ.(Nearest integer)

Given : $R=8.3 \text{ J K}^{-1} \text{ mol}^{-1}$

Given 1412
Answer :

Question Type : SA
Question ID : 7155054304
Status : Answered

Q.86 If the boiling points of two solvents X and Y (having same molecular weights) are in the ratio 2:1 and their enthalpy of vaporizations are in the ratio 1:2, then the boiling point elevation constant of X is m times the boiling point elevation constant of Y. The value of m is _____ (nearest integer).

Given --
Answer :

Question Type : SA
Question ID : 7155054305
Status : Not Answered

Q.87 The solubility product of BaSO_4 is 1×10^{-10} at 298K. The solubility of BaSO_4 in 0.1 M K_2SO_4 (aq) solution is _____ $\times 10^{-9}$ g L^{-1} (nearest integer).

Given: Molar mass of BaSO_4 is 233 g mol^{-1}

Given --
Answer :

Question Type : SA
Question ID : 7155054306
Status : Not Answered

Q.88 The number of atomic orbitals from the following having 5 radial nodes is _____.

7s, 7p, 6s, 8p, 8d

Given 1
Answer :

Question Type : SA
Question ID : 7155054302
Status : Marked For Review

Q.89 The number of incorrect statements from the following is _____

A. The electrical work that a reaction can perform at constant pressure and temperature is equal to the reaction Gibbs energy.

B. E°_{cell} is dependent on the pressure.

C. $\frac{dE^\circ_{\text{cell}}}{dT} = \frac{\Delta_r S^\circ}{nF}$

D. A cell is operating reversibly if the cell potential is exactly balanced by an opposing source of potential difference.

Given --
Answer :

Question Type : SA
Question ID : 7155054307
Status : Not Answered

Q.90 Coagulating value of the electrolytes AlCl_3 and NaCl for As_2S_3 are 0.09 and 50.04 respectively. The coagulating power of AlCl_3 is x times the coagulating power of NaCl . The value of x is _____.

Given **556**

Answer :

Question Type : **SA**

Question ID : **7155054308**

Status : **Answered**

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