Joint Entrance Examination (Main) - JEE(Main)

Paper Name	B.E/B.Tech.(Paper I)
Test Date	27-06-2022
Slot	SLOT - 1
Lang	English

Q:1
Topic Name: Mathematics-Section A

ItemCode:101361

Question: The area of the polygon, whose vertices are the non-real roots of the equation $\bar{z} = iz^2$ is :

A $\frac{3\sqrt{3}}{4}$

B $\frac{3\sqrt{3}}{2}$

C $\frac{3}{2}$

D $\frac{3}{4}$

Q:2
Topic Name: Mathematics-Section A

ItemCode:101362

Question: Let the system of linear equations $x+2y+z=2,\ \alpha x+3y-z=\alpha,\ -\alpha x+y+2z=-\alpha$ be inconsistent. Then α is equal to :

A $\frac{5}{2}$

B $-\frac{5}{2}$

C $\frac{7}{2}$

D $-\frac{7}{2}$

Q:3
Topic Name: Mathematics-Section A

ItemCode:101363

Question: If $x = \sum_{n=0}^{\infty} a^n,\ y = \sum_{n=0}^{\infty} b^n,\ z = \sum_{n=0}^{\infty} c^n$, where a, b, c are in A.P. and $|a| < 1, |b| < 1, |c| < 1,$ $abc \neq 0$, then :

A x, y, z are in A.P.

B x, y, z are in G.P.

C $\frac{1}{x}, \frac{1}{y}, \frac{1}{z}$ are in A.P.

D	$\frac{1}{x}+\frac{1}{y}+\frac{1}{z}=1-(a+b+c)$

Q:4
Topic Name: Mathematics-Section A

ItemCode:101364

Question: Let $\frac{dy}{dx} = \frac{ax - by + a}{bx + cy + a}$, where a, b, c are constants, represent a circle passing through the point (2, 5). Then the shortest distance of the point (11, 6) from this circle is :

A	10
B	8
C	7
D	5

Q:5
Topic Name: Mathematics-Section A

ItemCode:101365

Question: Let a be an integer such that $\lim_{x \to 7} \frac{18 - [1 - x]}{[x - 3a]}$ exists, where [t] is greatest integer $\leq$ t. Then a is equal to :

A	-6
B	-2
C	2
D	6

Q:6
Topic Name: Mathematics-Section A

ItemCode:101366

Question: The number of distinct real roots of $x^4-4x+1=0$ is :

A	4
B	2
C	1
D	0

Q:7
Topic Name: Mathematics-Section A

ItemCode:101367

Question: The lengths of the sides of a triangle are $10+x^2$, $10+x^2$ and $20-2x^2$. If for $x=k$, the area of the triangle is maximum, then $3k^2$ is equal to :

A	5
B	8
C	10

D	12

Q:8
Topic Name: Mathematics-Section A

ItemCode:101368

Question: If $\cos^{-1}\left(\frac{y}{2}\right) = \log_e\left(\frac{x}{5}\right)^5$, $|y| < 2$, then :

A	$x^2y'' + xy' - 25y = 0$
B	$x^2y'' - xy' - 25y = 0$
C	$x^2y'' - xy' + 25y = 0$
D	$x^2y'' + xy' + 25y = 0$

Q:9
Topic Name: Mathematics-Section A

ItemCode:101369

Question: If $\int \frac{(x^2 + 1)e^x}{(x+1)^2}\,dx = f(x)e^x + C$, where C is a constant, then $\frac{d^3f}{dx^3}$ at $x = 1$ is equal to :

A	$-\frac{3}{4}$
B	$\frac{3}{4}$
C	$-\frac{3}{2}$
D	$\frac{3}{2}$

Q:10
Topic Name: Mathematics-Section A

ItemCode:101370

Question: The value of the integral $\int_{-2}^{2} \frac{|x^3+x|}{(e^{x|x|} + 1)}\,dx$ is equal to :

A	$5e^2$
B	$3e^{-2}$
C	4
D	6

Q:11
Topic Name: Mathematics-Section A

ItemCode:101371

Question: If $\frac{dy}{dx} + \frac{2^{x-y}(2^y - 1)}{2^x - 1} = 0$, $x, y > 0$, $y(1) = 1$, then $y(2)$ is equal to :

A	$2+\log_2 3$
B	$2+\log_3 2$
C	$2-\log_3 2$
D	$2-\log_2 3$

Q:12
Topic Name: Mathematics-Section A

ItemCode:101372

Question: In an isosceles triangle ABC, the vertex A is (6, 1) and the equation of the base BC is $2x+y=4$. Let the point B lie on the line $x+3y=7$. If (α, β) is the centroid of ΔABC, then $15(\alpha+\beta)$ is equal to :

A	39
B	41
C	51
D	63

Q:13
Topic Name: Mathematics-Section A

ItemCode:101373

Question: Let the eccentricity of an ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, $a>b$, be $\frac{1}{4}$. If this ellipse passes through the point $\left(-4\sqrt{\frac{2}{5}}, 3\right)$, then a^2+b^2 is equal to :

A	29
B	31
C	32
D	34

Q:14
Topic Name: Mathematics-Section A

ItemCode:101374

Question: If two straight lines whose direction cosines are given by the relations $l+m-n=0$, $3l^2+m^2+cnl=0$ are parallel, then the positive value of c is :

A	6
B	4
C	3
D	2

Q:15
Topic Name: Mathematics-Section A

ItemCode:101375

Question: Let $\vec{a} = \hat{i} + \hat{j} - \hat{k}$ and $\vec{c} = 2\hat{i} - 3\hat{j} + 2\hat{k}$. Then the number of vectors $\vec{b}$ such that $\vec{b} \times \vec{c} = \vec{a}$ and $|\vec{b}| \in \{1, 2, ..., 10\}$ is :

A	0
B	1
C	2
D	3

Q:16
Topic Name: Mathematics-Section A

ItemCode:101376

Question: Five numbers x_1, x_2, x_3, x_4, x_5 are randomly selected from the numbers 1, 2, 3, ..., 18 and are arranged in the increasing order ($x_1 < x_2 < x_3 < x_4 < x_5$). The probability that $x_2 = 7$ and $x_4 = 11$ is :

A	$\frac{1}{136}$
B	$\frac{1}{72}$
C	$\frac{1}{68}$
D	$\frac{1}{34}$

Q:17
Topic Name: Mathematics-Section A

ItemCode:101377

Question: Let X be a random variable having binomial distribution B(7, p). If $P(X=3) = 5P(X=4)$, then the sum of the mean and the variance of X is :

A	$\frac{105}{16}$
B	$\frac{7}{16}$
C	$\frac{77}{36}$
D	$\frac{49}{16}$

Q:18
Topic Name: Mathematics-Section A

ItemCode:101378

Question: The value of $\cos\left(\frac{2\pi}{7}\right) + \cos\left(\frac{4\pi}{7}\right) + \cos\left(\frac{6\pi}{7}\right)$ is equal to :

A	-1
B	$-\frac{1}{2}$
C	$-\frac{1}{3}$
D	$-\frac{1}{4}$

Q:19
Topic Name: Mathematics-Section A

ItemCode:101379

Question: $\sin^{-1}\left(\sin\frac{2\pi}{3}\right) + \cos^{-1}\left(\cos\frac{7\pi}{6}\right) + \tan^{-1}\left(\tan\frac{3\pi}{4}\right)$ is equal to :

A	$\frac{11\pi}{12}$
B	$\frac{17\pi}{12}$
C	$\frac{31\pi}{12}$
D	$-\frac{3\pi}{4}$

Q:20
Topic Name: Mathematics-Section A

ItemCode:101380

Question: The boolean expression $(\sim(p \wedge q)) \vee q$ is equivalent to :

A	$q \rightarrow (p \wedge q)$
B	$p \rightarrow q$
C	$p \rightarrow (p \rightarrow q)$
D	$p \rightarrow (p \vee q)$

Q:21
Topic Name: Mathematics-Section B

ItemCode:101381

Question: Let $f: \mathbf{R} \rightarrow \mathbf{R}$ be a function defined by $f(x) = \frac{2e^{2x}}{e^{2x} + e}$. Then

$f\left(\frac{1}{100}\right) + f\left(\frac{2}{100}\right) + f\left(\frac{3}{100}\right) + \ldots + f\left(\frac{99}{100}\right)$ is equal to _____.

Q:22
Topic Name: Mathematics-Section B

ItemCode:101382

Question: If the sum of all the roots of the equation $e^{2x} - 11e^{x} - 45e^{-x} + \frac{81}{2} = 0$ is $\log_e p$, then p is equal to _____.

Q:23
Topic Name: Mathematics-Section B

ItemCode:101383

Question: The positive value of the determinant of the matrix A, whose

$$\text{Adj}(\text{Adj}(A)) = \begin{pmatrix} 14 & 28 & -14 \\ -14 & 14 & 28 \\ 28 & -14 & 14 \end{pmatrix}, \text{ is } \_\_\_\_\_.$$

Q:24
Topic Name: Mathematics-Section B

ItemCode:101384

Question: The number of ways, 16 identical cubes, of which 11 are blue and rest are red, can be placed in a row so that between any two red cubes there should be at least 2 blue cubes, is _____.

Q:25
Topic Name: Mathematics-Section B

ItemCode:101385

Question: If the coefficient of x^{10} in the binomial expansion of $\left(\frac{\sqrt{x}}{5^{\frac{1}{4}}} + \frac{\sqrt{5}}{x^{\frac{1}{3}}}\right)^{60}$ is $5^k \cdot l$, where l, k $\in$ **N** and l is co-prime to 5, then k is equal to _____.

Q:26
Topic Name: Mathematics-Section B

ItemCode:101386

Question: Let

$A_1 = \{(x, y) : |x| \leq y^2, |x| + 2y \leq 8\}$ and

$A_2 = \{(x, y) : |x| + |y| \leq k\}$. If 27 (Area A_1) = 5 (Area A_2), then k is equal to :

Q:27
Topic Name: Mathematics-Section B

ItemCode:101387

Question: If the sum of the first ten terms of the series

$$\frac{1}{5} + \frac{2}{65} + \frac{3}{325} + \frac{4}{1025} + \frac{5}{2501} + \ldots$$

is $\frac{m}{n}$, where m and n are co-prime numbers, then m + n is equal to _____.

Q:28
Topic Name: Mathematics-Section B

ItemCode:101388

Question: A rectangle R with end points of one of its sides as (1, 2) and (3, 6) is inscribed in a circle. If the equation of a diameter of the circle is $2x-y+4=0$, then the area of R is _____.

Q:29
Topic Name: Mathematics-Section B

ItemCode:101389

Question: A circle of radius 2 unit passes through the vertex and the focus of the parabola $y^2=2x$ and touches the parabola $y=\left(x-\frac{1}{4}\right)^2+\alpha$, where $\alpha>0$. Then $(4\alpha-8)^2$ is equal to _____.

Q:30
Topic Name: Mathematics-Section B

ItemCode:101390

Question: Let the mirror image of the point (a, b, c) with respect to the plane $3x-4y+12z+19=0$ be $(a-6, \beta, \gamma)$. If $a+b+c=5$, then $7\beta-9\gamma$ is equal to _____.

Q:31
Topic Name: Physics-Section A

ItemCode:101301

Question: A projectile is launched at an angle 'α' with the horizontal with a velocity 20 ms^{-1}. After 10 s, its inclination with horizontal is 'β'. The value of tanβ will be : ($g=10\ ms^{-2}$).

A	$\tan\alpha+5\sec\alpha$
B	$\tan\alpha-5\sec\alpha$
C	$2\tan\alpha-5\sec\alpha$
D	$2\tan\alpha+5\sec\alpha$

Q:32
Topic Name: Physics-Section A

ItemCode:101302

Question: A girl standing on road holds her umbrella at 45° with the vertical to keep the rain away. If she starts running without umbrella with a speed of $15\sqrt{2}$ kmh^{-1}, the rain drops hit her head vertically. The speed of rain drops with respect to the moving girl is :

A	30 kmh^{-1}
B	$\frac{25}{\sqrt{2}}$ kmh^{-1}
C	$\frac{30}{\sqrt{2}}$ kmh^{-1}
D	25 kmh^{-1}

Q:33
Topic Name: Physics-Section A

ItemCode:101303

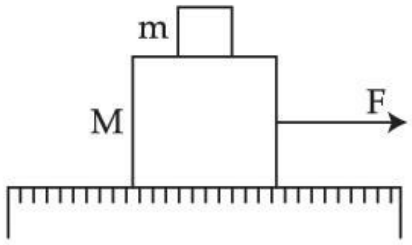
Question: A silver wire has a mass (0.6 ± 0.006) g, radius (0.5 ± 0.005) mm and length (4 ± 0.04) cm. The maximum percentage error in the measurement of its density will be :

A	4 %
B	3 %
C	6 %
D	7 %

Q:34
Topic Name: Physics-Section A

ItemCode:101304

Question: A system of two blocks of masses m = 2 kg and M = 8 kg is placed on a smooth table as shown in figure. The coefficient of static friction between two blocks is 0.5. The maximum horizontal force F that can be applied to the block of mass M so that the blocks move together will be :



A	9.8 N
B	39.2 N
C	49 N
D	78.4 N

Q:35
Topic Name: Physics-Section A

ItemCode:101305

Question: Two blocks of masses 10 kg and 30 kg are placed on the same straight line with coordinates (0, 0) cm and (x, 0) cm respectively. The block of 10 kg is moved on the same line through a distance of 6 cm towards the other block. The distance through which the block of 30 kg must be moved to keep the position of centre of mass of the system unchanged is :

A	4 cm towards the 10 kg block
B	2 cm away from the 10 kg block
C	2 cm towards the 10 kg block
D	4 cm away from the 10 kg block

Q:36
Topic Name: Physics-Section A

ItemCode:101306

Question: A 72 Ω galvanometer is shunted by a resistance of 8 Ω . The percentage of the total current which passes through the galvanometer is :

A	0.1%
B	10%
C	25%
D	0.25%

Q:37
Topic Name: Physics-Section A

ItemCode:101307

Question:

Given below are two statements :

Statement I : The law of gravitation holds good for any pair of bodies in the universe.

Statement II : The weight of any person becomes zero when the person is at the centre of the earth.

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

A	Both **Statement I** and **Statement II** are true
B	Both **Statement I** and **Statement II** are false
C	**Statement I** is true but **Statement II** is false
D	**Statement I** is false but **Statement II** is true

Q:38
Topic Name: Physics-Section A

ItemCode:101308

Question:

What percentage of kinetic energy of a moving particle is transferred to a stationary particle when it strikes the stationary particle of 5 times its mass ?

(Assume the collision to be head-on elastic collision)

A	50.0%
B	66.6%
C	55.6%
D	33.3%

Q:39
Topic Name: Physics-Section A

ItemCode:101309

Question:

The velocity of a small ball of mass 'm' and density d_1, when dropped in a container filled with glycerine, becomes constant after some time. If the density of glycerine is d_2, then the viscous force acting on the ball, will be :

A	$mg\left(1-\frac{d_1}{d_2}\right)$
B	$mg\left(1-\frac{d_2}{d_1}\right)$
C	$mg\left(\frac{d_1}{d_2}-1\right)$

D	$mg\left(\frac{d_2}{d_1}-1\right)$

Q:40
Topic Name: Physics-Section A

ItemCode:101310

Question: The susceptibility of a paramagnetic material is 99. The permeability of the material in Wb/A-m, is :

[Permeability of free space $\mu_0 = 4\pi \times 10^{-7}$ Wb/A-m]

A	$4\pi \times 10^{-7}$
B	$4\pi \times 10^{-4}$
C	$4\pi \times 10^{-5}$
D	$4\pi \times 10^{-6}$

Q:41
Topic Name: Physics-Section A

ItemCode:101311

Question: The current flowing through an ac circuit is given by

$I = 5\ \sin(120\pi t)A$

How long will the current take to reach the peak value starting from zero ?

A	$\frac{1}{60}$ s
B	60 s
C	$\frac{1}{120}$ s
D	$\frac{1}{240}$ s

Q:42
Topic Name: Physics-Section A

ItemCode:101312

Question: Match **List - I** with **List - II** :

	List - I		**List - II**
(a)	Ultravoilet rays	(i)	Study crystal structure
(b)	Microwaves	(ii)	Greenhouse effect
(c)	Infrared waves	(iii)	Sterilizing surgical instrument
(d)	X-rays	(iv)	Radar system

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

A	(a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)
B	(a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)

C	(a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)
D	(a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)

Q:43
Topic Name: Physics-Section A

ItemCode:101313

Question: An α particle and a carbon 12 atom has same kinetic energy K. The ratio of their de-Broglie wavelengths ($\lambda_\alpha : \lambda_{C12}$) is :

A	$1 : \sqrt{3}$
B	$\sqrt{3} : 1$
C	$3 : 1$
D	$2 : \sqrt{3}$

Q:44
Topic Name: Physics-Section A

ItemCode:101314

Question: A force of 10 N acts on a charged particle placed between two plates of a charged capacitor. If one plate of capacitor is removed, then the force acting on that particle will be.

A	5 N
B	10 N
C	20 N
D	Zero

Q:45
Topic Name: Physics-Section A

ItemCode:101315

Question: The displacement of simple harmonic oscillator after 3 seconds starting from its mean position is equal to half of its amplitude. The time period of harmonic motion is :

A	6 s
B	8 s
C	12 s
D	36 s

Q:46
Topic Name: Physics-Section A

ItemCode:101316

Question: An observer moves towards a stationary source of sound with a velocity equal to one-fifth of the velocity of sound. The percentage change in the frequency will be :

A	20%
B	10%
C	5%
D	0%

Q:47
Topic Name: Physics-Section A

ItemCode:101317

Question: Consider a light ray travelling in air is incident into a medium of refractive index $\sqrt{2n}$. The incident angle is twice that of refracting angle. Then, the angle of incidence will be :

A $\sin^{-1}(\sqrt{n})$

B $\cos^{-1}\left(\sqrt{\frac{n}{2}}\right)$

C $\sin^{-1}(\sqrt{2n})$

D $2\cos^{-1}\left(\sqrt{\frac{n}{2}}\right)$

Q:48
Topic Name: Physics-Section A

ItemCode:101318

Question: A hydrogen atom in its ground state absorbs 10.2 eV of energy. The angular momentum of electron of the hydrogen atom will increase by the value of :
(Given, Planck's constant $= 6.6 \times 10^{-34}$ Js).

A 2.10×10^{-34} Js

B 1.05×10^{-34} Js

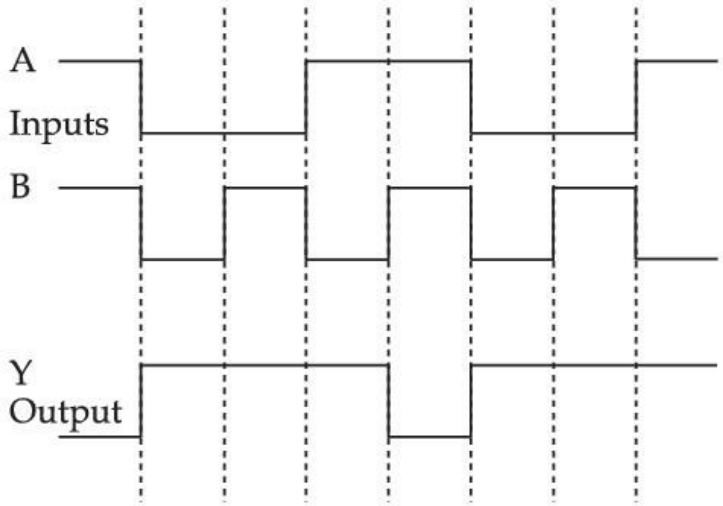
C 3.15×10^{-34} Js

D 4.2×10^{-34} Js

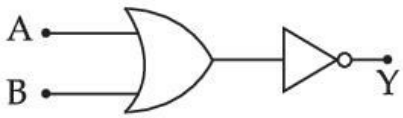
Q:49
Topic Name: Physics-Section A

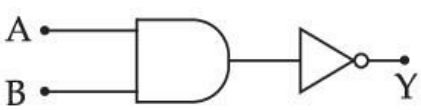
ItemCode:101319

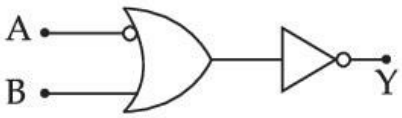
Question: Identify the correct Logic Gate for the following output (Y) of two inputs A and B.

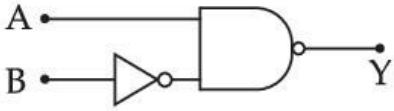


A



B 

C 

D 

Q:50
Topic Name: Physics-Section A

ItemCode:101320

Question: A mixture of hydrogen and oxygen has volume 2000 cm^3, temperature 300 K, pressure 100 kPa and mass 0.76 g. The ratio of number of moles of hydrogen to number of moles of oxygen in the mixture will be :
[Take gas constant $R = 8.3\ JK^{-1}mol^{-1}$]

A $\frac{1}{3}$

B $\frac{3}{1}$

C $\frac{1}{16}$

D $\frac{16}{1}$

Q:51
Topic Name: Physics-Section B

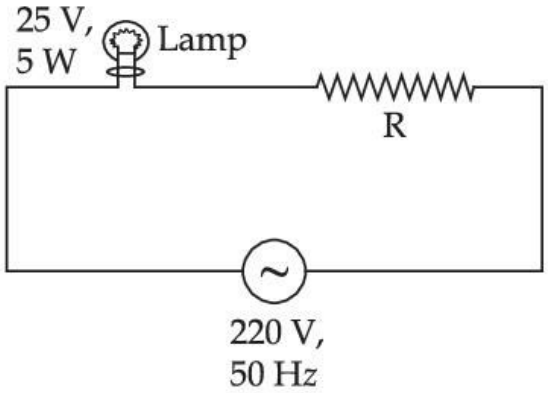
ItemCode:101321

Question: In a carnot engine, the temperature of reservoir is 527°C and that of sink is 200 K. If the workdone by the engine when it transfers heat from reservior to sink is 12000 kJ, the quantity of heat absorbed by the engine from reservoir is _____ $\times 10^6$ J.

Q:52
Topic Name: Physics-Section B

ItemCode:101322

Question: A 220 V, 50 Hz AC source is connected to a 25 V, 5 W lamp and an additional resistance R in series (as shown in figure) to run the lamp at its peak brightness, then the value of R (in ohm) will be _____.



Q:53
Topic Name: Physics-Section B

ItemCode:101323

Question: In Young's double slit experiment the two slits are 0.6 mm distance apart. Interference pattern is observed on a screen at a distance 80 cm from the slits. The first dark fringe is observed on the screen directly opposite to one of the slits. The wavelength of light will be _____ nm.

Q:54
Topic Name: Physics-Section B

ItemCode:101324

Question: A beam of monochromatic light is used to excite the electron in Li^{++} from the first orbit to the third orbit. The wavelength of monochromatic light is found to be $x \times 10^{-10}$ m. The value of x is _____.
[Given hc = 1242 eV nm]

Q:55
Topic Name: Physics-Section B

ItemCode:101325

Question: A cell, shunted by a 8 Ω resistance, is balanced across a potentiometer wire of length 3 m. The balancing length is 2 m when the cell is shunted by 4 Ω resistance. The value of internal resistance of the cell will be _____ Ω.

Q:56
Topic Name: Physics-Section B

ItemCode:101326

Question: The current density in a cylindrical wire of radius 4 mm is 4×10^6 Am^{-2}. The current through the outer portion of the wire between radial distances $\frac{R}{2}$ and R is _____ π A.

Q:57
Topic Name: Physics-Section B

ItemCode:101327

Question: A capacitor of capacitance 50 pF is charged by 100 V source. It is then connected to another uncharged identical capacitor. Electrostatic energy loss in the process is _____ nJ.

Q:58
Topic Name: Physics-Section B

ItemCode:101328

Question: The height of a transmitting antenna at the top of a tower is 25 m and that of receiving antenna is, 49 m. The maximum distance between them, for satisfactory communication in LOS (Line-Of-Sight) is $K\sqrt{5} \times 10^2$ m. The value of K is _____.
(Assume radius of Earth is $64 \times 10^{+5}$ m) [Calculate upto nearest integer value]

Q:59
Topic Name: Physics-Section B

ItemCode:101329

Question: The area of cross-section of a large tank is 0.5 m^2. It has a narrow opening near the bottom having area of cross-section 1 cm^2. A load of 25 kg is applied on the water at the top in the tank. Neglecting the speed of water in the tank, the velocity of the water, coming out of the opening at the time when the height of water level in the tank is 40 cm above the bottom, will be _____ cms^{-1}. [Take $g = 10\ ms^{-2}$]

Q:60
Topic Name: Physics-Section B

ItemCode:101330

Question: A pendulum of length 2 m consists of a wooden bob of mass 50 g. A bullet of mass 75 g is fired towards the stationary bob with a speed v. The bullet emerges out of the bob with a speed $\frac{v}{3}$ and the bob just completes the vertical circle. The value of v is _____ ms^{-1}. (if $g = 10\ m/s^2$).

Q:61
Topic Name: Chemistry-Section A

ItemCode:101331

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

Assertion (A) : At 10°C, the density of a 5 M solution of KCl [atomic masses of K & Cl are 39 & 35.5 g mol^{-1} respectively], is 'x' g ml^{-1}. The solution is cooled to −21°C. The molality of the solution will remain unchanged.

Reason (R) : The molality of a solution does not change with temperature as mass remains unaffected with temperature.

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

A	Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
B	Both **(A)** and **(R)** are true but **(R)** is not the correct explanation of **(A)**.
C	**(A)** is true but **(R)** is false.

D	**(A)** is false but **(R)** is true.

Q:62
Topic Name: Chemistry-Section A

ItemCode:101332

Question:

Based upon VSEPR theory, match the shape (geometry) of the molecules in **List-I** with the molecules in **List - II** and select the **most appropriate** option.

	List - I (Shape)		**List - II (Molecules)**
(A)	T-shaped	(I)	XeF_4
(B)	Trigonal planar	(II)	SF_4
(C)	Square planar	(III)	ClF_3
(D)	See-saw	(IV)	BF_3

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

Q:63
Topic Name: Chemistry-Section A

ItemCode:101333

Question:

Match **List - I** with **List - II**.

	List - I		**List - II**
(A)	Spontaneous process	(I)	$\Delta H < 0$
(B)	Process with $\Delta P = 0$, $\Delta T = 0$	(II)	$\Delta G_{T,P} < 0$
(C)	$\Delta H_{reaction}$	(III)	Isothermal and isobaric process
(D)	Exothermic Process	(IV)	[Bond energies of molecules in reactants] − [Bond energies of product molecules]

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

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

Q:64
Topic Name: Chemistry-Section A

ItemCode:101334

Match **List - I** with **List - II**.

	List - I		**List - II**
(A)	Lyophilic colloid	(I)	Liquid-liquid colloid
(B)	Emulsion	(II)	Protective colloid
(C)	Positively charged colloid	(III)	$FeCl_3 + NaOH$
(D)	Negatively charged colloid	(IV)	$FeCl_3$ + hot water

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

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

Q:65
Topic Name: Chemistry-Section A

ItemCode:101335

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

Assertion (A) : The ionic radii of O^{2-} and Mg^{2+} are same.

Reason (R) : Both O^{2-} and Mg^{2+} are isoelectronic species.

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

A	Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
B	Both **(A)** and **(R)** are true but **(R)** is not the correct explanation of **(A)**.
C	**(A)** is true but **(R)** is false.
D	**(A)** is false but **(R)** is true.

Q:66
Topic Name: Chemistry-Section A

ItemCode:101336

Match **List - I** with **List - II**.

	List - I		**List - II**
(A)	Concentration of gold ore	(I)	Aniline
(B)	Leaching of alumina	(II)	NaOH
(C)	Froth stabiliser	(III)	SO_2
(D)	Blister copper	(IV)	NaCN

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

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

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

Q:67
Topic Name: Chemistry-Section A

ItemCode:101337

Question: Addition of H_2SO_4 to BaO_2 produces :

A	BaO, SO_2 and H_2O
B	$BaHSO_4$ and O_2
C	$BaSO_4$, H_2 and O_2
D	$BaSO_4$ and H_2O_2

Q:68
Topic Name: Chemistry-Section A

ItemCode:101338

Question: $BeCl_2$ reacts with $LiAlH_4$ to give :

A	$Be + Li[AlCl_4] + H_2$
B	$Be + AlH_3 + LiCl + HCl$
C	$BeH_2 + LiCl + AlCl_3$
D	$BeH_2 + Li[AlCl_4]$

Q:69
Topic Name: Chemistry-Section A

ItemCode:101339

Match **List - I** with **List - II**.

	List - I (Si-Compounds)		**List - II (Si-Polymeric/Other Products)**
(A)	$(CH_3)_4Si$	(I)	Chain Silicone
(B)	$(CH_3)Si(OH)_3$	(II)	Dimeric Silicone
(C)	$(CH_3)_2Si(OH)_2$	(III)	Silane
(D)	$(CH_3)_3Si(OH)$	(IV)	2D - Silicone

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

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

Q:70
Topic Name: Chemistry-Section A

ItemCode:101340

Question: Heating white phosphorus with conc. NaOH solution gives mainly :

A	Na_3P and H_2O
B	H_3PO and NaH
C	$P(OH)_3$ and NaH_2PO_4
D	PH_3 and NaH_2PO_2

Q:71
Topic Name: Chemistry-Section A

ItemCode:101341

Question: Which of the following will have maximum stabilization due to crystal field ?

A	$[Ti(H_2O)_6]^{3+}$
B	$[Co(H_2O)_6]^{2+}$
C	$[Co(CN)_6]^{3-}$
D	$[Cu(NH_3)_4]^{2+}$

Q:72
Topic Name: Chemistry-Section A

ItemCode:101342

Question: Given below are two Statements :

Statement I : Classical smog occurs in cool humid climate. It is a reducing mixture of smoke, fog and sulphur dioxide.

Statement II : Photochemical smog has components, ozone, nitric oxide, acrolein, formaldehyde, PAN etc.

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

A	Both **Statement I** and **Statement II** are correct.
B	Both **Statement I** and **Statement II** are incorrect.
C	**Statement I** is correct but **Statement II** is incorrect.
D	**Statement I** is incorrect but **Statement II** is correct.

Q:73
Topic Name: Chemistry-Section A

ItemCode:101343

Question: Which of the following is structure of a separating funnel ?

A

B 

C 

D 

Q:74
Topic Name: Chemistry-Section A

ItemCode:101344

Question:

'A' and 'B' respectively are :

$$\mathbf{A} \xrightarrow[(2)\ Zn\text{-}\ H_2O]{(1)\ O_3} \text{Ethane-1,2-dicarbaldehyde} + \text{Glyoxal/Oxaldehyde}$$

$$\mathbf{B} \xrightarrow[(2)\ Zn\text{-}\ H_2O]{(1)\ O_3} \text{5-oxohexanal}$$

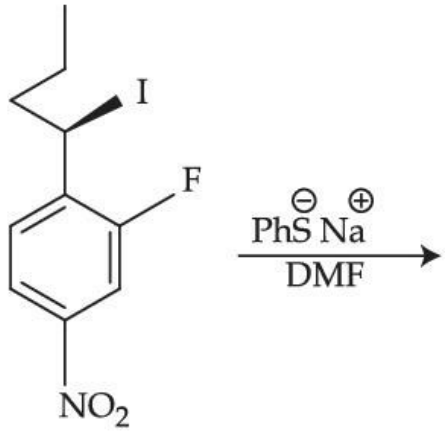
A	1-methylcyclohex-1,3-diene & cyclopentene.
B	Cyclohex-1,3-diene & cyclopentene
C	1-methylcyclohex-1,4-diene & 1-methylcyclopent-1-ene
D	Cyclohex-1,3-diene & 1-methylcyclopent-1-ene

Q:75
Topic Name: Chemistry-Section A

ItemCode:101345

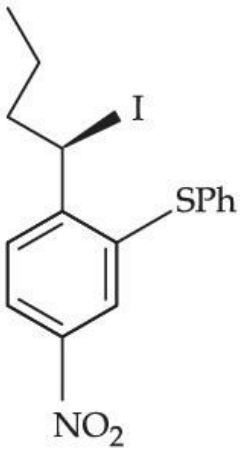
Question:

The major product of the following reaction is :

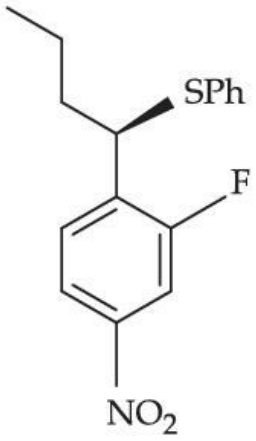


A

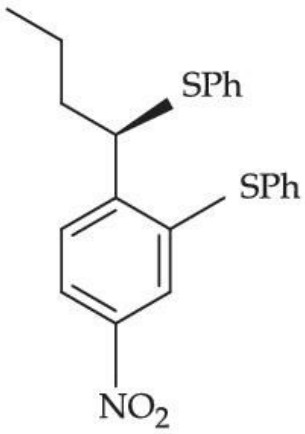
B



C



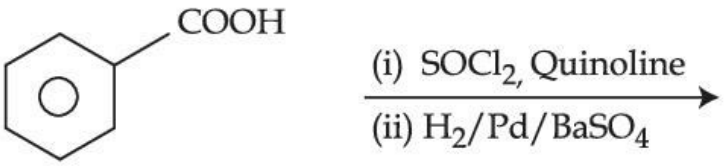
D

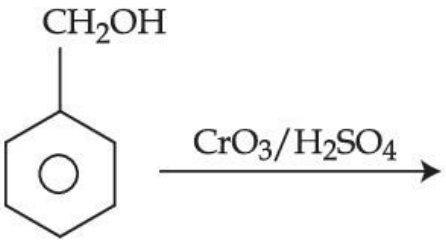


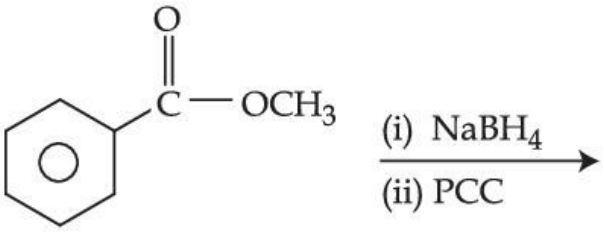
Q:76
Topic Name: Chemistry-Section A

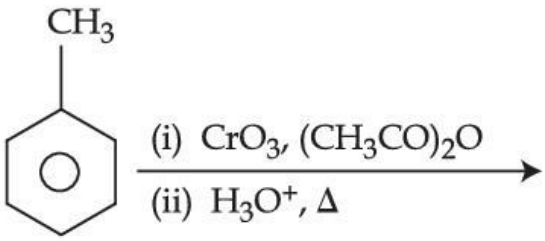
ItemCode:101346

Which of the following reactions will yield benzaldehyde as a product ?

(A) 

(B) 

(C) 

(D) 

Question:

A	(B) and (C)
B	(C) and (D)
C	(A) and (D)
D	(A) and (C)

Q:77
Topic Name: Chemistry-Section A

ItemCode:101347

Given below are two statements :

Statement - I : In Hofmann degradation reaction, the migration of only an alkyl group takes place from carbonyl carbon of the amide to the nitrogen atom.

Statement - II : The group is migrated in Hofmann degradation reaction to electron deficient atom.

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

Question:

A	Both **Statement I** and **Statement II** are correct.
B	Both **Statement I** and **Statement II** are incorrect.
C	**Statement I** is correct but **Statement II** is incorrect.
D	**Statement I** is incorrect but **Statement II** is correct.

Q:78
Topic Name: Chemistry-Section A

ItemCode:101348

Question: Match **List - I** with **List - II**.

List - I (Polymer)		**List - II (Used in)**	
(A)	Bakelite	(I)	Radio and television cabinets
(B)	Glyptal	(II)	Electrical switches
(C)	PVC	(III)	Paints and Lacquers
(D)	Polystyrene	(IV)	Water pipes

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

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

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

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

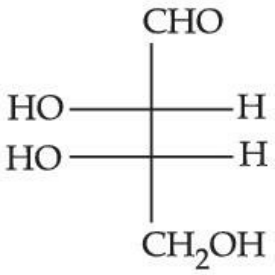
D (A) - (II), (B) - (III), (C) - (I), (D) - (IV)

Q:79
Topic Name: Chemistry-Section A

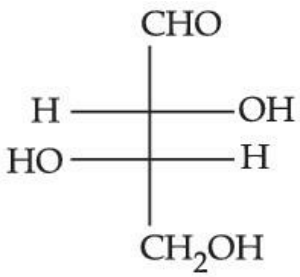
ItemCode:101349

Question: L-isomer of a compound 'A' ($C_4H_8O_4$) gives a positive test with $[Ag(NH_3)_2]^+$. Treatment of 'A' with acetic anhydride yields triacetate derivative. Compound 'A' produces an optically active compound (B) and an optically inactive compound (C) on treatment with bromine water and HNO_3 respectively. Compound (A) is :

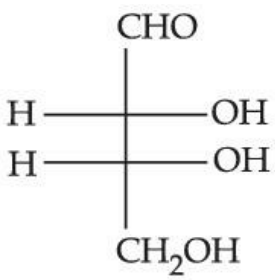
A



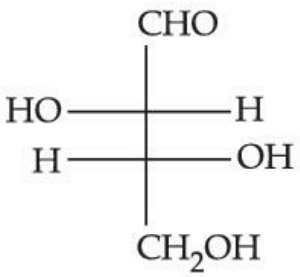
B



C



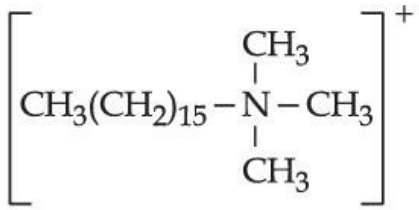
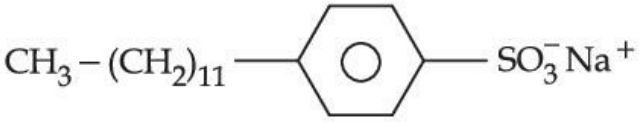
D



Q:80
Topic Name: Chemistry-Section A

ItemCode:101350

Question: Match **List - I** with **List - II**.

List - I		List - II	
(A)		(I)	Dishwashing powder
(B)		(II)	Toothpaste
(C)	$C_{17}H_{35}COO^-Na^+ + Na_2CO_3 + \text{Rosinate}$	(III)	Laundry soap
(D)	$CH_3(CH_2)_{16}COO(CH_2CH_2O)_nCH_2CH_2OH$	(IV)	Hair conditioner

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

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

Q:81
Topic Name: Chemistry-Section B

ItemCode:101351

Question: Metal deficiency defect is shown by $Fe_{0.93}O$. In the crystal, some Fe^{2+} cations are missing and loss of positive charge is compensated by the presence of Fe^{3+} ions. The percentage of Fe^{2+} ions in the $Fe_{0.93}O$ crystals is _____. (Nearest integer)

Q:82
Topic Name: Chemistry-Section B

ItemCode:101352

Question: If the uncertainty in velocity and position of a minute particle in space are, 2.4×10^{-26} (m s^{-1}) and 10^{-7} (m) respectively. The mass of the particle in g is _____. (Nearest integer)

(Given : $h = 6.626 \times 10^{-34}$ Js)

Q:83
Topic Name: Chemistry-Section B

ItemCode:101353

Question: 2 g of a non-volatile non-electrolyte solute is disolved in 200 g of two different solvents A and B whose ebullioscopic constants are in the ratio of 1 : 8. The elevation in boiling points of A and B are in the ratio $\frac{x}{y}$ $(x : y)$. The value of y is _____. (Nearest Integer)

Q:84
Topic Name: Chemistry-Section B

ItemCode:101354

Question: $2NOCl(g) \rightleftharpoons 2NO(g) + Cl_2(g)$

In an experiment, 2.0 moles of NOCl was placed in a one-litre flask and the concentration of NO after equilibrium established, was found to be 0.4 mol/L. The equilibrium constant at 30°C is _____ $\times 10^{-4}$.

Q:85
Topic Name: Chemistry-Section B

ItemCode:101355

Question: The limiting molar conductivities of NaI, $NaNO_3$ and $AgNO_3$ are 12.7, 12.0 and 13.3 mS m^2 mol^{-1}, respectively (all at 25°C). The limiting molar conductivity of AgI at this temperature is _____ mS m^2 mol^{-1}.

Q:86
Topic Name: Chemistry-Section B

ItemCode:101356

Question: The rate constant for a first order reaction is given by the following equation :

$$\ln k = 33.24 - \frac{2.0 \times 10^4 \text{ K}}{T}$$

The Activation energy for the reaction is given by _____ kJ mol^{-1}. (In Nearest integer)
(Given : R = 8.3 J K^{-1} mol^{-1})

Q:87
Topic Name: Chemistry-Section B

ItemCode:101357

Question: The number of statement(s) **correct** from the following for Copper (at. no. 29) is/are _____.

(A) Cu(II) complexes are always paramagnetic

(B) Cu(I) complexes are generally colourless

(C) Cu(I) is easily oxidized

(D) In Fehling solution, the active reagent has Cu(I)

Q:88
Topic Name: Chemistry-Section B

ItemCode:101358

Question: Acidified potassium permanganate solution oxidises oxalic acid. The spin-only magnetic moment of the mangenese product formed from the above reaction is _____ B.M. (Nearest Integer)

Q:89
Topic Name: Chemistry-Section B

ItemCode:101359

Question: Two elements A and B which form 0.15 moles of A_2B and AB_3 type compounds. If both A_2B and AB_3 weigh equally, then the atomic weight of A is _____ times of atomic weight of B.

Q:90
Topic Name: Chemistry-Section B

ItemCode:101360

Question: Total number of possible stereoisomers of dimethyl cyclopentane is _____.