

1 - JEE Main Maths 23-Jan 2026 Shift -2

Q1. 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 [2026]

- | | |
|----------------------|-----------------------|
| 1) $4(6 + \sqrt{3})$ | 2) $4(3 - \sqrt{3})$ |
| 3) $2(3 + \sqrt{3})$ | 4) $2(8 - 3\sqrt{3})$ |

Q2. If $f(x) = \begin{cases} \frac{a|x| + x^2 - 2(\sin|x|)(\cos|x|)}{x}, & x \neq 0 \\ b, & x = 0 \end{cases}$

is continuous at $x=0$, then $a+b$ is equal to [2026]

- | | |
|------|------|
| 1) 0 | 2) 4 |
| 3) 2 | 4) 1 |

Q3. 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. [2026]

- | | |
|-------------------|--------------------------|
| 1) $\frac{9}{5}$ | 2) $\frac{8\sqrt{3}}{5}$ |
| 3) $\frac{11}{5}$ | 4) $2\sqrt{3}$ |

Q4. The number of ways, in which 16 oranges can be distributed to four children such that each child gets at least one orange, is [2026]

- | | |
|--------|--------|
| 1) 403 | 2) 429 |
| 3) 455 | 4) 384 |

Q5. The system of linear equations

$$\begin{aligned} x + y + z &= 6 \\ 2x + 5y + az &= 36 \text{ has [2026]} \\ x + 2y + 3z &= b \end{aligned}$$

- | | |
|---|---|
| 1) unique solution for $a=8$ and $b=14$ | 2) infinitely many solutions for $a=8$ and $b=16$ |
| 3) infinitely many solutions for $a=8$ and $b=14$ | 4) unique solution for $a=8$ and $b=16$ |

Q6. 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 [2026]

- | | |
|------|------|
| 1) 2 | 2) 4 |
| 3) 1 | 4) 0 |

Q7. If $z = \frac{\sqrt{3}}{2} + \frac{i}{2}, i = \sqrt{-1}$ then $(z^{201} - i)^8$ is equal to [2026]

- | | |
|--------|-------|
| 1) 0 | 2) 1 |
| 3) 256 | 4) -1 |

3) 52

4) 55

Q15. Consider two sets $A = \{x \in \mathbb{Z} : ||x - 3| - 3| \leq 1$ and

$$B = \left\{x \in \mathbb{R} - \{1, 2\} : \frac{(x-2)(x-4)}{x-1} \log_e(|x-2|) = 0\right\}.$$

Then the number of onto functions $f: A \rightarrow B$ is equal to. **[2026]**

1) 62

2) 32

3) 79

4) 81

Q16. Let $\sum_{k=1}^n a_k = \alpha n^2 + \beta n$. If $a_{10} = 59$ and $a_{11} = 59$, then $\alpha + \beta$ is equal to **[2026]**

1) 3

2) 12

3) 7

4) 5

Q17. The sum of all the real solutions of the equation

$$\log_{(x+3)}(6x^2 + 28x + 30) = 5 - 2\log_{(6x+10)}(x^2 + 6x + 9) \text{ is equal to. [2026]}$$

1) 0

2) 2

3) 4

4) 1

Q18. 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 $B(\alpha, \beta)$ and $D(\gamma, \delta)$ are the other two vertices, then $|\alpha + \beta + \gamma + \delta|$ is equal to. **[2026]**

1) 6

2) 1

3) 3

4) 9

Q19. 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 $\lambda + \mu$ is. **[2026]**

1) 18

2) 20

3) 21

4) 19

Q20. The least value of $(\cos^2\theta - 6\sin\theta \cos\theta + 3\sin^2\theta + 2)$ is **[2026]**

1) $4 - \sqrt{10}$

2) $4 + \sqrt{10}$

3) 1

4) -1

Q21. If the solution curve $y=f(x)$ of the differential equation

$$(x^2 - 4)y' - 2xy + 2x(4 - x^2)^2 = 0, \quad x > 2,$$

passes through the point $(3,15)$ then the local maximum value of f is _____. **[2026]**

Q22. Let $A = \begin{bmatrix} 0 & 2 & -3 \\ -2 & 0 & 1 \\ 3 & -1 & 0 \end{bmatrix}$ and B be a matrix such that $B B (I - A) = I + A$ Then the sum of the diagonal elements of $B^T B$ is equal to _____. [2026]

Q23. 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 _____. [2026]

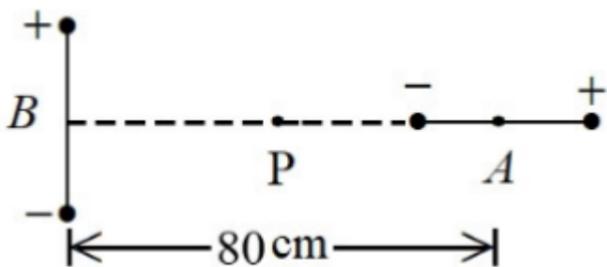
Q24. If the image of the point $P(a, 2, a)$ in the line $\frac{x}{2} = \frac{y+a}{1} = \frac{z}{1}$ is Q and the image of Q in the line $\frac{x-2b}{2} = \frac{y-a}{1} = \frac{z+2b}{-5}$ is P, then $a+b$ is equal to _____. [2026]

Q25. The number of elements in the set

$S = \{x: x \in [0, 100] \text{ and } \int_0^x t^2 \sin(x-t) dt = x^2\}$ is _____. [2026]

2 - JEE Main Physics 23-Jan 2026 Shift -2

Q26. Two short dipoles (A,B), A having charges $\pm 2 \mu\text{C}$ and length 1 cm and B having charges $\pm 4 \mu\text{C}$ 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. [2026]



- 1) $\frac{9}{16}\sqrt{2} \times 10^4$ 2) $\frac{9}{16}\sqrt{2} \times 10^5$
 3) $4.5\sqrt{2} \times 10^4$ 4) $9\sqrt{2} \times 10^4$

Q27. 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) _____ $^\circ\text{C}$.

($\log_e 2 = 0.693$) [2026]

- 1) -189 2) -117
 3) -30 4) -56

Q28. 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 _____. [2026]

- 1) 2.0 2) 1.5
 3) 1.0 4) 2.5

Q29. A paratrooper jumps from an aeroplane and opens a parachute after 2 s of free fall and starts decelerating 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.

($g = 10 \text{ m/s}^2$) [2026]

- 1) 20
3) 82.5

- 2) 62.5
4) 92.5

Q30. 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.

$\left(\pi = \frac{22}{7} \text{ and } g = 10 \text{ m/s}^2 \right)$ [2026]

- 1) 3.0
3) 2.0

- 2) 1.0
4) 1.5

Q31. 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. [2026]

- 1) 13.2
3) 8.25

- 2) 1.32
4) 6.6

Q32. 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 _____. [2026]

- 1) 1.75
3) 1.45

- 2) 1.55
4) 1.65

Q33. Suppose a long solenoid of 100 cm length, radius 2 cm having 500 turns per unit length, carries a $I = 10 \sin(\omega t)$ A, where $\omega = 1000 \text{ rad/s}$. A circular conducting loop (B) of radius 1 cm coaxially slides through the solenoid at speed $v=1 \text{ cm/s}$. The r.m.s. current through the loop when the coil B is inserted 10 cm inside the solenoid is $\frac{\alpha}{\sqrt{2}} \mu\text{A}$. The value of α is _____.

[Resistance of the loop = 10Ω] [2026]

- 1) 280
3) 197

- 2) 80
4) 100

Q34. 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 .

($g = 10 \text{ m/s}^2$, density of water = 10^3 kg/m^3 , and 1 atm pressure is 10^5 Pa) [2026]

- 1) 2.0
3) 3.0

- 2) 4.2
4) 4.5

Q35. The ratio of speeds of electromagnetic waves in vacuum and a medium, having dielectric constant $k = 3$ and permeability $\mu = 2\mu_0$, is

$\left(\mu_0 = \text{permeability of vacuum} \right)$ [2026]

- 1) $\sqrt{6}:1$
3) 36:1

- 2) 3:2
4) 6:1

Q36. The internal energy of a monoatomic gas is $3nRT$. One mole of helium is kept in a cylinder having internal cross sectional area of 17 cm^2 and fitted with a light movable frictionless piston. The gas is heated slowly by supplying 126 J heat. If the temperature rises by 4°C , then the piston will move ____ cm.

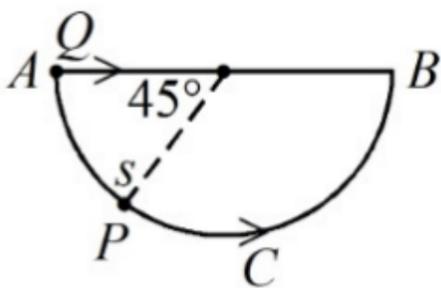
(atmospheric pressure = 10^5 Pa) [2026]

- 1) 15.5
- 2) 1.45
- 3) 14.5
- 4) 1.55

Q37. 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. [2026]

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

Q38. 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. [2026]

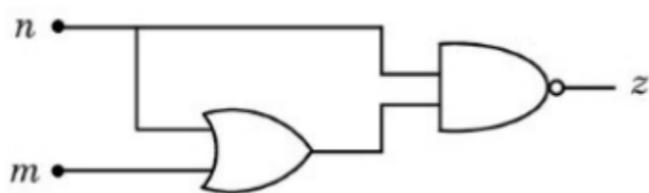


- 1) $t_P < t_Q$
- 2) $t_P = t_Q$
- 3) $t_P > 1.25 t_Q$
- 4) $t_P > t_Q$

Q39. Which of the following pair of nuclei are isobars of the element? [2026]

- 1) ${}^2_1\text{H}$ and ${}^3_1\text{H}$
- 2) ${}^{236}_{92}\text{U}$ and ${}^{238}_{92}\text{U}$
- 3) ${}^3_1\text{H}$ and ${}^3_2\text{He}$
- 4) ${}^{198}_{80}\text{Hg}$ and ${}^{197}_{79}\text{Au}$

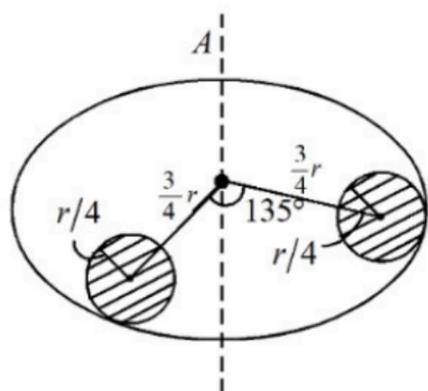
Q40. For the given logic gate circuit, which of the following is the correct truth table? [2026]



- 1)

n	m	z
0	0	1
0	1	0
1	1	0
1	0	0
- 2)

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



Q47. The velocity of sound in air is doubled when the temperature is raised from 0°C to $\alpha^{\circ}\text{C}$. The value of α is _____. [2026]

Q48. 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. [2026]

Q49. 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 _____. [2026]

Q50. 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) [2026]

3 - JEE Main Chemistry 23-Jan 2026 Shift -2

Q51. 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 [2026]

- | | |
|-----------|-----------|
| 1) 34.79% | 2) 37.57% |
| 3) 87.65% | 4) 53.58% |

Q52. 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 $(\text{CH}_3 - \text{CH} = \text{CH} - \overset{\text{O}}{\parallel} \text{C} - \text{CH}_3)$ 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: [2026]

- | | |
|------------------|------------------|
| 1) A, B & C Only | 2) A, C & E Only |
| 3) A & C Only | 4) B, D & E Only |

Q53. Identify the **CORRECT** set of details from the following:

- A. $[\text{Co}(\text{NH}_3)_6]^{3+}$: Inner orbital complex; $d^2 sp^3$ hybridized
 B. $[\text{MnCl}_6]^{3-}$: Outer orbital complex; $sp^3 d^2$ hybridized

C. $[\text{CoF}_6]^{3-}$: Outer orbital complex; d^2sp^3 hybridized

D. $[\text{FeF}_6]^{3-}$: Outer orbital complex; sp^3d^2 hybridized

E. $[\text{Ni}(\text{CN})_4]^{2-}$: Inner orbital complex; sp^3 hybridized

Choose the correct answer from the options given below: [2026]

1) A, C & E Only

2) C & D Only

3) A, B, C, D & E

4) A, B & D Only

Q54. Both human DNA and RNA are chiral molecules. The chirality in DNA and RNA arises due to the presence of [2026]

1) Chiral phosphate unit

2) L-sugar component

3) D-sugar component

4) Base unit

Q55. 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: [2026]

1) Both Statement I and Statement II are false

2) Both Statement I and Statement II are true

3) Statement I is false but Statement II is true

4) Statement I is true but Statement II is false

Q56. 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: [2026]

1) 2.3, 4.6

2) 3.1, 6.2

3) 1.5, 3.0

4) 1.4, 2.8

Q57. 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? [2026]

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 $c_1 > c_2$.

Q58. 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.



Identify the correct set from the following: [2026]

1) $\Delta_r G^\circ (1) < 0$; $\Delta_r G^\circ (2) < 0$

2) $\Delta_r G^\circ (1) < 0$; $\Delta_r G^\circ (2) > 0$

$$3) \Delta_r G^\circ(1) > 0 ; \Delta_r G^\circ(2) > 0$$

$$4) \Delta_r G^\circ(1) > 0 ; \Delta_r G^\circ(2) < 0$$

Q59. 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: [2026]

- 1) B, C and E Only
- 2) B and D Only
- 3) A and D Only
- 4) B, D and E Only

Q60. 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 [2026]

- 1) As & Sb
- 2) As & Bi
- 3) N & As
- 4) Bi & N

Q61. Identify the INCORRECT statements from the following:

- A. Notation ${}_{12}^{24}\text{Mg}$ represents 24 protons and 12 neutrons.
- B. Wavelength of a radiation of frequency $4.5 \times 10^{15} \text{ s}^{-1}$ is $6.7 \times 10^{-8} \text{ m}$
- 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: [2026]

- 1) B and C Only
- 2) A and B Only
- 3) A and D Only
- 4) A and C Only

Q62. The oxidation state of chromium in the final product formed in the reaction between KI and acidified $\text{K}_2\text{Cr}_2\text{O}_7$ solution is: [2026]

- 1) +4
- 2) +2
- 3) +6
- 4) +3

Q63. Given below are two statements:

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

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

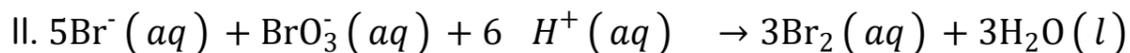
In the light of the above statements, choose the correct answer from the options given below:

[2026]

- | | |
|--|--|
| 1) Both Statement I and Statement II are true | 2) Both Statement I and Statement II are false |
| 3) Statement I is false but Statement II is true | 4) Statement I is true but Statement II is false |

Q64. Observe the following reactions at T(K).

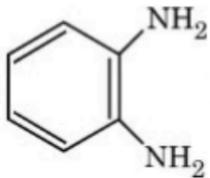
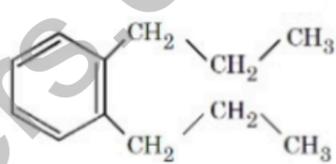
I. $A \rightarrow \text{products}$



Both the reactions are started at 10.00 am. The rates of these reactions at 10.10 am are same. The value of $-\frac{\Delta[\text{Br}^-]}{\Delta t}$ at 10.10 am is $2 \times 10^{-4} \text{ mol L}^{-1} \text{ min}^{-1}$. The concentration of A at 10.10 am is $10^{-2} \text{ mol L}^{-1}$. What is the first order rate constant (in min^{-1}) of reaction I? [2026]

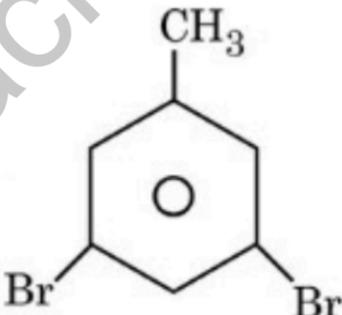
- | | |
|--------------|-----------------------|
| 1) 10^{-2} | 2) 4×10^{-3} |
| 3) 10^{-3} | 4) 2×10^{-3} |

Q65. Given below are two statements:

Statement I:  can be synthesized from the given  using simpler

reagents in the order:

(i) Acidic KMnO_4 (ii) Ammonia, (iii) Bromine and alkali.

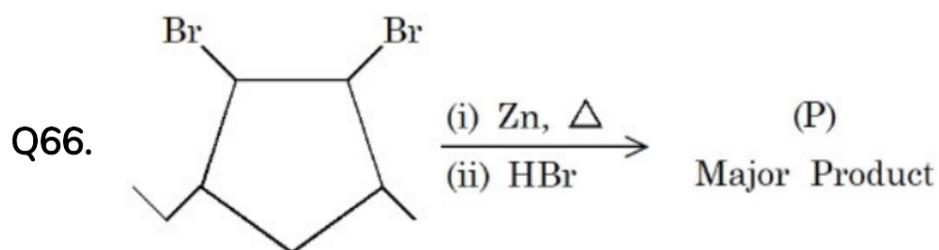
Statement II:  can be converted into  using reagents in the order:

(i) Bromine- H_2O (ii) $\text{NaNO}_2 / \text{HCl} (0 - 5^\circ\text{C})$, (iii) Aqueous H_3PO_2 .

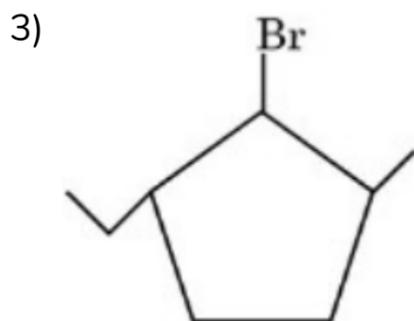
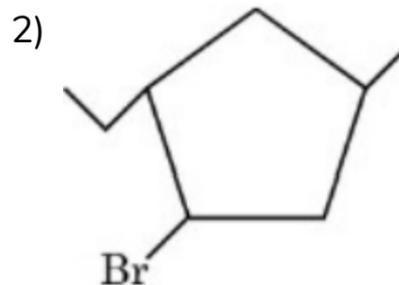
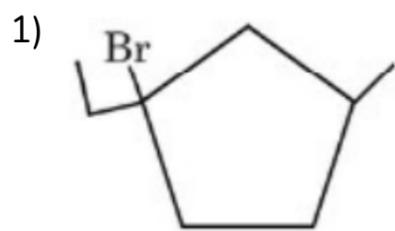
In the light of the above statements, choose the correct answer from the options given below:

[2026]

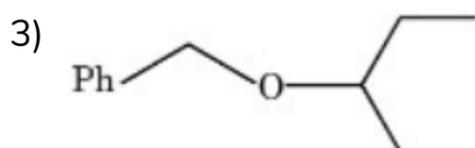
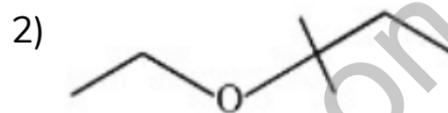
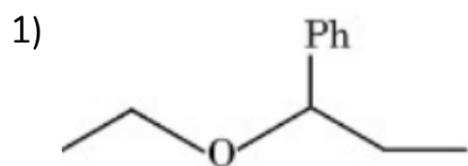
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|--|--|
| 1) Both Statement I and Statement II are true | 2) Statement I is false but Statement II is true |
| 3) Both Statement I and Statement II are false | 4) Statement I is true but Statement II is false |



Identify (P) [2026]



Q67. 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). [2026]



Q68. 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: [2026]

- 1) A & D Only
- 2) B, C & E Only
- 3) A, B & E Only
- 4) A & E Only

Q69. 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: [2026]

- 1) 7
- 2) 8
- 3) 5
- 4) 4

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