



Sri Chaitanya IIT Academy.,India.

★ A.P ★ T.S ★ KARNATAKA ★ TAMILNADU ★ MAHARASTRA ★ DELHI ★ RANCHI

A right Choice for the Real Aspirant
ICON Central Office - Madhapur - Hyderabad

SEC: Sr.Super60_NUCLEUS-BT

JEE-MAIN

Date: 23-08-2025

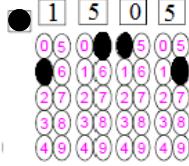
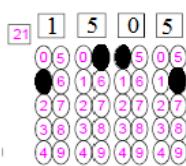
Time: 09.00Am to 12.00Pm

RPTM-07

Max. Marks: 300

IMPORTANT INSTRUCTION:

1. Immediately fill in the Admission number on this page of the Test Booklet with **Blue/Black Ball Point Pen** only.
 2. The candidates should not write their Admission Number anywhere (except in the specified space) on the Test Booklet/ Answer Sheet.
 3. The test is of **3 hours** duration.
 4. The Test Booklet consists of **75 Questions**. The maximum marks are **300**.
 5. There are **three** parts in the question paper 1,2,3 consisting of **Mathematics, Physics and Chemistry** having **25 Questions** in each subject and subject having **two sections**.
 - (I) Section –I contains **20 Multiple Choice Questions** with only one correct option.
Marking scheme: +4 for correct answer, 0 if not attempt and -1 in all other cases.
 - (II) Section-II contains **05 Numerical Value Type Questions**.
- The Answer should be within **0 to 9999**. If the Answer is in **Decimal** then round off to the **Nearest Integer** value (Example i.e. If answer is above **10** and less than **10.5** round off is **10** and If answer is from **10.5** and less than **11** round off is **11**).
- To cancel any attempted question bubble on the question number box.
- For example: To cancel attempted Question 21. Bubble on 21 as shown below



Question Answered for Marking

Question Cancelled for Marking

Marking scheme: +4 for correct answer, 0 if not attempt and -1 in all other cases.

6. Use **Blue / Black Point Pen only** for writing particulars / marking responses on the Answer Sheet. **Use of pencil is strictly prohibited.**
7. No candidate is allowed to carry any textual material, printed or written, bits of papers, mobile phone any electron device etc, except the Identity Card inside the examination hall.
8. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
9. On completion of the test, the candidate must hand over the Answer Sheet to the invigilator on duty in the Hall. **However, the candidate are allowed to take away this Test Booklet with them.**
10. **Do not fold or make any stray marks on the Answer Sheet**

Name of the Candidate (in Capital): _____

Admission Number: _____

| | | | | | | | |
|--|--|---|--|--|--|--|--|
| | | * | | | | | |
|--|--|---|--|--|--|--|--|

Candidate's Signature: _____

Invigilator's Signature: _____



MATHEMATICS : Areas and Differential Equations

PHYSICS

: Ray Optics: Rectilinear propagation of light; Reflection by plane and spherical mirrors, Magnification; Refraction at plane and spherical surfaces; Total internal reflection; Thin lenses; Combinations of mirrors and thin lenses; Magnification. Experiments: focal length of a convex lens and convex and concave mirrors using UV method (parallax method), The plot of the angle of deviation vs angle of incidence for a triangular prism. Refractive index of a glass slab using a travelling microscope. Deviation and dispersion of light by a prism (Deleted for MAINS);

CHEMISTRY

: Amines: Basicity of substituted anilines and aliphatic amines, Preparation from nitro compounds, nitriles and amides; Reactions: Hoffmann bromamide degradation, Gabriel phthalimide synthesis; Reaction with nitrous acid, Azo coupling reaction of diazonium salts of aromatic amines; Sandmeyer and related reactions of diazonium salts; Carbylamine reaction, Hinsberg test, Alkylation and acylation reaction Carboxylic acids & derivatives: Physical properties; Preparation: from nitriles, Grignard reagents, hydrolysis of esters and amides; Formation of esters, acid chlorides , and amides, Preparation of benzoic acid from alkylbenzenes; Reactions: reduction, halogenation, formation of esters, acid chlorides, anhydrides and amides
Polymers: Types of polymerization (addition, condensation); Homo and copolymers; Natural rubber; Cellulose; Nylon; Teflon; Bakelite; PVC; polythene,synthetic rubber,Bio-degradable polymers; Applications of polymers.

NOTE : POLYMERS (NOT IN JEE MAINS)



**SECTION-I
(SINGLE CORRECT ANSWER TYPE)**

This section contains **20 Multiple Choice Questions**. Each question has 4 options (1), (2), (3) and (4) for its answer, out of which ONLY ONE option can be correct.

Marking scheme: +4 for correct answer, 0 if not attempted and -1 in all other cases.

1. A continuous function $f : R \rightarrow R$ satisfies the differential equation

$$f(x) = (1+x^2) \left(1 + \int_0^x \frac{f^2(t)}{1+t^2} dt \right), \text{ then } (f(-1) + f(-2)) \text{ is equal to}$$

- 1) $\frac{207}{119}$ 2) $\frac{217}{119}$ 3) $\frac{227}{119}$ 4) $\frac{119}{207}$

2. Let $f : R^+ \rightarrow R$ be a differentiable function where $f(x) = e - (x-1)(\ln x - 1) + \int_1^x f(t)dt$.

Then identify which of the following is not true?

- 1) $f(e) = 1 + e^e$
 2) f increases on R^+
 3) $f(x) = 0$ has exactly one real root in $(0, \infty)$
 4) f decreases on R^+

3. The curve C passes through $(2, 2)$ in which the portion of tangent included between the coordinate axes is bisected at point of contact. The curve C passes through

- 1) $\left(2, \frac{1}{2}\right)$ 2) $\left(3, \frac{4}{3}\right)$ 3) $\left(3, \frac{3}{4}\right)$ 4) $\left(2, \frac{1}{4}\right)$

4. Let the differential equation be $x \frac{dy}{dx} - y = x^2 (xe^x + e^x - 1)$ for all $x \in R - \{0\}$ such that $y(1) = e - 1$. If $y(2) = Ky(1)(y(1) + 2)$, then the value of K is

- 1) 1 2) 2 3) 3 4) 4

5. Let $f : [1, \infty) \rightarrow R$ be a differentiable function such that $f(1) = \frac{1}{3}$ and

$$3 \int_1^x f(t)dt = xf(x) - \frac{x^3}{3}, x \in [1, \infty). \text{ Let e denotes the base of the natural logarithm. Then}$$

the value of $f(e)$ is equal to

- 1) $\frac{e^2 + 4}{3}$ 2) $\frac{\log_e 4 + e}{3}$ 3) $\frac{4e^2}{3}$ 4) $\frac{e^2 - 4}{3}$

**THE PERFECT HAT-TRICK WITH ALL-INDIA RANK 1
IN JEE MAIN 2023 JEE ADVANCED 2023 AND NEET 2023**



6. Consider a rectangle ABCD formed by the points $A(0,0), B(6,0), C(6,4), D(0,4)$.
 $P(x,y)$ is a moving interior point of the rectangle moving in such a way that
 $d(P,AB) \leq \min\{d(P,BC), d(P,CD), d(P,AD)\}$
 Here $d(P,AB), d(P,BC), d(P,CD)$ and $d(P,AD)$ represent the distances of the point P from the sides AB, BC, CD and AD respectively. Area of the region representing all possible positions of the point P is equal to
 1) 8 sq. units 2) 4 sq. units 3) 12 sq. units 4) 6 sq. units
7. If $\frac{dy}{dx} = x + \int_0^1 y(x) dx = 0, y(0) = 1$, then $3 \int_0^1 y(x) dx =$
 1) 7 2) 5 3) 2 4) 11
8. Area bounded by the curve $f(x) = \cos^{-1}(\cos x), 0 \leq x \leq 2\pi$ with the tangent to the curve $g(x) = |\cos x|$ at $x = \pi$ is λ sq. units. The value of $[\lambda]$ (where $[\cdot]$ represents greatest integer function) is equal to
 1) 4 2) 6 3) 5 4) 3
9. Consider functions $f(x)$ and $g(x)$, both defined from $R \rightarrow R$ and are defined as $f(x) = 2x - x^2$ and $g(x) = x^n$ where $n \in N$, If the area between $f(x)$ and $g(x)$ is $\frac{3}{5}$ sq. units , then n is a divisor of
 1) 28 2) 21 3) 35 4) 45
10. If the area bounded by the curve $f(x) = \cos^{-1}\left(\sin\left(\left\{\frac{\pi}{2}\right\} - [\sin x]\right)\right)$ and $x-axis$ from $x=0$ to $x=2\pi$ is $k\pi$ sq. units, then the value of $3k$ is ([.] is greatest integer function and {.} is fractional part function)
 1) 6 2) 3 3) 12 4) 15
11. Let $f: R \rightarrow R$ be a twice differentiable function such that $f(x+y) = f(x)f(y)$ for all $x, y \in R$. If $f'(0) = 4\alpha$ and f satisfies $f''(x) - 3\alpha f'(x) - f(x) = 0, \alpha > 0$, then the area of the region $R = \{(x, y) : 0 \leq f(\alpha x), 0 \leq x \leq 2\}$ is $\beta e^\gamma - 1$. Then the value of $2\alpha + \beta + \gamma =$
 1) 3 2) 4 3) 5 4) 6



12. The area (in sq. units) of the region $\{(x, y) : 0 \leq y \leq 2|x|+1, 0 \leq y \leq x^2 + 1, |x| \leq 3\}$ is A, then the value of 3A is equal to
 1) 17 2) 32 3) 64 4) 80
13. If $f(x) = x - 1$ and $g(x) = |f(|x|)| - 2$, then the area (in sq. units) bounded by $y = g(x)$ and the curve $x^2 - 4y + 8 = 0$ is equal to
 1) $\frac{4}{3}(4\sqrt{2} - 5)$ 2) $\frac{4}{3}(4\sqrt{2} - 3)$ 3) $\frac{8}{3}(4\sqrt{2} - 3)$ 4) $\frac{8}{3}(4\sqrt{2} - 5)$
14. If $(x^2 + 4y^2 + 4xy)dy = (2x + 4y + 1)dx$ has a solution
 $y = \ln|f(x, y)| - \frac{3}{2\sqrt{2}}\ln|g(x, y)| + c$, then

| | COLUMN-I | | COLUMN-II |
|----|------------------|----|-----------------|
| A) | $f(0, 0)$ | P) | $3 - 2\sqrt{2}$ |
| B) | $g(0, 0)$ | Q) | $\sqrt{2} - 1$ |
| C) | $f(1, -1)$ | R) | 2 |
| D) | $g(\sqrt{2}, 0)$ | S) | -1 |

- 1) A: R, B:P, C:Q , D: S 2) A: R, B:Q, C:S , D: P
 3) A: P, B:Q, C:R , D: S 4) A: R, B:P, C:S , D:Q
15. Let $f : [-1, 1] \rightarrow \left[-\frac{1}{2}, \frac{1}{2}\right]$ and $f(x) = \frac{x}{1+x^2}$. The area (in sq. units) bounded by $y = f^{-1}(x)$, $x-axis$ between the ordinates $x = -\frac{1}{2}$ and $x = \frac{1}{2}$ is
 1) $\frac{1}{2}\ln e$ 2) $\ln\left(\frac{e}{2}\right)$ 3) $\ln e$ 4) $\frac{1}{2}\ln\left(\frac{e}{2}\right)$
16. The area enclosed by the curves $y = \log_e(x + e^2)$, $x = \log_e\left(\frac{2}{y}\right)$ and $x = \log_e 2$, above the line $y=1$ is $(1 + \beta e + \gamma \log_e 2)$ where $\beta, \gamma \in I$, then $|\beta - \gamma|$ is equal to
 1) 2 2) 3 3) 4 4) 5



17. The area of region $\{(x, y) : xy \leq 8, 1 \leq y \leq x^2\}$ is $\left(\lambda \log_e 2 - \frac{11+\alpha}{3} \right)$ sq. units, where $\lambda, \alpha \in N$. Then the value of $\left[\frac{\lambda}{\alpha} \right]$ (where $[.]$ represents greatest integer function) is equal to
 1) 3 2) 5 3) 6 4) 4
18. Let S be the set of all points $x, y \in (0,1)$ such that $\left[\log_2 \frac{1}{x} \right]$ and $\left[\log_5 \frac{1}{y} \right]$ are both even (where $[.]$ represents the greatest integer function). Then the area of the region S is equal to (in sq.units)
 1) $\frac{4}{9}$ 2) $\frac{5}{9}$ 3) $\frac{2}{9}$ 4) $\frac{8}{9}$
19. If $u = u(x)$ and $v = v(x)$ be differentiable functions for $x > 0$ such that $xu' + v = 0, xv' + u = 0, u(1) = 0, v(1) = 2$, then $\int_0^1 \frac{u}{v} dx =$
 1) 1 2) $\frac{\pi}{4}$ 3) $\frac{\pi}{2} - 1$ 4) $\frac{\pi}{4} - 1$
20. Statement-I : Let $f : R \rightarrow R$, $f(x) = x + \sin x$. If $f^{-1}(x)$ is the inverse function of $f(x)$, then $\int_0^\pi f^{-1}(x) dx = \frac{\pi^2}{2} - 1$

Statement-II : The graph of $y = f^{-1}(x)$ is the image of the graph of $y = f(x)$ in the line $x - y = 0$

- 1) Statement-I is true, Statement-II is true
 2) Statement-I is true, Statement-II is false
 3) Statement-I is false, Statement-II is true
 4) Statement-I is false, Statement-II is false

SECTION-II (NUMERICAL VALUE TYPE)

This section contains 5 Numerical Value Type Questions. The Answer should be within 0 to 9999. If the Answer is in Decimal then round off to the Nearest Integer value (Example i.e. If answer is above 10 and less than 10.5 round off is 10 and If answer is from 10.5 and less than 11 round off is 11).

Marking scheme: +4 for correct answer, 0 if not attempt and -1 in all other cases.



21. The slope of the tangent to a curve $C: y = y(x)$ at any point (x, y) on it is

$\frac{2e^{2x} - 6e^{-x} + 9}{2 + 9e^{-2x}}$. If C passes through the points $\left(0, \frac{1}{2} + \frac{\pi}{2\sqrt{2}}\right)$ and $\left(\alpha, \frac{e^{2\alpha}}{2}\right)$,

then $e^{2\alpha}$ is equal to $\frac{l}{2} \left(\frac{11+m\sqrt{2}}{11-n\sqrt{2}} \right)$. The value of $(l+m+n) = \underline{\hspace{2cm}}$

22. Let $f:[1,4] \rightarrow R$ be a twice differentiable function on $(1,4)$ such that

$f(x) = e^{-x} \int_3^x (3t^2 + 2t + 4f'(t)) dt$. If $f'(2) = \frac{\alpha e^\beta - 64}{(e^\beta - 4)^2}$, then $\frac{\alpha}{\beta}$ is equal to $\underline{\hspace{2cm}}$

23. Let $g(x) = \int_x^{x^2 + \frac{\pi}{3}} 2 \cos^2 \mu d\mu$ for all $x \in R$ and $f: \left[0, \frac{1}{2}\right] \rightarrow [0, \infty)$ be a continuous

function. For $t \in \left[0, \frac{1}{2}\right]$, if $g'(t) + 4$ is the area of the region bounded by

$x=0, y=0, y=f(x)$ and $x=t$, then $f(0)$ is $\underline{\hspace{2cm}}$

24. Let $f(x) = \frac{x^3}{24} + \frac{x^2}{8} + \frac{13x}{12} + 1$ and $g(x)$ is the inverse function of $f(x)$. If the area

bounded by the curve $g(x)$, the x-axis and the ordinates $x=-1$ and $x=4$, is A sq. units, then the value of $3A$ is equal to

25. Let $f: R \rightarrow R$ be a thrice differentiable odd function satisfying

$f'(x) \geq 0, f''(x) = f(x), f(0) = 0, f'(0) = 2$, then the value of $6f(\log_e 2)$ is equal to



**SECTION-I
(SINGLE CORRECT ANSWER TYPE)**

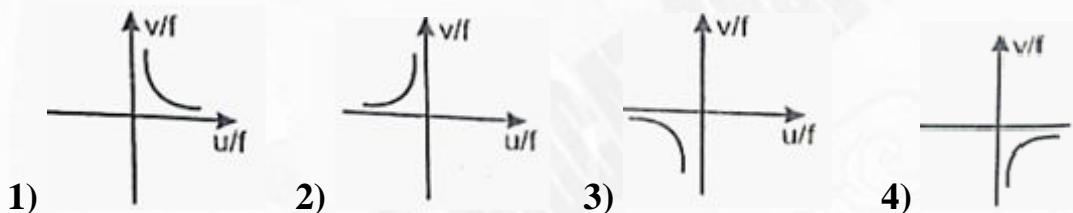
This section contains **20 Multiple Choice Questions**. Each question has 4 options (1), (2), (3) and (4) for its answer, out of which **ONLY ONE** option can be correct.

Marking scheme: +4 for correct answer, 0 if not attempted and -1 in all other cases.

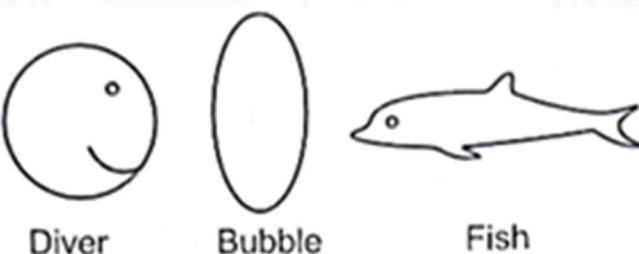
26. A plane mirror is moving with velocity $4\hat{i} + 5\hat{j} + 6\hat{k}$. A point object in front of the mirror moves with a velocity $3\hat{i} + 4\hat{j} + 5\hat{k}$. Here \hat{k} is along the normal to the plane mirror and facing towards the object. The velocity of the image is:

- 1) $-3\hat{i} - 4\hat{j} + 5\hat{k}$ 2) $3\hat{i} + 4\hat{j} + 7\hat{k}$ 3) $3\hat{i} + 4\hat{j} + 11\hat{k}$ 4) $7\hat{i} + 9\hat{j} + 11\hat{k}$

27. A real inverted image in a concave mirror is represented by (u, v, f are coordinates)



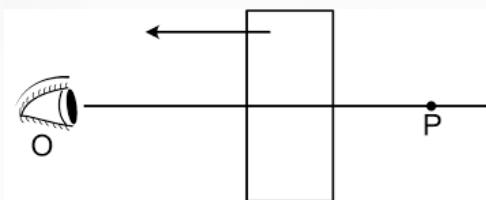
28. A spherical mirror forms an image of magnification 2. The object distance, if focal length of mirror is 24cm, may be
- 1) 36cm, 24cm 2) 12cm 3) 36cm only 4) 12, 36cm only
29. A fish views the smiling face of a scuba diver through an air bubble present between them. Relative to the actual face of the diver, the image observed by the fish will appear



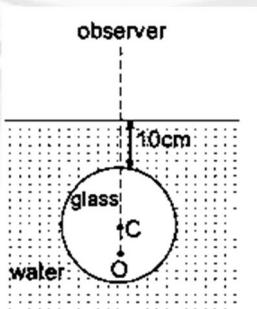
- 1) Smaller and erect
2) Smaller and inverted
3) Larger and erect
4) Can be either of above depending on the distance of the diver



30. In the figure shown a slab of refractive index $\frac{3}{2}$ is moved at speed 5m/s towards a stationary observer. A point 'P' is observed by the observer with the help of paraxial rays through the slab. Both 'O' and observer lie in air. The velocity with which the image will move is:

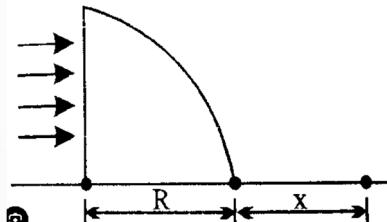


- 1) $\frac{5}{2} \text{ m/s towards left}$ 2) $\frac{15}{2} \text{ m/s towards left}$
 3) $5 \text{ m/s towards left}$ 4) Zero
31. The flat bottom of cylinder tank is silvered and water ($\mu = 4/3$) is filled in the tank upto a height h. A small bird is hovering at a height $3h$ from the bottom of the tank. When a small hole is opened near the bottom of the tank, the water level falls at the rate of 2cm/s. The bird will perceive that his image's velocity is:
 1) 1 cm/s upward 2) 2 cm/s downwards
 3) 1 cm/s downward 4) none of these
32. A glass sphere ($\mu=1.5$) of radius 5 cm contains a small air bubble located 7.5 cm below its surface at O. The sphere is immersed in water ($\mu=\frac{4}{3}$) so that its top surface lies 10 cm beneath the water surface. The bubble is observed normally from air. Determine the apparent position of the bubble.

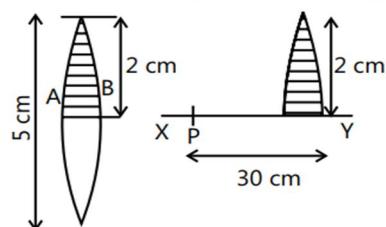




- 1) 15cm below the surface of water
 2) 10.5 cm below the surface of water
 3) 16.66 cm below the surface of water
 4) 13.5 cm below the surface of water
33. A uniform horizontal beam of light is incident on a quarter-cylinder of radius $R = 5\text{cm}$ and refractive index $\mu = \frac{2}{\sqrt{3}}$. A region of the table extending up to a distance x from the cylinder remains unilluminated. Find the value of x .



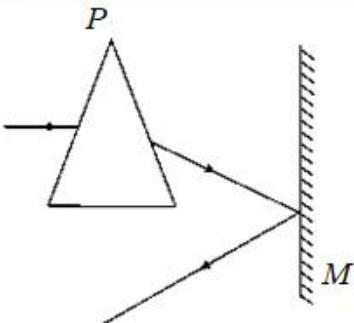
- 1) 7.2 cm 2) 12.5 cm 3) 5 cm 4) 10 cm
34. A boy of height 3m with his eye level at 2.8m stands before a plane mirror of length 1.5m fixed on the wall. The height of the lower edge of the mirror above the floor is 1.6m. Then:
- 1) The boy will see his full image
 2) The boy cannot see his hair
 3) The boy cannot see his feet
 4) The boy cannot see neither his hair nor his feet
35. A converging lens of focal length 20 cm and aperture diameter 5cm is cut along the line AB. The part of the lens shown shaded in the diagram is now used to form an image of a point P placed 30 cm away from it on the line XY, which is perpendicular to the plane of the lens. The image of P will be formed:



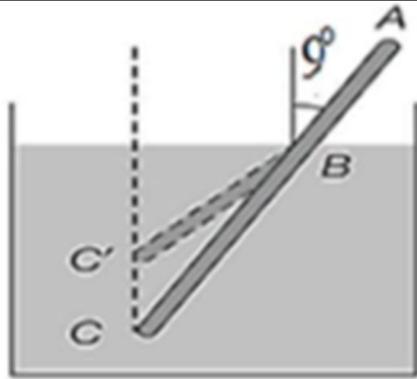
- 1) 0.5 cm above XY
 2) 1 cm below XY
 3) on XY
 4) 1.5cm below XY



36. A prism having an apex angle 4° and refractive index of 1.50 is located in front of a vertical plane mirror as shown in the figure. A horizontal ray of light is incident on the prism. The total angle through which the given ray is deviated is

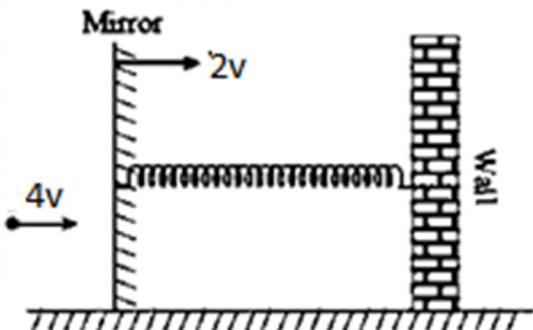


- 1) 4° Clockwise 2) 178° Clockwise 3) 2° Clockwise 4) 8° Clockwise
37. A monochromatic ray is incident on one face of a prism of angle 75° . The emergent ray grazes the other face of the prism. If the refractive index of the prism is $\mu = \sqrt{2}$, the angle of incidence on the first face is:
- 1) 30° 2) 45° 3) 60° 4) 0°
38. A microscope is focused on an object at the bottom of a bucket. If liquid with refractive index $4/5$ is poured inside the bucket, then microscope have to be raised by 20cm to focus the object again. The height of the liquid in the bucket is:
- 1) 100cms 2) 16cms 3) 25cms 4) 20cms
39. In an experiment with a convex lens, the plot of the image distance (v') against the object distance (u') measured from the focus gives a curve $v'u' = 400$. If all the distances are measured in cm. The magnitude of the focal length of the lens is _____ cm
1) 10 2) 20 3) 80 4) 40
40. A small rod ABC is put in water making an angle 90° with vertical. If it is viewed paraxially from above, it will look like bent shaped ABC'. The angle of bending ($\angle CBC'$) will be in degree is $\left(n_w = \frac{4}{3} \right)$ (consider small angle approximation of trigonometric ratios).



- 1) 6^0 2) 3^0 3) 4^0 4) 4.5^0

41. A plane mirror is tied to the free end of an ideal spring. The other end of the spring is attached to a wall. The spring with mirror is held vertically to the floor, can slide along it smoothly. When the spring is at its natural length, the velocity of the mirror is $2V$ with respect to ground frame. An object is moving towards the mirror with speed $4V$ with respect to ground frame. Then, Match the following



| | Column A | | Column B |
|----|--|----|-----------------|
| 1) | Speed of image with respect to ground frame when spring is at natural length | P) | $2V$ |
| 2) | Speed of image with respect to mirror when spring is at natural length | Q) | 0 |
| 3) | Speed of image with respect to object when spring is at natural length | R) | $4V$ |
| 4) | Speed of image with respect to ground frame when spring is at maximum compressed state | S) | $6V$ |

- 1) $A - Q, B - P, C - R, D - R$ 2) $A - Q, B - Q, C - R, D - S$
 3) $A - R, B - P, C - R, D - Q$ 4) $A - Q, B - P, C - R, D - Q$



- 42.** Assertion (A): Refractive index of glass is less than that of air.

Reason(R): The optical density of a medium is directly proportional to its mass density, which in turn determines its refractive index.

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

- 1) Both (A) and (R) are correct and (R) is the correct explanation of (A)
- 2) (A) is correct and (R) is not correct
- 3) Both A and R are not correct
- 4) Both A and R are correct but R is not the correct explanation of A

- 43.** **Statement I:** The minimum distance between real object and its real image for a convex lens is $= 4 \times \text{focal length}$

Statement II: In liquid of refractive index $\mu > 1.5$, convex lens made of glass ($\mu = 1.5$) always tries to diverge light.

- 1) Statement I is true, statement II is true and statement II is a correct explanation for statement I
- 2) Statement I is true, statement II is true and statement II is not a correct explanation for statement I
- 3) Statement I is true, statement II is false
- 4) Statement I is false, statement II is true

- 44.** Given below are two statements

Statement I: When an object is placed at the centre of curvature of a concave lens, image is formed at the centre of curvature of the lens on the other side. (Surrounding medium is air)

Statement II: Concave lens always forms a virtual and erect image. (Surrounding medium is air)

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

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



45. Statement I: A man with a metre scale goes inside water $\left(\mu_w = \frac{4}{3} \right)$. The length of the scale as observed by the man will be $\frac{4}{3}$ metre

Statement II: To the man inside water, the length of the metre scale will be one metre

Read the two statements carefully to mark, the correct option out of the options given below:

- 1) If both statements are true and the statement –II is the correct explanation of statement-I
- 2) If both statements are true and the statement –II is not the correct explanation of statement-I
- 3) If statement –I true but statement-II is false
- 4) If statement-I is false but statement-II is true

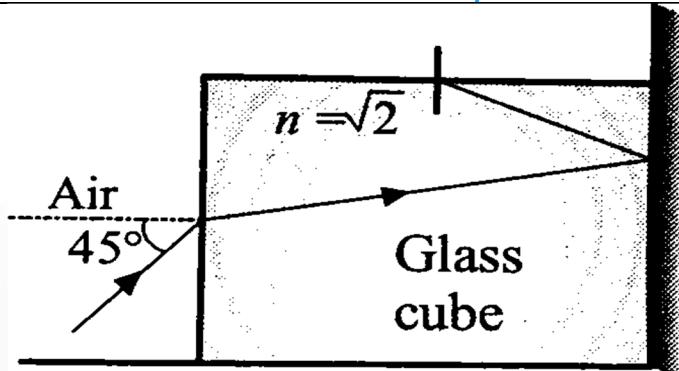
SECTION-II (NUMERICAL VALUE TYPE)

This section contains **5 Numerical Value Type Questions**. The Answer should be within **0 to 9999**. If the Answer is in **Decimal** then round off to the **Nearest Integer** value (Example i.e. If answer is above **10** and less than **10.5** round off is **10** and If answer is from **10.5** and less than **11** round off is **11**).

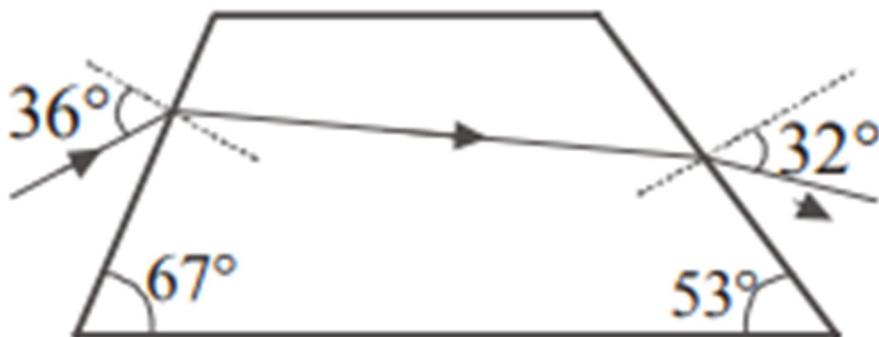
Marking scheme: +4 for correct answer, 0 if not attempt and -1 in all other cases

46. An object is placed 25 cm in front of a mirror, producing a magnification of m_1 . When the object is shifted 15 cm farther from its initial position, the magnification changes to m_2 . If $m_1 / m_2 = 4$, determine the focal length of the mirror in centimeters.
47. In an experiment to measure focal length (f) of convex lens of 20cm, the object is placed at 30cm. The error in the measurement of the focal length of the lens is $\frac{n}{90}$ cm. Find n
(Least count of the scale used in the experiment is 1mm)
48. Consider a glass cube whose right face is silvered, as shown in the figure. A ray of light is incident on the left face of the cube and undergoes refraction and reflection inside it. When the ray finally emerges from the cube, calculate the angle of deviation it undergoes (in degrees).

**THE PERFECT HAT-TRICK WITH ALL- INDIA RANK 1
IN JEE MAIN 2023 JEE ADVANCED 2023 AND NEET 2023**



49. A concave mirror of radius of curvature 40 cm is placed behind a glass slab of thickness 6 cm and refractive index 1.5. The slab is oriented such that its faces are perpendicular to the principal axis of the mirror. If the final image formed coincides with the object itself, find the distance of the object from the mirror (in cm).
50. A prism with its upper portion removed is shown in the figure. A ray of light is incident on the first refracting surface as indicated. Calculate the angle of deviation produced by the prism (in degrees).



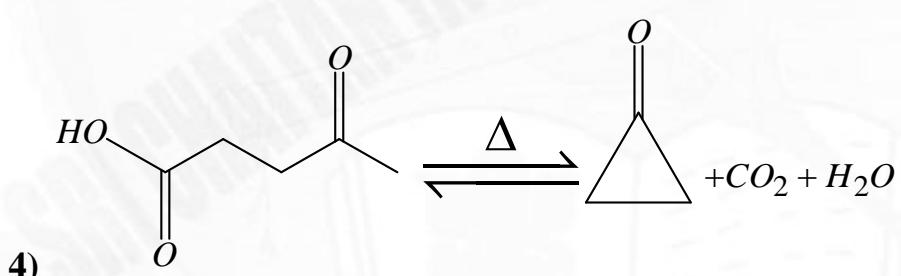
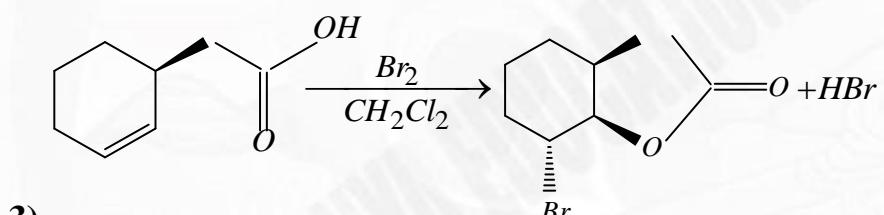
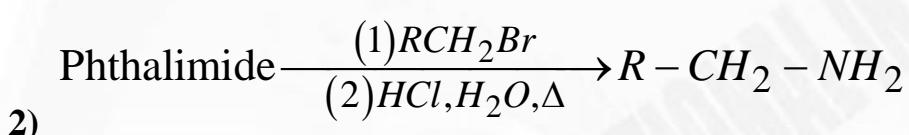
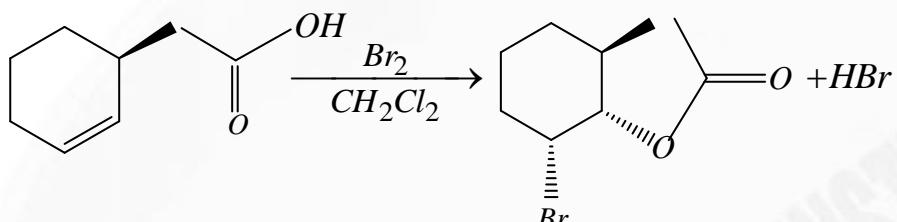


**SECTION-I
(SINGLE CORRECT ANSWER TYPE)**

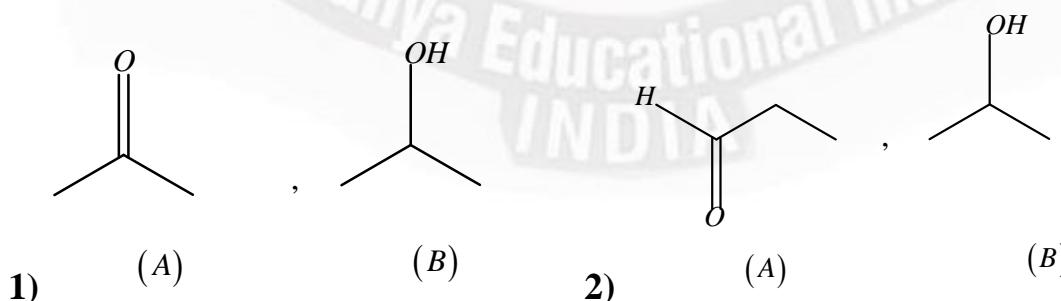
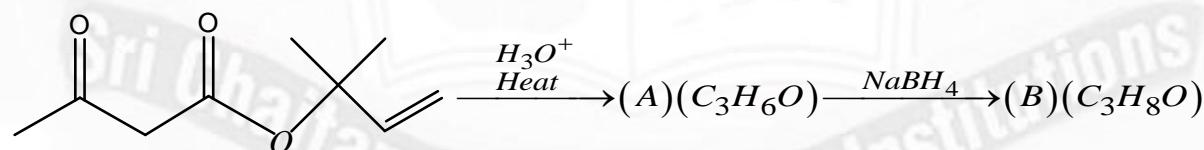
This section contains **20 Multiple Choice Questions**. Each question has 4 options (1), (2), (3) and (4) for its answer, out of which **ONLY ONE** option can be correct.

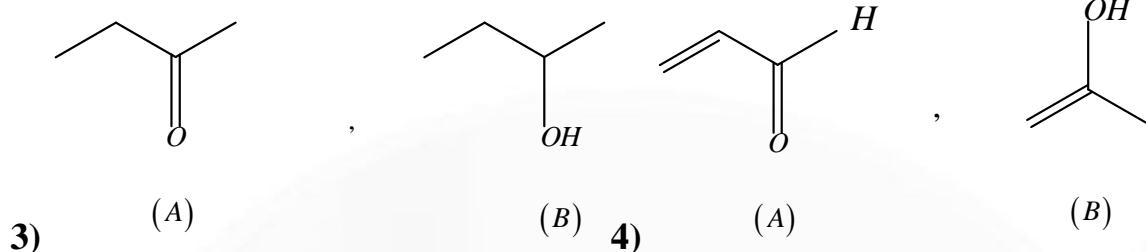
Marking scheme: +4 for correct answer, 0 if not attempted and -1 in all other cases.

- 51.** Which of the following is correct.

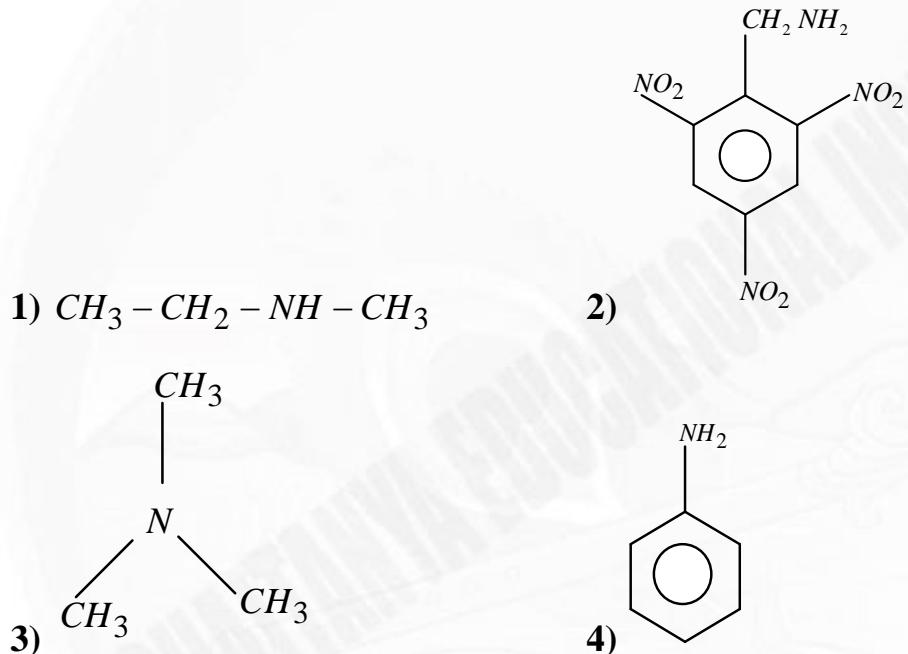


- 52.** Identify the products A and B from given reactions

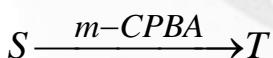
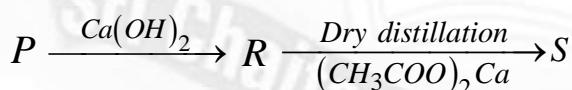
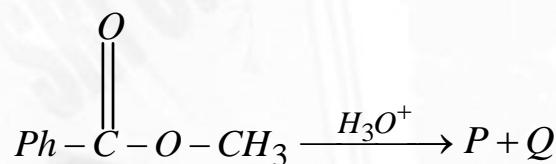




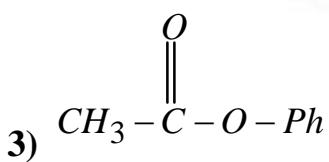
53. Which amine can be obtained by Gabriel phthalimide amine synthesis?



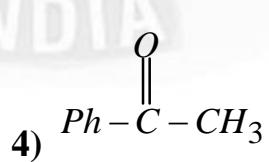
54. The unknown T is



- 1) $PhCOOH$



- 2) CH_3COOH





55. Match the column I with column II

| | Column I | | Column II |
|-----|-----------------|-----|--|
| (A) | | (P) | Products are diastereomers |
| (B) | | (Q) | Racemic mixture obtained |
| (C) | | (R) | One of the product is optically active |
| (D) | | (S) | CO_2 gas will evolve |

1) A → P, R, S : B → P, R, S : C → Q, R, S : D → Q, R, S

2) A → P, Q, R : B → Q, R, S : C → P, R, S : D → P, Q

3) A → P, R, S, P : B → P, Q, R : C → P, S : D → P, R, S

4) A → P, Q, R : B → P, R, S : C → Q, R, S : D → P, S

56. **Assertion:** Aliphatic amines cannot form stable $RN_2^{(+)}Cl^-$ with $NaNO_2 + HCl$ while aromatic amines form stable diazonium salts.

Reason: Aliphatic diazonium salts are not stabilized by resonance.

Choose the correct answer from the options given below:



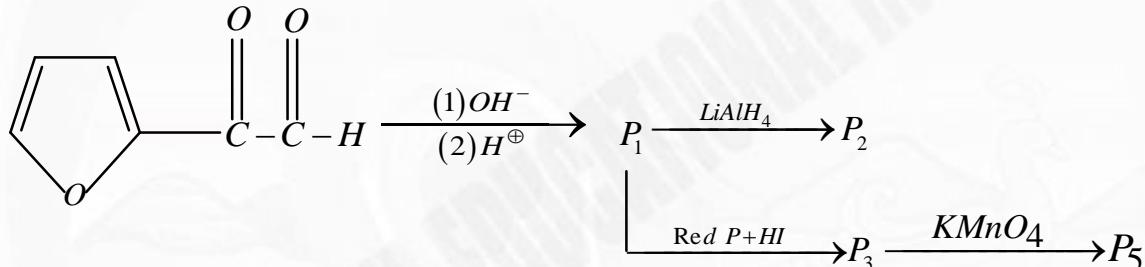
- 1) Assertion is true, reason is true and reason is correct explanation of assertion
- 2) Assertion is true, reason is true but reason is not correct explanation of assertion
- 3) Assertion is true, reason is false
- 4) Assertion is false, reason is true

57. **Assertion:** Rate of decarboxylation of CH_3COOH is faster than propanoic acid

Reason: CH_3^- is less stable than $CH_3CH_2^-$

- 1) Assertion is true, reason is true and reason is correct explanation of assertion
- 2) Assertion is true, reason is true but reason is not correct explanation of assertion
- 3) Assertion is true, reason is false
- 4) Assertion is false, reason is true

58. Which compound having D.U = 3 is/are



- 1) P_1
- 2) P_2
- 3) P_5
- 4) None of these

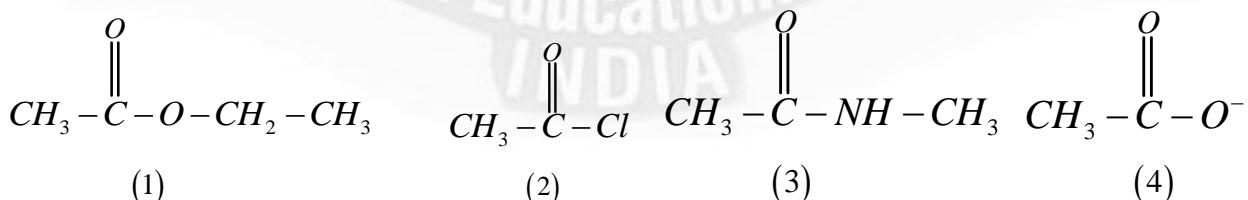
59. The order of hydrolysis for following is

- 1) $RCOX > RCONH_2 > RCOOCOR > RCOOR$
- 2) $RCOX > RCOOCOR > RCOOR > RCONH_2$
- 3) $RCOOR > RCOX > RCOOCOR > RCONH_2$
- 4) $RCONH_2 > RCOOR > RCOOCOR > RCOX$

60. Which of the following should be most volatile?

- | | |
|--------------------------|---------------------|
| (I) $CH_3CH_2CH_2NH_2$ | (II) $(CH_3)_3N$ |
| (III) $CH_3CH_2-NH-CH_3$ | (IV) $CH_3CH_2CH_3$ |
- 1) II
 - 2) IV
 - 3) I
 - 4) III

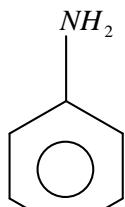
61. Arrange following in order of increasing toward nucleophile



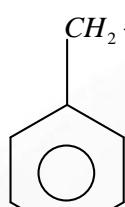
- 1) $1 < 2 < 3 < 4$
- 2) $4 < 3 < 1 < 2$
- 3) $4 < 3 < 2 < 1$
- 4) $3 < 2 < 1 < 4$



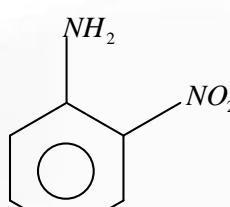
62. Arrangement of following compounds in order of increasing basic strength



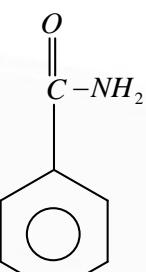
(1)



(2)



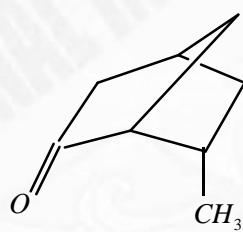
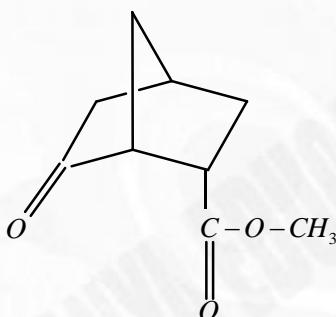
(3)



(4)

- 1)** $4 < 2 < 1 < 3$ **2)** $4 < 3 < 1 < 2$ **3)** $4 < 1 < 3 < 2$ **4)** $2 < 1 < 3 < 4$

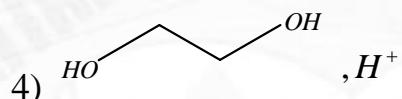
63. For the following conversion arrange the following reagent in correct sequence respectively



1) $LiAlH_4$ is followed by H_2O

2) N_2H_4 followed by $OH^- \Delta$

3) H_3O^+



5) PCC / CH_2Cl_2

1) 1,2,3,4,5

2) 4,2,1,5,3

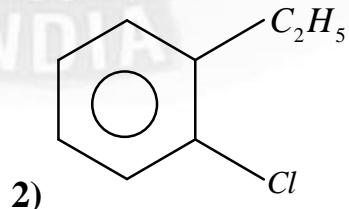
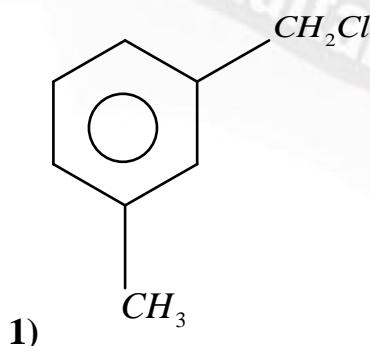
3) 2,4,5,1,3

4) 4,1,5,2,3

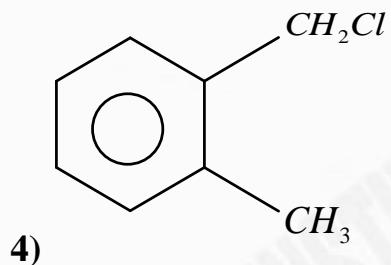
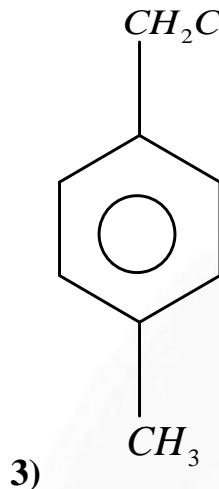
64. Compound (A), C_8H_9Cl , gives a precipitate when warmed with alcoholic $AgNO_3$.

Oxidation of (A) gives an acid (B), $C_8H_6O_4$. (B) Easily forms anhydride on heating.

Identify the compound (A)



**THE PERFECT HAT-TRICK WITH ALL-INDIA RANK 1
IN JEE MAIN 2023 JEE ADVANCED 2023 AND NEET 2023**

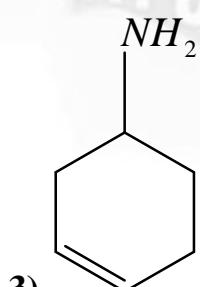
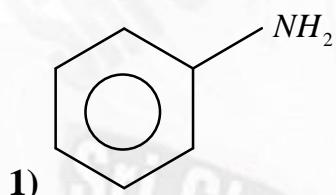


65. **Statement-I:** P and Q are isomers and both are vicinal dicarboxylic acid and having molecular formula $C_4H_4O_4$ in which P is more acidic than Q. and Both P and Q are stereoisomers

Statement-II: Melting point of Q is higher Than P

- 1) Statement-I and Statement-II both correct
- 2) Statement-I correct Statement-II incorrect
- 3) Statement-I and Statement-II both incorrect
- 4) Statement-I incorrect Statement-II correct

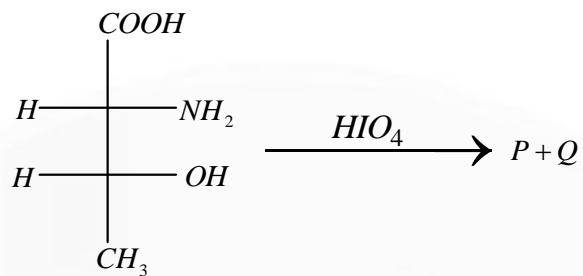
66. Carbonylamin test can be used for the identification of which of these compounds



- 4) All of these

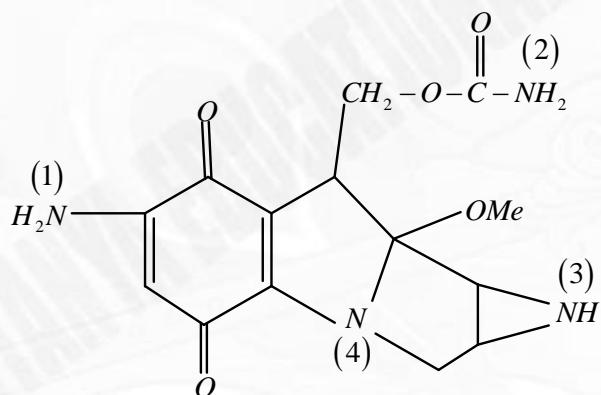


67. In following reaction P and Q is



- 1) CH_3CHO 2) $H-C(OH)=O$ 3) $CH_2=O$ 4) Both 1 and 3

68. Mitomycin C is an anticancer agent and used to treat stomach and colorectal cancer, its structure is

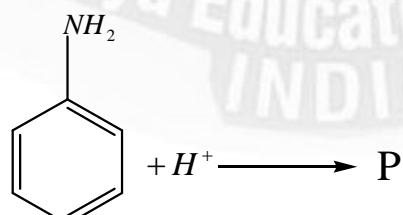


- 1) Contains 5 chiral centre C-atom 2) 3 rd nitrogen is highly basic
 3) Contain 3 chiral C-atom 4) 4th nitrogen is highly basic

69. Arrange the following compounds in increasing order of boiling point

- 1) $(CH_3)_3N < CH_3NHEt < Pr\ NH_2 < Pr\ OH$ 2) $(CH_3)_3N < Pr\ NH_2 < Pr\ OH < MeNHEt$
 3) $Pr\ NH_2 < MeNHEt < Me_3N < Pr\ OH$ 4) $Me_3N < MeNHEt < Pr\ OH < Pr\ NH_2$

70. Statement-I: The number of resonating structure of product is two for reactions





Statement-II: Lone pair of Nitrogen in P get involve in resonance

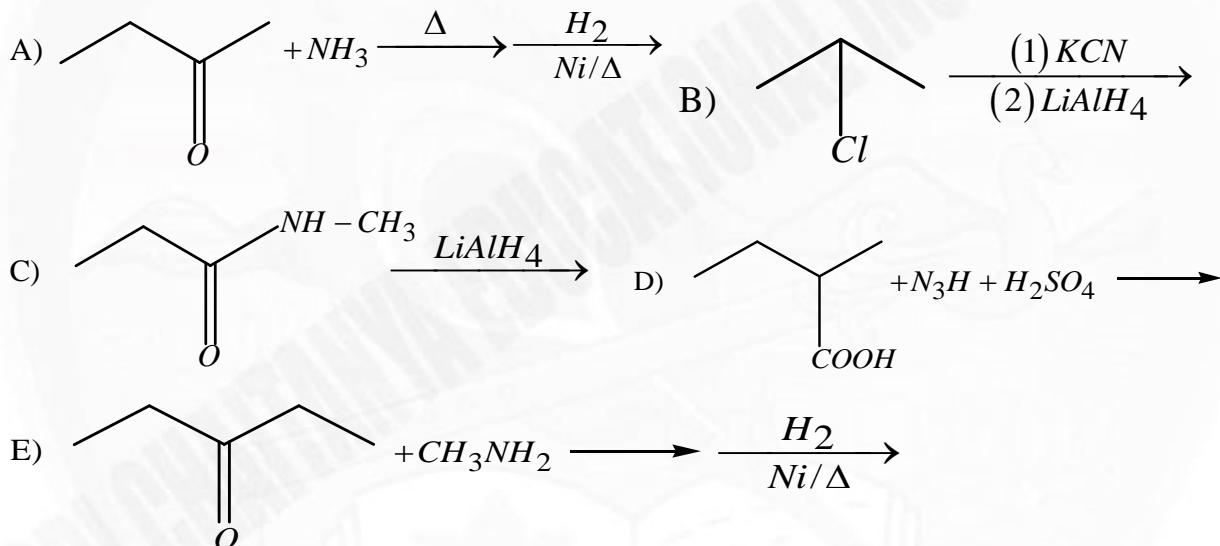
- 1) Statement-I and Statement-II both correct
- 2) Statement-I correct Statement-II incorrect
- 3) Statement-I and Statement-II both incorrect
- 4) Statement-I incorrect Statement-II correct

SECTION-II (NUMERICAL VALUE TYPE)

This section contains 5 Numerical Value Type Questions. The Answer should be within **0 to 9999**. If the Answer is in **Decimal** then round off to the **Nearest Integer** value (Example i.e. If answer is above **10** and less than **10.5** round off is **10** and If answer is from **10.5** and less than **11** round off is **11**).

Marking scheme: +4 for correct answer, 0 if not attempt and -1 in all other cases

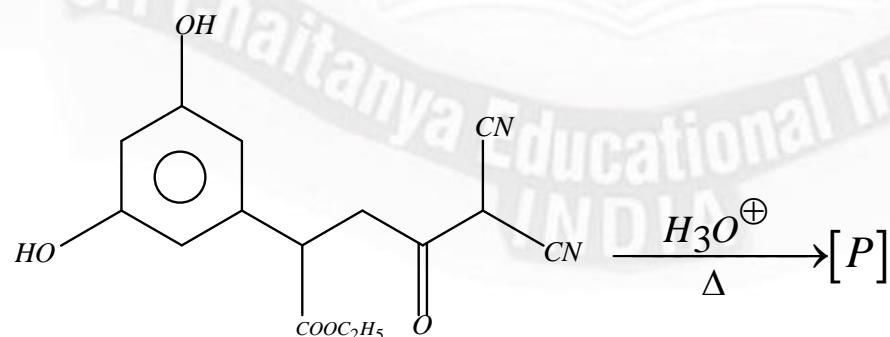
71. Total number of reactions in which product is 1° amine



72. The Number of reagents among the following which can reduce $CH_3CH_2NO_2$ in to ethyl amine

$Fe / HCl, Sn / HCl, H_2 / Ni, NH_2NH_2 / H_3O^+, B_2H_6 / THF, LiAlH_4, NaBH_4$

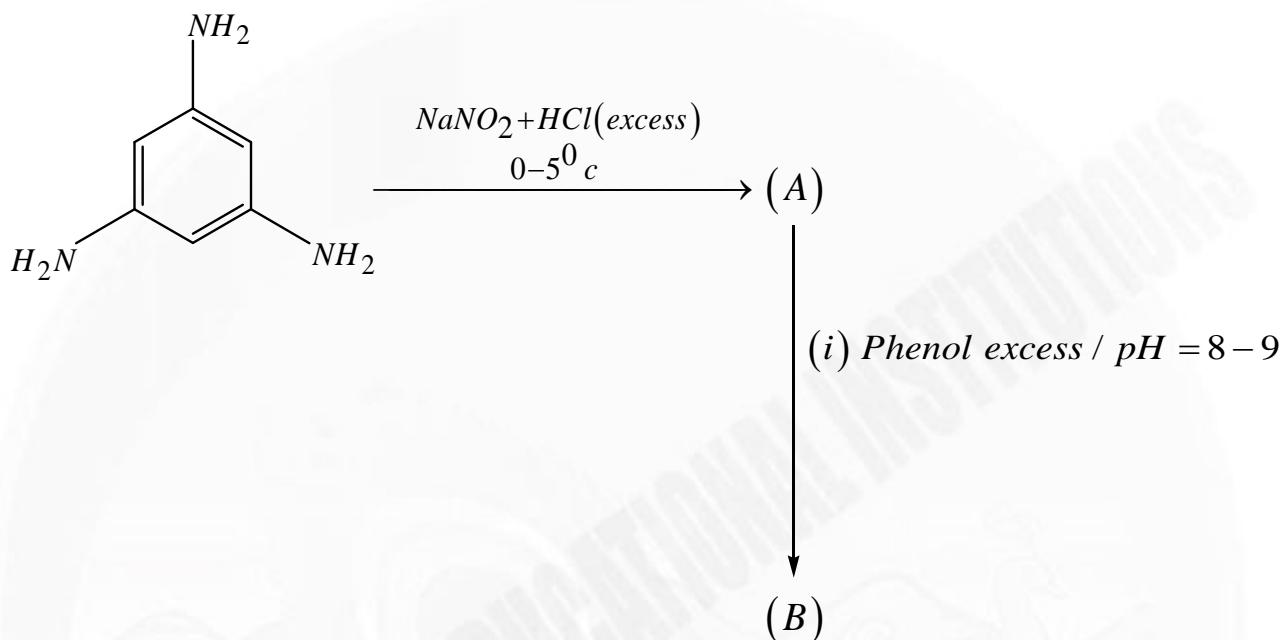
73.



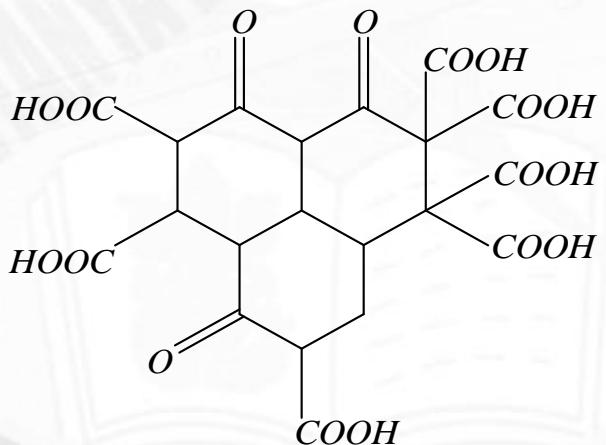
Number of moles of $NaOH$ required to neutralize one mole of $[P]$



74.



Calculate degree of unsaturation in compound (B)

75. How many moles of CO_2 will be liberated when the given compound is heated.

JEE MAIN 2025

31 STUDENTS BELOW 100 AIR



BELOW
100
ALL INDIA OPEN
CATEGORY RANKS

31

BELOW
500
ALL INDIA OPEN
CATEGORY RANKS

95

BELOW
10
ALL INDIA CATEGORY
RANKS COUNT

10

BELOW
100
ALL INDIA CATEGORY
RANKS COUNT

98

BELOW
1000
ALL INDIA CATEGORY
RANKS COUNT

579

TOTAL QUALIFIED RANKS
FOR JEE ADVANCED-2025

22,094

*DLP/AITS

JEE 2025 STARS SHINE BRIGHT

Sri Chaitanya Tops JEE ADVANCED

ALL INDIA OPEN CATEGORY RANKS



BELOW
100
ALL INDIA OPEN
CATEGORY RANKS
29

BELOW
500
ALL INDIA OPEN
CATEGORY RANKS
113

BELOW
1000
ALL INDIA OPEN
CATEGORY RANKS
205

BELOW
1000
ALL INDIA CATEGORY
RANKS COUNT
745

NUMBER OF
QUALIFIED RANKS
4,212

*DLP/AITS