NTA JEE Mains Jan 2026

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Subject	B. Tech

Section : **Mathematics Section A**

Q.1 Let $\sum_{k=1}^{n} a_k = \alpha n^2 + \beta n$. If $a_{10} = 59$ and $a_6 = 7a_1$, then $\alpha + \beta$ is equal to

Options
1. 3
2. 5
3. 7
4. 12

Question Type : **MCQ**
Question ID : **444792456**
Option 1 ID : **4447921551**
Option 2 ID : **4447921552**
Option 3 ID : **4447921553**
Option 4 ID : **4447921554**
Status : **Answered**
Chosen Option : **2**

Q.2 Let $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$, $\vec{b} = 2\hat{i} + \hat{j} - \hat{k}$, $\vec{c} = \lambda\hat{i} + \hat{j} + \hat{k}$ and $\vec{v} = \vec{a} \times \vec{b}$. If $\vec{v} \cdot \vec{c} = 11$ and the length of the projection of $\vec{b}$ on $\vec{c}$ is p, then $9p^2$ is equal to

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

Question Type : **MCQ**
Question ID : **444792465**
Option 1 ID : **4447921590**
Option 2 ID : **4447921588**
Option 3 ID : **4447921589**
Option 4 ID : **4447921587**
Status : **Answered**
Chosen Option : **1**

Q.3 The system of linear equations

$x + y + z = 6$

$2x + 5y + az = 36$

$x + 2y + 3z = b$

has

Options
1. unique solution for $a = 8$ and $b = 16$
2. unique solution for $a = 8$ and $b = 14$
3. infinitely many solutions for $a = 8$ and $b = 14$
4. infinitely many solutions for $a = 8$ and $b = 16$

Question Type : **MCQ**
Question ID : **444792455**
Option 1 ID : **4447921548**
Option 2 ID : **4447921547**
Option 3 ID : **4447921549**
Option 4 ID : **4447921550**
Status : **Answered**
Chosen Option : **3**

Q.4 The least value of $(\cos^2\theta - 6\sin\theta\cos\theta + 3\sin^2\theta + 2)$ is

Options
1. 1
2. $4+\sqrt{10}$
3. -1
4. $4-\sqrt{10}$

Question Type : **MCQ**
Question ID : **444792468**
Option 1 ID : **4447921602**
Option 2 ID : **4447921599**
Option 3 ID : **4447921601**
Option 4 ID : **4447921600**
Status : **Answered**
Chosen Option : **4**

Q.5 If the mean and the variance of the data

Class	4–8	8–12	12–16	16–20
Frequency	3	λ	4	7

are μ and 19 respectively, then the value of λ + μ is

Options
1. 19
2. 21
3. 20
4. 18

Question Type : **MCQ**
Question ID : **444792459**
Option 1 ID : **4447921564**
Option 2 ID : **4447921566**
Option 3 ID : **4447921565**
Option 4 ID : **4447921563**
Status : **Answered**
Chosen Option : **1**

Q.6 Let A = {0,1,2,...,9}. Let R be a relation on A defined by $(x, y) \in R$ if and only if $|x - y|$ is a multiple of 3.

Given below are two statements:

Statement I: $n(R) = 36$.

Statement II: R is an equivalence relation.

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

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

Question Type : **MCQ**
Question ID : **444792451**
Option 1 ID : **4447921533**
Option 2 ID : **4447921534**
Option 3 ID : **4447921532**
Option 4 ID : **4447921531**
Status : **Answered**
Chosen Option : **2**

Q.7 The number of ways, in which 16 oranges can be distributed to four children such that each child gets at least one orange, is

Options

1. 429
2. 384
3. 403
4. 455

Question Type : **MCQ**
Question ID : **444792457**
Option 1 ID : **4447921558**
Option 2 ID : **4447921555**
Option 3 ID : **4447921556**
Option 4 ID : **4447921557**
Status : **Answered**
Chosen Option : **4**

Q.8 The area of the region enclosed between the circles $x^2 + y^2 = 4$ and $x^2 + (y-2)^2 = 4$ is:

Options

1. $\frac{4}{3}\left(2\pi - \sqrt{3}\right)$
2. $\frac{2}{3}\left(2\pi - 3\sqrt{3}\right)$
3. $\frac{4}{3}\left(2\pi - 3\sqrt{3}\right)$
4. $\frac{2}{3}\left(4\pi - 3\sqrt{3}\right)$

Question Type : **MCQ**
Question ID : **444792470**
Option 1 ID : **4447921610**
Option 2 ID : **4447921609**
Option 3 ID : **4447921607**
Option 4 ID : **4447921608**
Status : **Not Answered**
Chosen Option : **--**

Q.9 Bag A contains 9 white and 8 black balls, while bag B contains 6 white and 4 black balls. One ball is randomly picked up from the bag B and mixed up with the balls in the bag A. Then a ball is randomly drawn from the bag A. If the probability, that the ball drawn is white, is $\frac{p}{q}$, $gcd\,(p, q) = 1$, then p + q is equal to

Options

1. 21
2. 22
3. 24
4. 23

Question Type : **MCQ**
Question ID : **444792458**
Option 1 ID : **4447921561**
Option 2 ID : **4447921560**
Option 3 ID : **4447921562**
Option 4 ID : **4447921559**
Status : **Answered**
Chosen Option : **4**

Q.10 Let $\frac{\pi}{2} < \theta < \pi$ and $\cot\theta = -\frac{1}{2\sqrt{2}}$. Then the value of

$$\sin\left(\frac{15\theta}{2}\right)(\cos 8\theta + \sin 8\theta) + \cos\left(\frac{15\theta}{2}\right)(\cos 8\theta - \sin 8\theta)$$

is equal to

Options

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

Question Type : **MCQ**
Question ID : **444792464**
Option 1 ID : **4447921583**
Option 2 ID : **4447921586**
Option 3 ID : **4447921585**
Option 4 ID : **4447921584**
Status : **Answered**
Chosen Option : **4**

Q.11

If $f(x)=\begin{cases}\dfrac{a|x|+x^2-2(\sin|x|)(\cos|x|)}{x} & , x\neq 0\\ b & , x=0\end{cases}$

is continuous at $x = 0$, then $a + b$ is equal to

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

Question Type : **MCQ**
Question ID : **444792467**
Option 1 ID : **4447921595**
Option 2 ID : **4447921596**
Option 3 ID : **4447921597**
Option 4 ID : **4447921598**
Status : **Answered**
Chosen Option : **3**

Q.12 Consider two sets $A=\{x\in\mathbb{Z}:|(|x-3|-3)|\le 1\}$ and

$B=\left\{x\in\mathbb{R}-\{1,2\}:\dfrac{(x-2)(x-4)}{x-1}\log_e(|x-2|)=0\right\}$. Then the number of onto functions $f: A\to B$ is equal to

Options
1. 81
2. 79
3. 62
4. 32

Question Type : **MCQ**
Question ID : **444792452**
Option 1 ID : **4447921538**
Option 2 ID : **4447921537**
Option 3 ID : **4447921536**
Option 4 ID : **4447921535**
Status : **Not Answered**
Chosen Option : **--**

Q.13 Let $\vec{a}, \vec{b}, \vec{c}$ be three vectors such that $\vec{a} \times \vec{b} = 2(\vec{a} \times \vec{c})$. If $|\vec{a}| = 1, |\vec{b}| = 4, |\vec{c}| = 2$, and the angle between $\vec{b}$ and $\vec{c}$ is 60°, then $|\vec{a} \cdot \vec{c}|$ is equal to

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

Question Type : **MCQ**
Question ID : **444792466**
Option 1 ID : **4447921592**
Option 2 ID : **4447921591**
Option 3 ID : **4447921593**
Option 4 ID : **4447921594**
Status : **Answered**
Chosen Option : **1**

Q.14 The sum of all the real solutions of the equation $\log_{(x+3)}\left(6x^2 + 28x + 30\right) = 5 - 2\log_{(6x+10)}\left(x^2 + 6x + 9\right)$ is equal to

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

Question Type : **MCQ**
Question ID : **444792453**
Option 1 ID : **4447921542**
Option 2 ID : **4447921541**
Option 3 ID : **4447921540**
Option 4 ID : **4447921539**
Status : **Answered**
Chosen Option : **4**

Q.15 An equilateral triangle OAB is inscribed in the parabola $y^2 = 4x$ with the vertex O at the vertex of the parabola. Then the minimum distance of the circle having AB as a diameter from the origin is

Options

1. $4\left(6+\sqrt{3}\right)$
2. $2\left(8-3\sqrt{3}\right)$
3. $2\left(3+\sqrt{3}\right)$
4. $4\left(3-\sqrt{3}\right)$

Question Type : **MCQ**
Question ID : **444792461**
Option 1 ID : **4447921572**
Option 2 ID : **4447921571**
Option 3 ID : **4447921573**
Option 4 ID : **4447921574**
Status : **Answered**
Chosen Option : **4**

Q.16 Let $I(x)=\int \frac{3dx}{(4x+6)\left(\sqrt{4x^2+8x+3}\right)}$ and $I(0)=\frac{\sqrt{3}}{4}+20$. If

$I\left(\frac{1}{2}\right)=\frac{a\sqrt{2}}{b}+c$, where $a, b, c \in N$, $\gcd(a, b) = 1$, then $a + b + c$ is equal to

Options

1. 31
2. 28
3. 30
4. 29

Question Type : **MCQ**
Question ID : **444792469**
Option 1 ID : **4447921606**
Option 2 ID : **4447921603**
Option 3 ID : **4447921605**
Option 4 ID : **4447921604**
Status : **Answered**
Chosen Option : **1**

Q.17 If the points of intersection of the ellipses $x^2 + 2y^2 - 6x - 12y + 23 = 0$ and $4x^2 + 2y^2 - 20x - 12y + 35 = 0$ lie on a circle of radius r and centre (a, b), then the value of $ab + 18r^2$ is

Options
1. 51
2. 52
3. 53
4. 55

Question Type : **MCQ**
Question ID : **444792460**
Option 1 ID : **4447921567**
Option 2 ID : **4447921570**
Option 3 ID : **4447921569**
Option 4 ID : **4447921568**
Status : **Not Answered**
Chosen Option : **--**

Q.18 Let A(1, 2) and C(−3, −6) be two diagonally opposite vertices of a rhombus, whose sides AD and BC are parallel to the line $7x - y = 14$. If B (α, β) and D (γ, δ) are the other two vertices, then $|\alpha + \beta + \gamma + \delta|$ is equal to

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

Question Type : **MCQ**
Question ID : **444792463**
Option 1 ID : **4447921579**
Option 2 ID : **4447921580**
Option 3 ID : **4447921582**
Option 4 ID : **4447921581**
Status : **Answered**
Chosen Option : **4**

Q.19

Let PQ be a chord of the hyperbola $\frac{x^2}{4}-\frac{y^2}{b^2}=1$, perpendicular to the x-axis such that OPQ is an equilateral triangle, O being the centre of the hyperbola. If the eccentricity of the hyperbola is $\sqrt{3}$, then the area of the triangle OPQ is

Options

1. $\frac{8\sqrt{3}}{5}$
2. $\frac{11}{5}$
3. $\frac{9}{5}$
4. $2\sqrt{3}$

Question Type : **MCQ**
Question ID : **444792462**
Option 1 ID : **4447921575**
Option 2 ID : **4447921578**
Option 3 ID : **4447921577**
Option 4 ID : **4447921576**
Status : **Answered**
Chosen Option : **1**

Q.20

If $z=\frac{\sqrt{3}}{2}+\frac{i}{2}, i=\sqrt{-1}$, then $(z^{201}-i)^8$ is equal to

Options

1. 1
2. 256
3. 0
4. -1

Question Type : **MCQ**
Question ID : **444792454**
Option 1 ID : **4447921545**
Option 2 ID : **4447921546**
Option 3 ID : **4447921543**
Option 4 ID : **4447921544**
Status : **Answered**
Chosen Option : **2**

Section : **Mathematics Section B**

Q.21 Let S denote the set of 4-digit numbers $abcd$ such that $a > b > c > d$ and P denote the set of 5-digit numbers having product of its digits equal to 20. Then $n(S) + n(P)$ is equal to ____

Given **260**
Answer :

Question Type : **SA**
Question ID : **444792472**
Status : **Answered**

Q.22 Let $A=\begin{bmatrix}0 & 2 & -3\\ -2 & 0 & 1\\ 3 & -1 & 0\end{bmatrix}$ and B be a matrix such that $B(I-A)=I+A$. Then the sum of the diagonal elements of B^TB is equal to ____

Given **3**
Answer :

Question Type : **SA**
Question ID : **444792471**
Status : **Answered**

Q.23 If the image of the point $P(a, 2, a)$ in the line $\frac{x}{2}=\frac{y+a}{1}=\frac{z}{1}$ is Q and the image of Q in the line $\frac{x-2b}{2}=\frac{y-a}{1}=\frac{z+2b}{-5}$ is P, then $a+b$ is equal to ____.

Given **--**
Answer :

Question Type : **SA**
Question ID : **444792473**
Status : **Not Answered**

Q.24 If the solution curve $y=f(x)$ of the differential equation
$(x^2-4)\,y'-2xy+2x\,(4-x^2)^2=0\,,\ x>2,$
passes through the point (3, 15), then the local maximum value of f is_____

Given **16**
Answer :

Question Type : **SA**
Question ID : **444792475**
Status : **Answered**

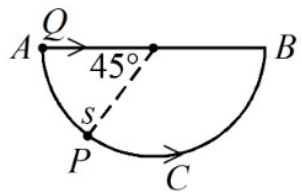
Q.25 The number of elements in the
set $S=\left\{x: x\in[0,100] \text{ and } \int_0^x t^2\sin(x-t)\,dt=x^2\right\}$ is ____

Given **16**
Answer :

Question Type : **SA**
Question ID : **444792474**
Status : **Answered**

Section : **Physics Section A**

Q.26 A bead P sliding on a frictionless semi-circular string (ACB) and it is at point S at $t = 0$ and at this instant the horizontal component of its velocity is v. Another bead Q of the same mass as P is ejected from point A at $t = 0$ along the horizontal string AB, with the speed v, friction between the beads and the respective strings may be neglected in both cases. Let t_P and t_Q be the respective times taken by beads P and Q to reach the point B, then the relation between t_P and t_Q is



Options
1. $t_P > t_Q$
2. $t_P < t_Q$
3. $t_P = t_Q$
4. $t_P > 1.25t_Q$

Question Type : **MCQ**
Question ID : **444792478**
Option 1 ID : **4447921625**
Option 2 ID : **4447921624**
Option 3 ID : **4447921626**
Option 4 ID : **4447921627**
Status : **Not Answered**
Chosen Option : **--**

Q.27 The internal energy of a monoatomic gas is 3nRT. One mole of helium is kept in a cylinder having internal cross section area of 17 cm^2 and fitted with a light movable frictionless piston. The gas is heated slowly by suppling 126 J heat. If the temperature rises by 4 °C, then the piston will move _____ cm.
(atmospheric pressure = 10^5 Pa)

Options
1. 1.55
2. 14.5
3. 1.45
4. 15.5

Question Type : **MCQ**
Question ID : **444792484**
Option 1 ID : **4447921650**
Option 2 ID : **4447921649**
Option 3 ID : **4447921651**
Option 4 ID : **4447921648**
Status : **Not Answered**
Chosen Option : **--**

Q.28 The current passing through a conducting loop in the form of equilateral triangle of side $4\sqrt{3}$ cm is 2 A. The magnetic field at its centroid is $\alpha \times 10^{-5}$ T. The value of α is _____.
(Given : $\mu_o = 4\pi \times 10^{-7}$ SI units)

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

Question Type : **MCQ**
Question ID : **444792487**
Option 1 ID : **4447921660**
Option 2 ID : **4447921663**
Option 3 ID : **4447921661**
Option 4 ID : **4447921662**
Status : **Answered**
Chosen Option : **4**

Q.29 Which of the following pair of nuclei are isobars of the element?

Options
1. ${}_{1}^{2}H$ and ${}_{1}^{3}H$
2. ${}_{80}^{198}Hg$ and ${}_{79}^{197}Au$
3. ${}_{1}^{3}H$ and ${}_{2}^{3}He$
4. ${}_{92}^{236}U$ and ${}_{92}^{238}U$

Question Type : **MCQ**
Question ID : **444792494**
Option 1 ID : **4447921688**
Option 2 ID : **4447921691**
Option 3 ID : **4447921690**
Option 4 ID : **4447921689**
Status : **Answered**
Chosen Option : **3**

Q.30 A paratrooper jumps from an aeroplane and opens a parachute after 2 s of free fall and starts deaccelerating with 3 m/s^2. At 10 m height from ground, while descending with the help of parachute, the speed of paratrooper is 5 m/s. The initial height of the airplane is _____m.
($g = 10\ m/s^2$)

Options
1. 62.5
2. 20
3. 92.5
4. 82.5

Question Type : **MCQ**
Question ID : **444792477**
Option 1 ID : **4447921621**
Option 2 ID : **4447921623**
Option 3 ID : **4447921622**
Option 4 ID : **4447921620**
Status : **Answered**
Chosen Option : **3**

Q.31 One mole of an ideal diatomic gas expands from volume V to $2V$ isothermally at a temperature 27 °C and does W joule of work. If the gas undergoes same magnitude of expansion adiabatically from 27 °C doing the same amount of work W, then its final temperature will be (close to) _____°C.
($\log_e 2 = 0.693$)

Options
1. −56
2. −189
3. −117
4. −30

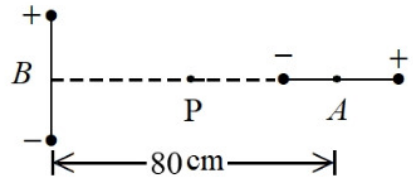
Question Type : **MCQ**
Question ID : **444792483**
Option 1 ID : **4447921645**
Option 2 ID : **4447921647**
Option 3 ID : **4447921644**
Option 4 ID : **4447921646**
Status : **Answered**
Chosen Option : **1**

Q.32 A circular loop of radius 7 cm is placed in uniform magnetic field of 0.2 T directed perpendicular to plane of loop. The loop is converted into a square loop in 0.5 s. The EMF induced in the loop is_____ mV.

Options
1. 6.6
2. 1.32
3. 8.25
4. 13.2

Question Type : **MCQ**
Question ID : **444792490**
Option 1 ID : **4447921674**
Option 2 ID : **4447921672**
Option 3 ID : **4447921675**
Option 4 ID : **4447921673**
Status : **Answered**
Chosen Option : **1**

Q.33 Two shorts dipoles (A, B), A having charges ± 2 μC and length 1 cm and B having charges ± 4 μC and length 1 cm are placed with their centres 80 cm apart as shown in the figure. The electric field at a point P, equi-distant from the centres of both dipoles is _____N/C.



Options

1. $4.5\sqrt{2}\times10^{4}$
2. $\frac{9}{16}\sqrt{2}\times10^{4}$
3. $\frac{9}{16}\sqrt{2}\times10^{5}$
4. $9\sqrt{2}\times10^{4}$

Question Type : **MCQ**
Question ID : **444792488**
Option 1 ID : **4447921667**
Option 2 ID : **4447921665**
Option 3 ID : **4447921666**
Option 4 ID : **4447921664**
Status : **Answered**
Chosen Option : **2**

Q.34 The ratio of speeds of electromagnetic waves in vacuum and a medium, having dielectric constant $k = 3$ and permeability of $\mu = 2\mu_0$, is
(μ_0 = permeability of vacuum)

Options

1. $6:1$
2. $3:2$
3. $36:1$
4. $\sqrt{6}:1$

Question Type : **MCQ**
Question ID : **444792491**
Option 1 ID : **4447921677**
Option 2 ID : **4447921676**
Option 3 ID : **4447921678**
Option 4 ID : **4447921679**
Status : **Answered**
Chosen Option : **4**

Q.35 A parallel plate capacitor with plate separation 5 mm is charged by a battery. On introducing a mica sheet of 2 mm and maintaining the connections of the plates with the terminals of the battery, it is found that it draws 25% more charge from the battery. The dielectric constant of mica is _____.

Options
1. 1.5
2. 2.5
3. 1.0
4. 2.0

Question Type : **MCQ**
Question ID : **444792485**
Option 1 ID : **4447921654**
Option 2 ID : **4447921652**
Option 3 ID : **4447921653**
Option 4 ID : **4447921655**
Status : **Answered**
Chosen Option : **4**

Q.36 A small metallic sphere of diameter 2 mm and density 10.5 g/cm^3 is dropped in glycerine having viscosity 10 Poise and density 1.5 g/cm^3 respectively. The terminal velocity attained by the sphere is ____ cm/s.
($\pi = \frac{22}{7}$ and $g = 10$ m/s^2)

Options
1. 3.0
2. 2.0
3. 1.5
4. 1.0

Question Type : **MCQ**
Question ID : **444792481**
Option 1 ID : **4447921639**
Option 2 ID : **4447921638**
Option 3 ID : **4447921637**
Option 4 ID : **4447921636**
Status : **Answered**
Chosen Option : **2**

Q.37 A prism of angle 75° and refractive index $\sqrt{3}$ is coated with thin film of refractive index 1.5 only at the back exit surface. To have total internal reflection at the back exit surface the incident angle must be_____.
(sin 15° = 0.25 and sin 25° = 0.43)

Options 1. $15°$
2. $< 15°$
3. $> 25°$
4. between 15° and 20°

Question Type : **MCQ**
Question ID : **444792493**
Option 1 ID : **4447921684**
Option 2 ID : **4447921687**
Option 3 ID : **4447921685**
Option 4 ID : **4447921686**
Status : **Answered**
Chosen Option : **4**

Q.38 An air bubble of volume 2.9 cm^3 rises from the bottom of a swimming pool of 5 m deep. At the bottom of the pool water temperature is 17 °C. The volume of the bubble when it reaches the surface, where the water temperature is 27 °C, is ____ cm^3.
($g = 10\ m/s^2$, density of water = $10^3\ kg/m^3$, and 1 atm pressure is 10^5 Pa)

Options 1. 4.2
2. 2.0
3. 3.0
4. 4.5

Question Type : **MCQ**
Question ID : **444792482**
Option 1 ID : **4447921640**
Option 2 ID : **4447921641**
Option 3 ID : **4447921642**
Option 4 ID : **4447921643**
Status : **Answered**
Chosen Option : **4**

Q.39 A block is sliding down on an inclined plane of slope θ and at an instant $t = 0$ this block is given an upward momentum so that it starts moving up on the inclined surface with velocity u. The distance (S) travelled by the block before its velocity become zero, is _____.
(g = gravitational acceleration)

Options

1. $\frac{u^2}{4g\sin\theta}$
2. $\frac{u^2}{\sqrt{2}g\cos\theta}$
3. $\frac{u^2}{2g\cos\theta}$
4. $\frac{2u^2}{g\cos\theta}$

Question Type : **MCQ**
Question ID : **444792479**
Option 1 ID : **4447921628**
Option 2 ID : **4447921631**
Option 3 ID : **4447921629**
Option 4 ID : **4447921630**
Status : **Not Answered**
Chosen Option : **--**

Q.40 To compare EMF of two cells using potentiometer the balancing lengths obtained are 200 cm and 150 cm. The least count of scale is 1 cm. The percentage error in the ratio of EMFs is _____

Options

1. 1.45
2. 1.65
3. 1.55
4. 1.75

Question Type : **MCQ**
Question ID : **444792476**
Option 1 ID : **4447921616**
Option 2 ID : **4447921618**
Option 3 ID : **4447921617**
Option 4 ID : **4447921619**
Status : **Not Answered**
Chosen Option : **--**

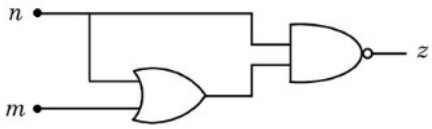
Q.41 Two charges 7 μC and −2 μC are placed at (−9, 0, 0) cm and (9, 0, 0) cm respectively in an external field $E = \frac{A}{r^2}\hat{r}$, where $A = 9 \times 10^5$ N/C.m^2 .

Considering the potential at infinity is 0, the electrostatic energy of the configuration is _____J.

Options
1. –90.7
2. 24.3
3. 49.3
4. 1.4

Question Type : **MCQ**
Question ID : **444792489**
Option 1 ID : **4447921668**
Option 2 ID : **4447921671**
Option 3 ID : **4447921670**
Option 4 ID : **4447921669**
Status : **Answered**
Chosen Option : **3**

Q.42 For the given logic gate circuit, which of the following is the correct truth table ?



Options

1.

n	m	z
0	0	0
0	1	1
1	1	0
1	0	1

2.

n	m	z
0	0	1
0	1	1
1	1	0
1	0	0

3.

n	m	z
0	0	1
0	1	0
1	1	0
1	0	0

4.

n	m	z
0	0	1
0	1	0
1	1	1
1	0	0

Question Type : **MCQ**
Question ID : **444792495**
Option 1 ID : **4447921695**
Option 2 ID : **4447921694**
Option 3 ID : **4447921692**
Option 4 ID : **4447921693**
Status : **Answered**
Chosen Option : **2**

Q.43 A body of mass 14 kg initially at rest explodes and breaks into three fragments of masses in the ratio 2 : 2 : 3. The two pieces of equal masses fly off perpendicular to each other with a speed of 18 m/s each. The velocity of the heavier fragment is ___ m/s.

Options

1. $12\sqrt{2}$
2. 12
3. $10\sqrt{2}$
4. $24\sqrt{2}$

Question Type : **MCQ**
Question ID : **444792480**
Option 1 ID : **4447921632**
Option 2 ID : **4447921634**
Option 3 ID : **4447921633**
Option 4 ID : **4447921635**
Status : **Answered**
Chosen Option : **1**

Q.44 When an unpolarized light falls at a particular angle on a glass plate (placed in air), it is observed that the reflected beam is linearly polarized. The angle of refracted beam with respect to the normal is_____.

($\tan^{-1}(1.52) = 57.7°$, refractive indices of air and glass are 1.00 and 1.52, respectively.)

Options

1. $36.3°$
2. $42.6°$
3. $32.3°$
4. $39.6°$

Question Type : **MCQ**
Question ID : **444792492**
Option 1 ID : **4447921681**
Option 2 ID : **4447921683**
Option 3 ID : **4447921680**
Option 4 ID : **4447921682**
Status : **Answered**
Chosen Option : **3**

Q.45 Suppose a long solenoid of 100 cm length, radius 2 cm having 500 turns per unit length, carries a current $I = 10 \sin(\omega t)$ A, where $\omega = 1000$ rad./s. A circular conducting loop (B) of radius 1 cm coaxially slided through the solenoid at a speed $v = 1$ cm/s. The r.m.s. current through the loop when the coil B is inserted 10 cm inside the solenoid is $\alpha / \sqrt{2}$ μA. The value of α is _____.
[Resistance of the loop = 10 Ω]

Options
1. 280
2. 197
3. 80
4. 100

Question Type : **MCQ**
Question ID : **444792486**
Option 1 ID : **4447921657**
Option 2 ID : **4447921658**
Option 3 ID : **4447921659**
Option 4 ID : **4447921656**
Status : **Not Answered**
Chosen Option : **--**

Section : **Physics Section B**

Q.46 The average energy released per fission for the nucleus of $^{235}_{92}\text{U}$ is 190 MeV.
When all the atoms of 47 g pure $^{235}_{92}\text{U}$ undergo fission process, the energy released is $\alpha \times 10^{23}$ MeV. The value of α is _____.

(Avogadro Number = 6×10^{23} per mole)

Given Answer : **228**

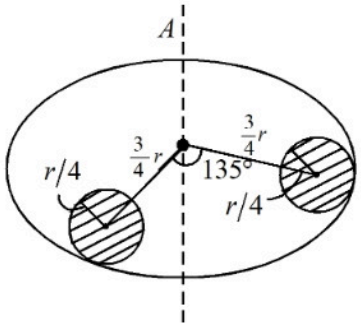
Question Type : **SA**
Question ID : **444792500**
Status : **Answered**

Q.47 A ball of radius r and density ρ dropped through a viscous liquid of density σ and viscosity η attains its terminal velocity at time t, given by $t = A\,\rho^a r^b \eta^c \sigma^d$, where A is a constant and a, b, c and d are integers. The value of $\frac{b+c}{a+d}$ is _____.

Given Answer : **1**

Question Type : **SA**
Question ID : **444792497**
Status : **Answered**

Q.48 Suppose there is a uniform circular disc of mass M kg and radius r m shown in figure. The shaded regions are cut out from the disc. The moment of inertia of the remainder about the axis A of the disc is given by $\frac{x}{256}Mr^2$. The value of x is_____.



Given **109**
Answer :

Question Type : **SA**
Question ID : **444792496**
Status : **Answered**

Q.49 The size of the images of an object, formed by a thin lens are equal when the object is placed at two different positions 8 cm and 24 cm from the lens. The focal length of the lens is _____ cm.

Given **16**
Answer :

Question Type : **SA**
Question ID : **444792499**
Status : **Answered**

Q.50 The velocity of sound in air is doubled when the temperature is raised from 0 °C to α °C. The value of α is _____.

Given **819**
Answer :

Question Type : **SA**
Question ID : **444792498**
Status : **Answered**

Section : **Chemistry Section A**

Q.51 Which statements are **NOT TRUE** about XeO_2F_2?

A. It has a see-saw shape.
B. Xe has 5 electron pairs in its valence shell in XeO_2F_2.
C. The O–Xe–O bond angle is close to 180°.
D. The F–Xe–F bond angle is close to 180°.
E. Xe has 16 valence electrons in XeO_2F_2.

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

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

Question Type : **MCQ**
Question ID : **444792503**
Option 1 ID : **4447921710**
Option 2 ID : **4447921711**
Option 3 ID : **4447921709**
Option 4 ID : **4447921712**
Status : **Answered**
Chosen Option : **4**

Q.52 The oxidation state of chromium in the final product formed in the reaction between KI and acidified $K_2Cr_2O_7$ solution is:

Options
1. +3
2. +2
3. +6
4. +4

Question Type : **MCQ**
Question ID : **444792510**
Option 1 ID : **4447921740**
Option 2 ID : **4447921739**
Option 3 ID : **4447921738**
Option 4 ID : **4447921737**
Status : **Answered**
Chosen Option : **1**

Q.53 Given below are two statements:

Statement I: The second ionisation enthalpy of Na is larger than the corresponding ionisation enthalpy of Mg.

Statement II: The ionic radius of O^{2-} is larger than that of F^-.

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

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

Question Type : **MCQ**
Question ID : **444792508**
Option 1 ID : **4447921730**
Option 2 ID : **4447921731**
Option 3 ID : **4447921729**
Option 4 ID : **4447921732**
Status : **Answered**
Chosen Option : **3**

Q.54 Identify the INCORRECT statements from the following:

A. Notation $^{24}_{12}Mg$ represents 24 protons and 12 neutrons.
B. Wavelength of a radiation of frequency $4.5 \times 10^{15}\ s^{-1}$ is 6.7×10^{-8} m.
C. One radiation has wavelength = λ_1 (900 nm) and energy = E_1. Other radiation has wavelength = λ_2 (300 nm) and energy = E_2. $E_1 : E_2 = 3 : 1$.
D. Number of photons of light of wavelength 2000 pm that provides 1 J of energy is 1.006×10^{16}.

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

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

Question Type : **MCQ**
Question ID : **444792502**
Option 1 ID : **4447921707**
Option 2 ID : **4447921705**
Option 3 ID : **4447921706**
Option 4 ID : **4447921708**
Status : **Answered**
Chosen Option : **3**

Q.55 Which of the following statements are **TRUE** about Haloform reaction?:

A. Sodium hypochlorite reacts with KI to give KOI.
B. KOI is a reducing agent.
C. α, β-unsaturated methylketone $\left(CH_3-CH=CH-\overset{\overset{O}{\|}}{C}-CH_3\right)$ will give iodoform reaction.
D. Isopropyl alcohol will not give iodoform test.
E. Methanoic acid will give positive iodoform test.

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

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

Question Type : **MCQ**
Question ID : **444792515**
Option 1 ID : **4447921758**
Option 2 ID : **4447921760**
Option 3 ID : **4447921757**
Option 4 ID : **4447921759**
Status : **Answered**
Chosen Option : **3**

Q.56 Identify the **CORRECT** set of details from the following:

A. $[Co(NH_3)_6]^{3+}$: Inner orbital complex; d^2sp^3 hybridized
B. $[MnCl_6]^{3-}$: Outer orbital complex; sp^3d^2 hybridized
C. $[CoF_6]^{3-}$: Outer orbital complex; d^2sp^3 hybridized
D. $[FeF_6]^{3-}$: Outer orbital complex; sp^3d^2 hybridized
E. $[Ni(CN)_4]^{2-}$: Inner orbital complex; sp^3 hybridized

Choose the correct answer from the options given below:

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

Question Type : **MCQ**
Question ID : **444792511**
Option 1 ID : **4447921741**
Option 2 ID : **4447921743**
Option 3 ID : **4447921744**
Option 4 ID : **4447921742**
Status : **Answered**
Chosen Option : **4**

Q.57 Given below are two statements:

Statement I: $(CH_3)_3\overset{\oplus}{C}$ is more stable than $\overset{\oplus}{C}H_3$ as nine hyperconjugation interactions are possible in $(CH_3)_3\overset{\oplus}{C}$.

Statement II: $\overset{\oplus}{C}H_3$ is less stable than $(CH_3)_3\overset{\oplus}{C}$ as only three hyperconjugation interactions are possible in $\overset{\oplus}{C}H_3$.

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

Question Type : **MCQ**
Question ID : **444792513**
Option 1 ID : **4447921749**
Option 2 ID : **4447921751**
Option 3 ID : **4447921750**
Option 4 ID : **4447921752**
Status : **Answered**
Chosen Option : **2**

Q.58 It is noticed that Pb^{2+} is more stable than Pb^{4+} but Sn^{2+} is less stable than Sn^{4+}. Observe the following reactions.

$PbO_2 + Pb \rightarrow 2PbO$; $\Delta_rG°(1)$

$SnO_2 + Sn \rightarrow 2SnO$; $\Delta_rG°(2)$

Identify the correct set from the following

Options

1. $\Delta_rG°(1) < 0$; $\Delta_rG°(2) > 0$
2. $\Delta_rG°(1) < 0$; $\Delta_rG°(2) < 0$
3. $\Delta_rG°(1) > 0$; $\Delta_rG°(2) > 0$
4. $\Delta_rG°(1) > 0$; $\Delta_rG°(2) < 0$

Question Type : **MCQ**
Question ID : **444792504**
Option 1 ID : **4447921713**
Option 2 ID : **4447921714**
Option 3 ID : **4447921715**
Option 4 ID : **4447921716**
Status : **Answered**
Chosen Option : **1**

Q.59 Observe the following reactions at T(K).

I. A → products.

II. $5Br^-(aq) + BrO_3^-(aq) + 6H^+(aq) \rightarrow 3Br_2(aq) + 3H_2O(l)$

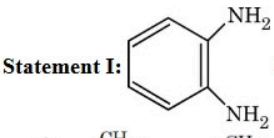
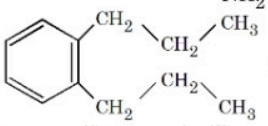
Both the reactions are started at 10.00 am. The rates of these reactions at 10.10 am are same. The value of $-\frac{\Delta[Br^-]}{\Delta t}$ at 10.10 am is 2×10^{-4} mol L^{-1} min^{-1}. The concentration of A at 10.10 am is 10^{-2} mol L^{-1}. What is the first order rate constant (in min^{-1}) of reaction I?

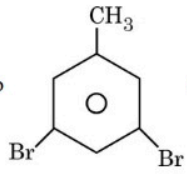
Options

1. 2×10^{-3}
2. 10^{-2}
3. 10^{-3}
4. 4×10^{-3}

Question Type : **MCQ**
Question ID : **444792507**
Option 1 ID : **4447921726**
Option 2 ID : **4447921727**
Option 3 ID : **4447921728**
Option 4 ID : **4447921725**
Status : **Answered**
Chosen Option : **4**

Q.60 Given below are two statements:

Statement I:  can be synthesized from  using simpler reagents in the order i) Acidic $KMnO_4$, ii) Ammonia, iii) Bromine and alkali

Statement II:  can be converted into  using reagents in the order i) Bromine-H_2O ii) $NaNO_2$/HCl (0 - 5 °C) (iii) Aq. H_3PO_2 .

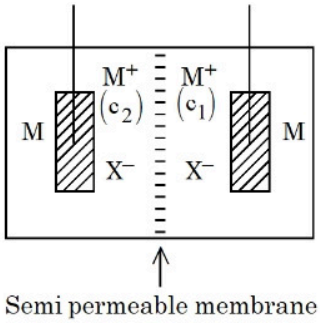
In the light of the above statements, choose the ***correct*** answer from the options given below

Options

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

Question Type : **MCQ**
Question ID : **444792517**
Option 1 ID : **4447921768**
Option 2 ID : **4447921765**
Option 3 ID : **4447921766**
Option 4 ID : **4447921767**
Status : **Answered**
Chosen Option : **2**

Q.61



Consider the above electrochemical cell where a metal electrode (M) is undergoing redox reaction by forming M^+ ($M \rightarrow M^+ + e^-$). The cation M^+ is present in two different concentrations c_1 and c_2 as shown above. Which of the following statement is correct for generating a positive cell potential?

Options
1. If c_1 is present at cathode, then $c_1 > c_2$.
2. If c_1 is present at anode, then $c_1 = c_2$.
3. If c_1 is present at anode, then $c_1 > c_2$.
4. If c_1 is present at cathode, then $c_1 < c_2$.

Question Type : **MCQ**
Question ID : **444792505**
Option 1 ID : **4447921719**
Option 2 ID : **4447921720**
Option 3 ID : **4447921718**
Option 4 ID : **4447921717**
Status : **Answered**
Chosen Option : **1**

Q.62 A student has been given a compound "*x*" of molecular formula- C_6H_7N. '*x*' is sparingly soluble in water. However, on addition of dilute mineral acid, '*x*' becomes soluble in water. '*x*' when treated with $CHCl_3$ and KOH(alc), 'y' is produced. 'y' has a specific unpleasant smell. On treatment with benzenesulphonyl chloride, '*x*' gives a compound 'z' which is soluble in alkali. The number of different "H" atoms present in 'z' is:-

Options
1. 8
2. 5
3. 7
4. 4

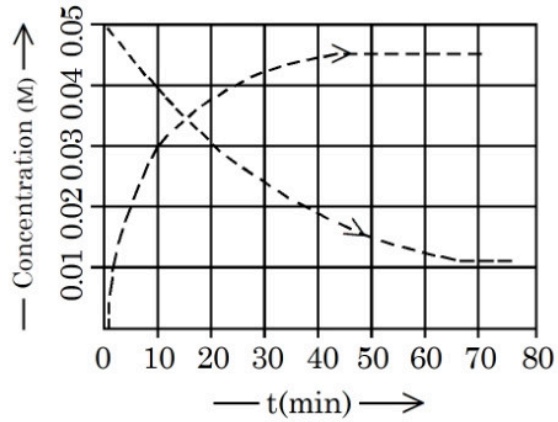
Question Type : **MCQ**
Question ID : **444792518**
Option 1 ID : **4447921772**
Option 2 ID : **4447921769**
Option 3 ID : **4447921771**
Option 4 ID : **4447921770**
Status : **Not Answered**
Chosen Option : **--**

Q.63 Elements X and Y belong to Group 15. The difference between the electronegativity values of 'X' and phosphorus is higher than that of the difference between phosphorus and 'Y'. 'X' & 'Y' are respectively

Options
1. Bi & N
2. As & Bi
3. As & Sb
4. N & As

Question Type : **MCQ**
Question ID : **444792509**
Option 1 ID : **4447921733**
Option 2 ID : **4447921734**
Option 3 ID : **4447921736**
Option 4 ID : **4447921735**
Status : **Answered**
Chosen Option : **1**

Q.64



Given above is the concentration vs time plot for a dissociation reaction : $A \rightarrow nB$.

Based on the data of the initial phase of the reaction (initial 10 min), the value of n is _____.

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

Question Type : **MCQ**
Question ID : **444792506**
Option 1 ID : **4447921723**
Option 2 ID : **4447921724**
Option 3 ID : **4447921722**
Option 4 ID : **4447921721**
Status : **Answered**
Chosen Option : **1**

Q.65 Iodoform test can differentiate between

A. Methanol and Ethanol
B. CH_3COOH and CH_3CH_2COOH
C. Cyclohexene and cyclohexanone
D. Diethyl ether and Pentan-3-one
E. Anisole and acetone

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

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

Question Type : **MCQ**
Question ID : **444792520**
Option 1 ID : **4447921777**
Option 2 ID : **4447921780**
Option 3 ID : **4447921779**
Option 4 ID : **4447921778**
Status : **Answered**
Chosen Option : **3**

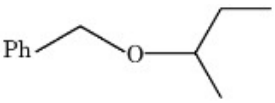
Q.66 Both human DNA and RNA are chiral molecules. The chirality in DNA and RNA arises due to the presence of

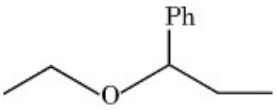
Options
1. L−sugar component
2. D−sugar component
3. Base unit
4. Chiral phosphate unit

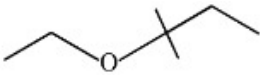
Question Type : **MCQ**
Question ID : **444792519**
Option 1 ID : **4447921774**
Option 2 ID : **4447921773**
Option 3 ID : **4447921775**
Option 4 ID : **4447921776**
Status : **Answered**
Chosen Option : **2**

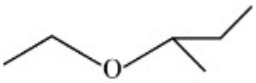
Q.67 A mixed ether (P), when heated with excess of hot concentrated hydrogen iodide produces two different alkyl iodides which when treated with aq. NaOH give compounds (Q) and (R). Both (Q) and (R) give yellow precipitate with NaOI. Identify the mixed ether (P):

Options

1. 

2. 

3. 

4. 

Question Type : **MCQ**
Question ID : **444792516**
Option 1 ID : **4447921762**
Option 2 ID : **4447921764**
Option 3 ID : **4447921761**
Option 4 ID : **4447921763**
Status : **Answered**
Chosen Option : **4**

Q.68 The work functions of two metals (M_A and M_B) are in the 1 : 2 ratio. When these metals are exposed to photons of energy 6 eV, the kinetic energy of liberated electrons of M_A : M_B is in the ratio of 2.642 : 1. The work functions (in eV) of M_A and M_B are respectively.

Options

1. 1.4, 2.8
2. 1.5, 3.0
3. 2.3, 4.6
4. 3.1, 6.2

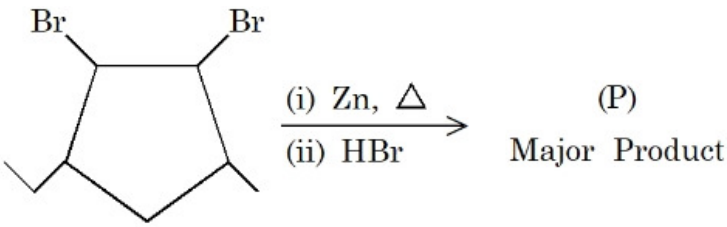
Question Type : **MCQ**
Question ID : **444792501**
Option 1 ID : **4447921704**
Option 2 ID : **4447921703**
Option 3 ID : **4447921701**
Option 4 ID : **4447921702**
Status : **Answered**
Chosen Option : **3**

Q.69 In Carius method 0.2425 g of an organic compound gave 0.5253 g silver chloride.
The percentage of chlorine in the organic compound is

Options
1. 37.57%
2. 53.58%
3. 34.79%
4. 87.65%

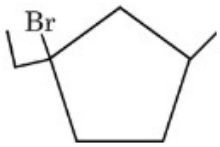
Question Type : **MCQ**
Question ID : **444792512**
Option 1 ID : **4447921745**
Option 2 ID : **4447921747**
Option 3 ID : **4447921746**
Option 4 ID : **4447921748**
Status : **Answered**
Chosen Option : **2**

Q.70



Identify (P)

Options

1.


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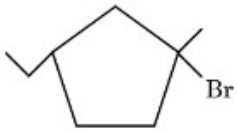
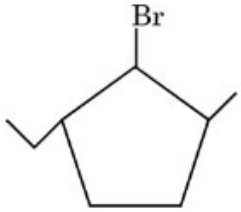
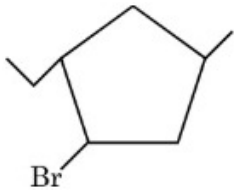


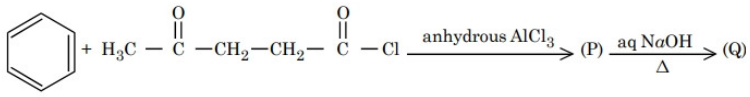
3.


4.


Question Type : **MCQ**
Question ID : **444792514**
Option 1 ID : **4447921753**
Option 2 ID : **4447921754**
Option 3 ID : **4447921756**
Option 4 ID : **4447921755**
Status : **Answered**
Chosen Option : **2**

Section : **Chemistry Section B**

Q.71 Consider the following reaction of benzene.



In compound (Q), the percentage of oxygen is _____%. (Nearest integer)

Given **18**
Answer :

Question Type : **SA**
Question ID : **444792522**
Status : **Answered**

Q.72 Two liquids A and B form an ideal solution. At 320 K, the vapour pressure of the solution, containing 3 mol of A and 1 mol of B is 500 mm Hg. At the same temperature, if 1 mol of A is further added to this solution, vapour pressure of the solution increases by 20 mm Hg. Vapour pressure (in mm Hg) of B in pure state is _____. (Nearest integer)

Given **200**
Answer :

Question Type : **SA**
Question ID : **444792525**
Status : **Answered**

Q.73 $X_2(g) + Y_2(g) \rightleftharpoons 2Z(g)$

$X_2(g)$ and $Y_2(g)$ are added to a 1 L flask and it is found that the system attains the above equilibrium at T(K) with the number of moles of $X_2(g)$, $Y_2(g)$ and $Z(g)$ being 3, 3 and 9 mol respectively (equilibrium moles). Under this condition of equilibrium, 10 mol of $Z(g)$ is added to the flask and the temperature is maintained at T(K). Then the number of moles of $Z(g)$ in the flask when the new equilibrium is established is _____ . (Nearest integer)

Given **15**
Answer :

Question Type : **SA**
Question ID : **444792524**
Status : **Answered**

Q.74 200 cc of $x \times 10^{-3}$ M potassium dichromate is required to oxidise 750 cc of 0.6 M Mohr's salt solution in acidic medium.

Here x = _____.

Given **375**
Answer :

Question Type : **SA**
Question ID : **444792523**
Status : **Answered**

Q.75 Total number of unpaired electrons present in the central metal atoms/ions of $[Ni(CO)_4]$, $[NiCl_4]^{2-}$, $[PtCl_2(NH_3)_2]$, $[Ni(CN)_4]^{2-}$ and $[Pt(CN)_4]^{2-}$ is _____ .

Given **2**
Answer :

Question Type : **SA**
Question ID : **444792521**
Status : **Answered**

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