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A.P T.S KARNATAKA TAMILNADU MAHARASTRA DELHI RANCHI

A right Choice for the Real Aspirant

ICON Central Office - Madhapur - Hyderabad

SEC: Sr.Super60_STERLING BT	**JEE-MAIN**	**Date: 16-08-2025**
Time: 09:00AM to 12:00PM	**RPTM-02**	**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 of make any stray marks on the Answer Sheet**

Name of the Candidate (in Capital): _____

Admission Number: | | | | | | | | | |

Candidate's Signature:_____ **Invigilator's Signature:** _____

16-08-25_Sr.Super60_STERLING BT_Jee-Main_RPTM-02_Test Syllabus

MATHEMATICS : LCD

PHYSICS : Thermal Physics: Second law of thermodynamics, Reversible and irreversible processes, Carnot engine and its efficiency (Important for ADVANCED), Heat Transfer: Heat conduction in one dimension, Elementary concepts of convection and radiation, Blackbody radiation: absorptive and emissive powers, Kirchhoff's law, Wien's displacement law, Stefan's law, Newton's law of cooling.
Ray Optics: Rectilinear propagation of light, Reflection, Magnification
(In Phy & Che Each Out of 25Qs, 10 Qs From NCERT is Mandatory)

CHEMISTRY : GOC: Inductive effect, Resonance and hyperconjugation, Keto-enol tautomerism, Hydrogen bonding- definition and their effects on physical properties of alcohols and carboxylic acids, Inductive and resonance effects on acidity and basicity of organic acids and bases, Polarity and inductive effects in alkyl halides, Reactive intermediates produced during homolytic and heterolytic bond cleavage, Formation, structure and stability of carbocations, carbanions and free radicals
Alkanes: Preparation, properties and reactions of alkanes. Homologous series, physical properties of alkanes (melting points, boiling points and density) and effect of branching on them, Combustion and halogenations of alkanes (including allylic and benzylic halogenation), Preparation of alkanes by Wurtz reaction and decarboxylation reaction, Corey-House Reaction.
(In Phy & Che Each Out of 25Qs, 10 Qs From NCERT is Mandatory)

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MATHEMATICS **Max Marks: 100**

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. Given below are two statements:

Statement-I: $\lim\limits_{x\to 0}\left(\dfrac{\tan^{-1}x+\log_e\sqrt{\dfrac{1+x}{1-x}}-2x}{x^5}\right)=\dfrac{2}{5}$

Statement-II: $\lim\limits_{x\to 1}\left(x^{\frac{2}{1-x}}\right)=\dfrac{1}{e^2}$

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

2. Let $f:(-\infty,\infty)-\{0\}\to\mathbb{R}$ be a differentiable function such that $f^1(1)=\lim\limits_{a\to\infty}a^2f\left(\dfrac{1}{a}\right)$.

Then $\lim\limits_{a\to\infty}\dfrac{a(a+1)}{2}\tan^{-1}\left(\dfrac{1}{a}\right)+a^2-2\log_e a$ is equal to

1) $\dfrac{5}{2}+\dfrac{\pi}{8}$ 2) $\dfrac{3}{8}+\dfrac{\pi}{4}$ 3) $\dfrac{3}{4}+\dfrac{\pi}{8}$ 4) $\dfrac{3}{2}+\dfrac{\pi}{4}$

3. If $\beta=\lim\limits_{x\to 0}\dfrac{e^{x^3}-\left(1-x^2\right)^{\frac{1}{3}}+\left(\left(1-x^2\right)^{\frac{1}{2}}-1\right)\sin x}{x\sin^2 x}$, then the value of 6β

1) 15 2) 10 3) 5 4) 7

4. Let $f(x)=\lim\limits_{n\to\infty}\sum\limits_{r=0}^{n}\left(\dfrac{\tan\left(x/2^{r+1}\right)+\tan^3\left(x/2^{r+1}\right)}{1-\tan^2\left(x/2^{r+1}\right)}\right)$

Then $\lim\limits_{x\to\infty}\dfrac{e^x-e^{f(x)}}{\left(x-f(x)\right)}$ is equal to

1) 4 2) 8 3) 3 4) 1

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5. Match the following

Column-I	**Column-II**
(P) Let $f:R\to R$ such that $f(a)=1, f'(a)=2$ and $\lim\limits_{x\to 0}\left(\dfrac{f^2(a+x)}{f(a)}\right)^{1/x}=e^k$, then k=	**(1) 0**
(Q) $\lim\limits_{x\to\frac{\pi^+}{2}}\dfrac{\cos\left(\tan^{-1}(\tan x)\right)}{x-\frac{\pi}{2}}=$	**(2) 1**
(R) $\lim\limits_{x\to\pi}\dfrac{\sin(\cos x+1)}{\cos\left(\frac{x}{2}\right)}=$	**(3) 4**
(S) $\lim\limits_{x\to 0}\dfrac{xe^{\sin x}-e^x\sin^{-1}(\sin x)}{\sin^2 x-x\sin x}=$	**(4) 3**

1) P-3,Q-2,R-1,S-2 **2)** P-2,Q-1,R-4,S-3
3) P-3,Q-4,R-1,S-2 **4)** P-3,Q-3,R-1,S-4

6. If the function $f(x)=\dfrac{\sin 3x+\alpha\sin x-\beta\cos 3x}{x^3}, x\in R,$ is continuous at $x=0$, then $f(0)$ is equal to α . Then $\left|\dfrac{\alpha}{2}\right|$ is :

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

7. Let x=2 be a root of the equation $x^2+px+q=0$ and

$$f(x)=\begin{cases}\dfrac{1-\cos\left(x^2-4px+q^2+8q+16\right)}{(x-2p)^4}, & x\neq 2p\\ 0, & x=2p\end{cases}$$

Then $\lim\limits_{x\to 2p^+}\left[f(x)\right]$, (where [.] denotes greatest integer function) is

1) 2 **2)** 1 **3)** -1 **4)** 0

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8. Let a function $g:[0,4]\to R$ be defined as

$$g(x)=\begin{cases}\max\limits_{0\le t\le x}\left\{t^3-6t^2+9t-3\right\}, & 0\le x\le 3\\ 4-x, & 3<x\le 4\end{cases}$$, then

The number of points in the interval (0,4), where $g(x)$ is not differentiable, is

1) 4 **2)** 3 **3)** 1 **4)** 0

9. Let $f(x)=\begin{cases}\max.\{|x|,x^2\}, & |x|\le 2\\ 8-2|x|, & 2<|x|\le 4\end{cases}$, Let s be the set of points in the interval (-4,4) at which f is not differentiable. Then S

1) is an empty set **2)** equals {-2, -1, 1, 2}

3) equals {-2, -1, 0, 1, 2} **4)** equals {-2, 2}

10. If for $p\neq q\neq 0$, the function $f(x)=\dfrac{\sqrt[7]{p(729+x)}-3}{\sqrt[3]{729+qx}-9}$ is continuous at $x=0$ then:

1) $7pqf(0)-1=0$ **2)** $63qf(0)-p^2=0$

3) $21qf(0)-p^2=0$ **4)** $7pqf(0)-9=0$

11. Let $a\in Z$ and [t] be the greatest integer $\le t$. Then the number of points, where the function $f(x)=[a+13\sin x];x\in(0,\pi)$ is not differentiable is

1) 15 **2)** 21 **3)** 25 **4)** 10

12. If $f(x)=\sin\left(\cos^{-1}\left(\dfrac{1-2^{2x}}{1+2^{2x}}\right)\right)$ and its first derivative with respect to x is $-\dfrac{b}{a}\log_e 2$

When $x=1$, where a and b are integers, then the minimum value of $|a^2-b^2|$ is

1) 531 **2)** 481 **3)** 381 **4)** 431

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13. Let $f(x)=\left(x^2-4x+3\right)\left|\left(x^3-6x^2+11x-6\right)\right|+\left|\sin\left(x+\frac{\pi}{4}\right)\right|$

The set of points at which the function $f(x)$ is not differentiable in $[0,2\pi]$ is

1) $\left\{1,2,3,\frac{3\pi}{4},\frac{7\pi}{4}\right\}$ **2)** $\{1,2,3\}$ **3)** $\left\{2,\frac{3\pi}{4},\frac{5\pi}{4}\right\}$ **4)** $\left\{2,\frac{3\pi}{4},\frac{7\pi}{4}\right\}$

14. If $y=\frac{x^2}{2}+\frac{1}{2}x\sqrt{x^2+1}+\ln\sqrt{x+\sqrt{x^2+1}}$ then the value of $xy'+\log y'$ is

1) y **2)** 0 **3)** 2y **4)** -2y

15. Let $g(x)=e^{f(x)}$ and $f(x+1)=x+f(x)\forall x\in R$. If $n\in I^+$, then $\frac{g'\left(n+\frac{1}{2}\right)}{g\left(n+\frac{1}{2}\right)}-\frac{g'\left(\frac{1}{2}\right)}{g\left(\frac{1}{2}\right)}=$

1) $2\left(1+\frac{1}{2}+\frac{1}{3}+\ldots+\frac{1}{n}\right)$ **2)** $2\left(1+\frac{1}{3}+\frac{1}{5}+\ldots+\frac{1}{2n-1}\right)$

3) n **4)** 1

16. If $f(x)=\frac{\left(a^x-1\right)^3}{\sin(x\log a)\log\left(1+x^2\log a^2\right)}$ is continuous at $x=0$, then $f(0)=$

1) $\log a$ **2)** $2\log a$ **3)** $\log a^{-1}$ **4)** $\log\sqrt{a}$

17. For a,b>0 let

$$f(x)=\begin{cases}\frac{\tan\left((a+1)x\right)+b\tan x}{x}, & x<0\\ 3, & x=0\\ \frac{\sqrt{ax+b^2x^2}-\sqrt{ax}}{b\sqrt{a}x\sqrt{x}}, & x>0\end{cases}$$

be a continuous function at $x=0$, Then $\frac{b}{a}$ is equal to:

1) 4 **2)** 5 **3)** 8 **4)** 6

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18. A differentiable function f satisfies the relation $f(x+y)=f(x)+f(y)+\lambda xy(x+y)-\mu$ for all $x,y\in R$ and $\lim_{h\to 0}\frac{3f(h)-1}{2h}=2$ also $f(2)=\frac{25}{3}$ then the value of $\left(\lambda+\frac{1}{\mu}\right)$ is

1) 4 **2)** 5 **3)** 6 **4)** 8

19. If $f(x)=\begin{cases}\dfrac{x\left(3e^{\frac{1}{x}}+4\right)}{2-e^{\frac{1}{x}}}, & x\neq 0\\ 0, & x=0\end{cases}$ then $f(x)$ is

1) continuous as well as differentiable at $x=0$

2) continuous but not differentiable at $x=0$

3) Neither differentiable at $x=0$ nor continuous at $x=0$

4) $f(x)$ is differentiable every where

20. If $f(x)=\begin{cases}\left(\sin\left(\dfrac{2x^2}{a}\right)+\cos\left(\dfrac{3x}{b}\right)\right)^{ab/x^2}, & ;x\neq 0\\ e^3, & ;x=0\end{cases}$

is continuous at $x=0\ \forall b\in R$ then the minimum value of $'a'$ is

1) $-1/8$ **2)** $-1/4$ **3)** $-1/2$ **4)** 0

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 largest value of the non-negative integer a for which

$$\lim_{x\to 1}\left\{\frac{-ax+\sin(x-1)+a}{x+\sin(x-1)-1}\right\}^{\frac{1-x}{1-\sqrt{x}}}=\frac{1}{4}\text{ is }_____$$

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

$f(x)=\begin{cases}3x^2+k\sqrt{x+1}, 0<x<1\\ mx^2+k^2, \quad x\geq 1\end{cases}$ is differentiable for all $x>0$. If $f'(8)$ is equal to α and $f'\left(\frac{1}{8}\right)$ is equal to β then the value of $\frac{\alpha\beta}{2}$ is equal to _____

23. If $f(x)=x^2+g'(1)+g''(2)$ and $g(x)=f(1)x^2+xf'(x)+f''(x)$, then value of $f(4)-g(4)=7k$. Then the value of k is _____

24. Let [t] denote the greatest integer $\leq t$. The number of points where the function $f(x)=[x]\left|x^2-1\right|+\sin\left(\frac{\pi}{[x]+3}\right)-[x+1], x\in(-2,2)$ is not continuous is _____

25. Let $g(x)$ is the only invertible function from $R\to R$ which satisfy the equation $g^3(x)-\left(x^3+2\right)g^2(x)+\left(2x^3+1\right)g(x)-x^3=0$.Then the value of $g'(8)\left(g^{-1}\right)'(8)$ is____

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PHYSICS **Max Marks: 100**

SECTION-I (SINGLE CORRECT ANSWER TYPE)

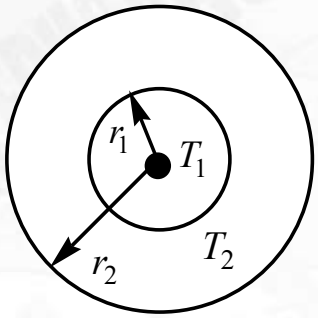
This section contains **20 Multiple Choice Questions.** Each question has 4 options (1), (2), (3) and (4) for its answer, out of which ONLY ONE option can be correct.

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

26. Three very large plates of same area are kept parallel and close to each other. They are considered as ideal black surfaces and have very high thermal conductivity. The first and third plates are maintained at temperatures 2T and 3T respectively. The temperature of the middle (i.e. second) plate under steady state condition is

1) $\left(\frac{65}{2}\right)^{1/4} T$ 2) $\left(\frac{97}{4}\right)^{1/4} T$ 3) $\left(\frac{97}{2}\right)^{1/4} T$ 4) $(97)^{1/4} T$

27. The figure shows a system of two concentric spheres of radii r_1 and r_2 are kept at temperatures T_1 and T_2, respectively. The radial rate of flow of heat in a substance between the two concentric spheres is proportional to



1) $\text{In}\left(\frac{r_2}{r_1}\right)$ 2) $\frac{(r_2 - r_1)}{(r_1 r_2)}$ 3) $(r_2 - r_1)$ 4) $\frac{r_1 r_2}{(r_2 - r_1)}$

28. Which of the following is/are the statements of Second law of thermodynamics?
Statement-I: No process is possible whose sole result is the absorption of heat from a reservoir and complete conversion of heat into work.
Statement-II: No process is possible whose sole result is the transfer of heat from a colder object to a hotter object.
1) I only 2) II and III 3) I and II 4) III only

29. Consider the following statements and select the correct option.
I.A real engine has efficiency greater than that of Carnot engine.
II.A real engine can't have efficiency greater than that of Carnot engine.
III. Working substance in Carnot engine is an ideal gas.
1) I only 2) II and III 3) I and II 4) I, II and III

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30. A Carnot engine, having an efficiency of $\eta = 1/10$ as heat engine, is used as a refrigerator. If the work done on the system is 10 J, the amount of energy absorbed from the reservoir at lower temperature is

1) 100 J 2) 99 J 3) 90 J 4) 1 J

31. The coefficient of performance of a refrigerator is 5. If the inside temperature of freezer is -20°C, then the temperature of the surroundings to which it rejects heat is

1) 41°C 2) 11°C 3) 21°C 4) 31°C

32. A planet is at an average distance d from the sun and its average surface temperature is T. Assume that the planet receives energy only from the sun and loses energy only through radiation from the surface. Neglect atmospheric effects. If $T \propto d^{-n}$, the value of n is…

1) 2 2) 1 3) $\frac{1}{2}$ 4) $\frac{1}{4}$

33. A black body is at a temperature of 2880 K. The energy of radiation emitted by this object with wavelength between 499 nm and 500 nm is U_1, between 999 nm and 1000 nm is U_2 and between 1499 nm and 1500 nm is U_3, Wein's constant $b = 2.88 \times 10^6 nm - K$, Then

1) $U_1 = 0$ 2) $U_2 = 0$ 3) $U_1 = U_2 = U_3$ 4) $U_2 > U_1$

34. Assertion (A)The formula connecting u, v and f for a spherical mirror is valid only for mirrors whose sizes are very small compared to their radii of curvature.
Reason (R) Laws of reflection are strictly valid for plane surfaces, but not for large spherical surfaces. Mark your answer as
1) If Assertion is true, Reason is true; Reason is the correct explanation for Assertion.
2) If Assertion is true, Reason is true; Reason is not correct explanation for Assertion.
3) If Assertion is true; Reason is false.
4) If Assertion is false; Reason is true.

35. Statement-I : As temperature of the black body increases, the wavelength at which the spectral intensity (E_λ) is maximum decreases.
Statement-II : The wavelength at which the spectral intensity will be maximum for a black body is proportional to the fourth power of its absolute temperature.

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1) Statement-I is true, statement-II is true and statement II is the correct explanation for statement I.
2) Statement-I is true, statement-II is true and statement II in NOT the correct explanation for statement-I.
3) Statement-I is true, statement II is false.
4) Statement-I is false, statement II is true.

36. Match the Column-I and Column-II

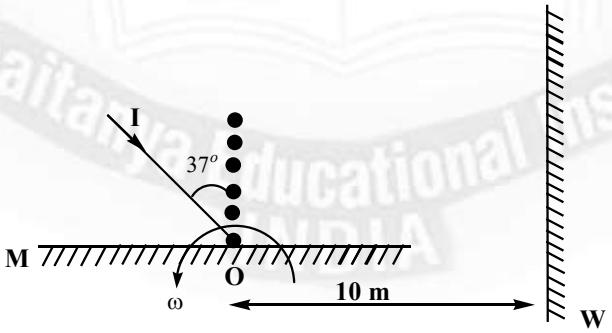
Column-I		Column-II	
A	An object is placed at focus before a convex mirror	P	Magnification is - ∞
B	An object is placed at centre of curvature before a concave mirror	Q	Magnification is 0.5
C	An object is placed at focus before a concave mirror	R	Magnification is +1
D	An object is placed at centre of curvature before a convex mirror	S	Magnification is -1
		T	Magnification is 0.33

1)(A)→(Q);(B)→(R);(C)→(S);(D)→(T) 2) (A)→(T); (B)→(S); (C) → (R); (D)→(P)
3)(A)→(Q);(B)→(S);(C)→(P);(D)→(T) 4) (A)→(R);(B)→(T);(C)→(Q);(D)→(S)

37. A ray of light travelling in the direction $\frac{1}{2}\left(\hat{i}+\sqrt{3}\hat{j}\right)$ is incident on a plane mirror. After reflection, it travels along the direction $\frac{1}{2}\left(\hat{i}-\sqrt{3}\hat{j}\right)$. The angle of incidence is

1) 30° 2) 45° B 60° B 75°

38. A light ray I is incident on a plane mirror M .The mirror is rotated in the direction as shown in the figure by an arrow at frequency $9/\pi$rps. The light reflected by the mirror is received on the wall at distance 10m, from the axis of rotation. When the angle of incident becomes 37°, the speed of the spot (a point) on the wall is….



1) $10\,ms^{-1}$ 2) $1000ms^{-1}$ 3) $500ms^{-1}$ 4) $100ms^{-1}$

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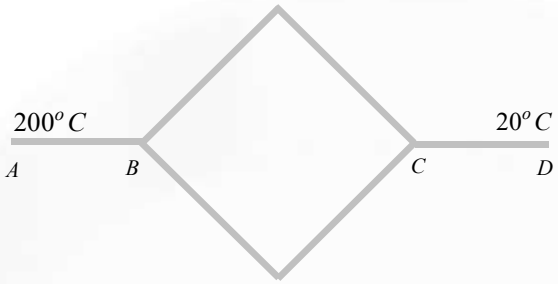
39. Six identical conducting rods are joined as shown in figure. If points A and D are maintained at temperatures 200°C and 20°C, respectively. The temperature of junction B will be

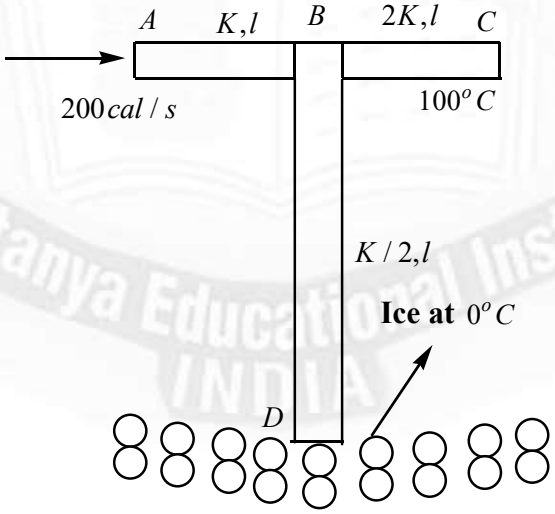


1) 120°C **2)** 100°C **3)** 140°C **4)** 80°C

40. Power radiated by a black body is P_0, and the wavelength corresponding to maximum energy is around λ_0. On changing the temperature of the black body, it was observed that the power radiated becomes $\frac{256}{81}P_0$. The shift in wavelength corresponding to the maximum energy will be

1) $+\frac{\lambda_0}{4}$ 2) $+\frac{\lambda_0}{2}$ 3) $-\frac{\lambda_0}{4}$ 4) $-\frac{\lambda_0}{2}$

41. Three rods AB, BC and BD of same length l and cross section A are arranged as shown. The end D is immersed in ice whose mass is 440 g and is at 0°C. The end C is maintained at 100°C. Heat is supplied at constant rate of 200 cal/s. Thermal conductivities of AB, BC and BD are K, 2K and K/2, respectively. Time after which whole ice will melt is (K =100 cal/m-s-°C, A=10 cm^2, $l = 1m$,Latent heat of fusion of ice L_f - 80 cal/g)



1) 400 s **2)** 600 s **3)** 700 s **4)** 800 s

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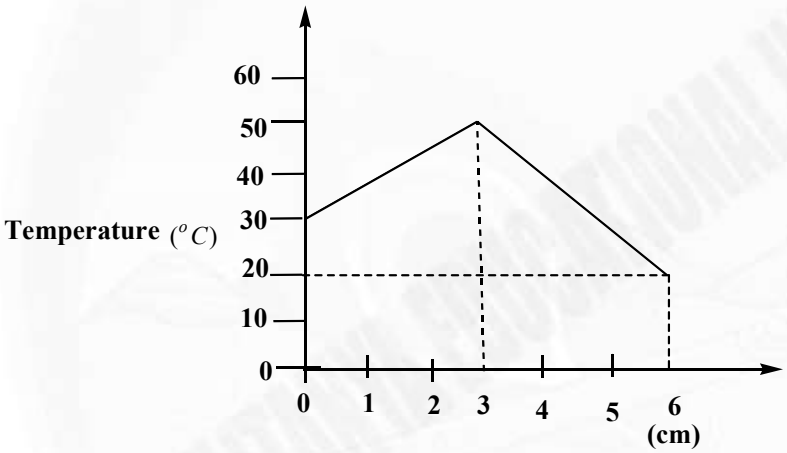
IN JEE MAIN 2023 JEE ADVANCED 2023 AND NEET 2023
JEE MAIN 2023 SINGARAJU VENKAT KOUNDINYA 300/300 RANK 1
JEE Advanced 2023 VAVILALA CHIDVILAS REDDY 341/360 RANK 1
NEET 2023 BORA VARUN CHAKRAVARTHI 720/720 RANK 1

42. A system receives heat continuously at the rate of 10 W. The temperature of the system becomes constant at 70°C when the temperature of the surroundings is 30°C. After the heater is switched off, the system cools from 50°C to 49.9°C in 1 min. The heat capacity of the system is (nearly)

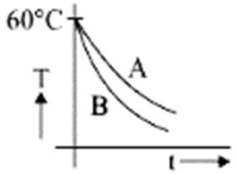
1) 1000 J/°C **2)** 1500 J/°C **3)** 2993 J/°C **4)** 1900 J/°C

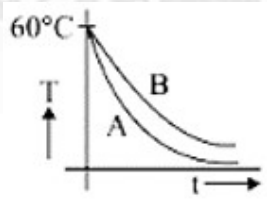
43. The temperature across two different slabs A and B are shown in the steady state (as shown in fig) the ratio of thermal conductivities of A and B is…

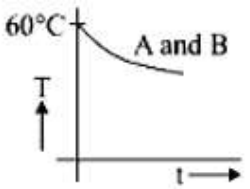


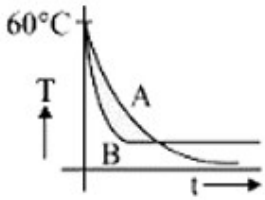
1) 2:3 **2)** 3:2 **3)** 1:1 **4)** 5:3

44. Two identical beakers A and B contain equal volumes of two different liquids at 60°C each and left to cool down. Liquid in A has density $8\times10^2 kg/m^3$ and specific heat of 2000J $kg^{-1}K^{-1}$ while liquid in B has density of 10^3 kg m^{-3} and specific heat of 4000J $kg^{-1}K^{-1}$.Which of the following best describes their temperature versus time graph schematically? (Assume the emissivity of both the beakers to be the same)

1) 

2) 

3) 

4) 

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45. Three rods of identical cross-sectional area and made from the same metal form the sides of an isosceles triangle ABC, right angled at B. The points A and B are maintained at temperatures T and $\left(\sqrt{2}\right)$T respectively. In the steady, the temperature of the point C is T_C. Assuming that only heat conduction takes place, T_c/T is…

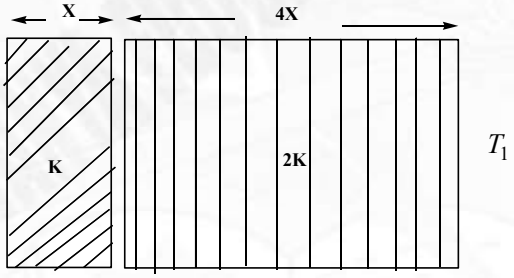
1) $\frac{1}{2\left(\sqrt{2}-1\right)}$ **2)** $\frac{3}{\sqrt{2}+1}$ **3)** $\frac{1}{\sqrt{3}\left(\sqrt{2}-1\right)}$ **4)** $\frac{1}{\left(\sqrt{2}+1\right)}$

SECTION-II (NUMERICAL VALUE TYPE)

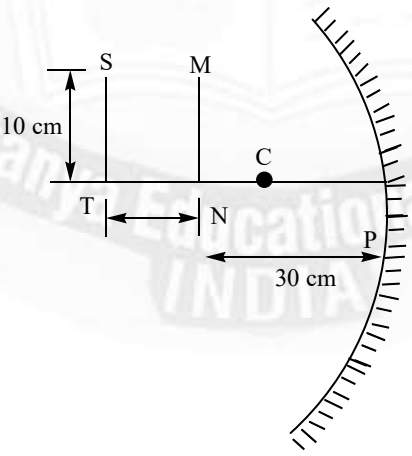
This section contains **5 Numerical Value Type Questions.** The Answer should be within **0 to 9999.** If the Answer is in **Decimal** then round off to the **Nearest Integer** value (Example i,e. If answer is above **10** and less than **10.5** round off is **10** and If answer is from **10.5** and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

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

46. The temperature of the two outer surfaces of a composite slab, consisting of two materials having coefficients of thermal conductivity K and 2K and thickness x and 4x, respectively, are T_2 and T_1 $(T_2 > T_1)$.The rate of heat transfer through the slab, in a steady state is $\left(\frac{A(T_2-T_1)K}{x}\right)f$. The value of $\frac{1}{f}$ is _____



47. A U-shaped wire is placed before a concave mirror having radius of curvature 20 cm as shown in figure. Find the total length of the image in cm.



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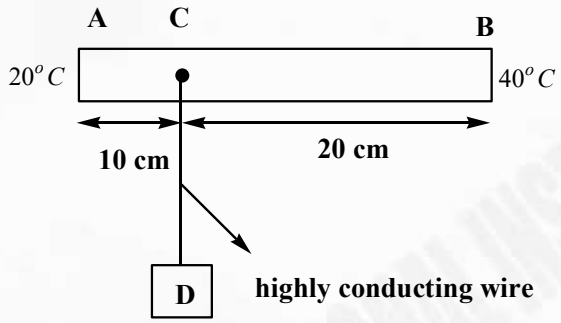
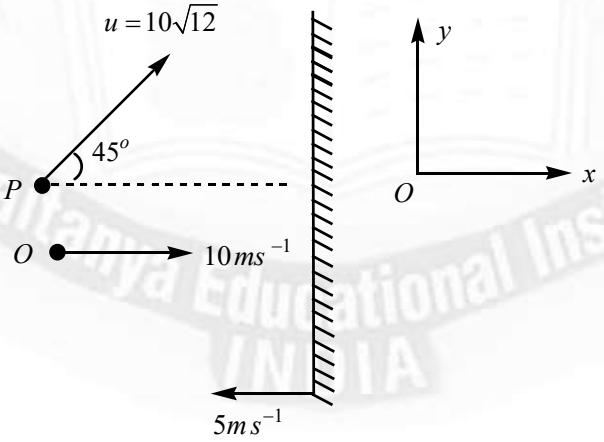
48. As shown in figure AB is a rod of length 30 cm and area of cross section 1.0 cm^2 and thermal conductivity 336 SI units. The ends A and B are maintained at temperatures 20°C and 40°C, respectively. A point C of this rod is connected to a box D, containing ice at 0°C, through a highly conducting wire of negligible heat capacity. The rate at which ice melts in the box is …… gs^{-1} (Latent heat of fusion of ice L_f = 80 cal/g)



49. A room at 20°C is heated by a heater of resistance 20 ohm connected to 200 V mains. The temperature is uniform throughout the room and the heat is transmitted through a glass window of area 1 m^2 and thickness 0.2 cm. Calculate the temperature outside in °C. (Thermal conductivity of glass is 0.2 cal/m °C s and mechanical equivalent of heat is 4.2 J/cal).

50. A plane mirror is moving with a uniform speed of 5 ms^{-1} along negative x-direction and observer O is moving with a velocity of 10 ms^{-1}. The velocity of image of a particle P, moving with a velocity as shown in the figure, as observed by observer O is $(p\hat{i}+q\hat{j})\ m/s$, then (q-p) is _____



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CHEMISTRY

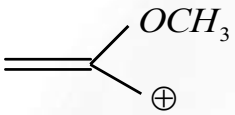
Max Marks: 100

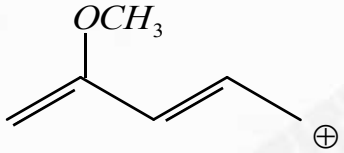
SECTION-I (SINGLE CORRECT ANSWER TYPE)

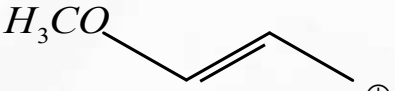
This section contains **20 Multiple Choice Questions.** Each question has 4 options (1), (2), (3) and (4) for its answer, out of which ONLY ONE option can be correct.

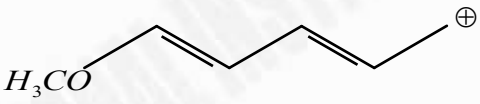
Marking scheme: +4 for correct answer, 0 if not attempted and –1 in all other cases.

51. Which of the following carbocations is most stable :

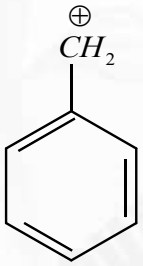
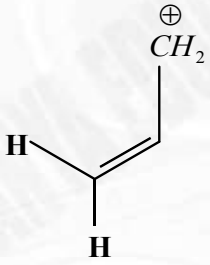
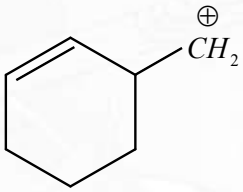
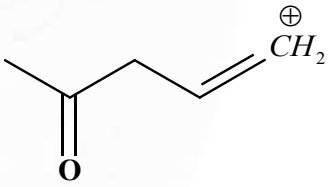
1) 

2) 

3) 

4) 

52.

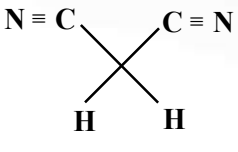
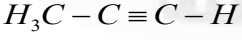
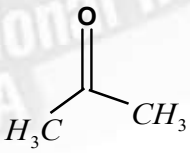
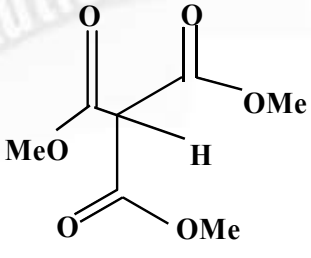
. **(A)**  **(B)**  **(C)**  **(D)** 

Among the given species, the carbocations which are **not** stabilized by resonance:

1) (C) and (D) only **2)** (A), (B) and (D) only

3) (A) and (B) only **4)** (A), (B) and (C) only

53. Which one of the following compounds possesses the most acidic hydrogen?

1)  **2)**  **3)**  **4)** 

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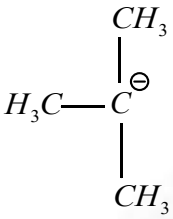
54. The increasing order of basicity for the following intermediates is (from weak to strong)

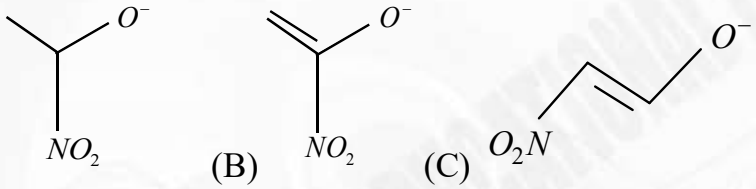


(i) (ii) $H_3C=CH-CH_2^-$ (iii) $HC\equiv C^-$ (iv) CH_3^- (v) CN^-

1) (iii) < (i)<(ii)<(iv)<(v) **2)** (v) < (i)<(iv)<(ii)<(iii)

3) (v) < (iii)<(ii)<(iv)<(i) **4)** (iii) < (iv)<(ii)<(i)<(v)

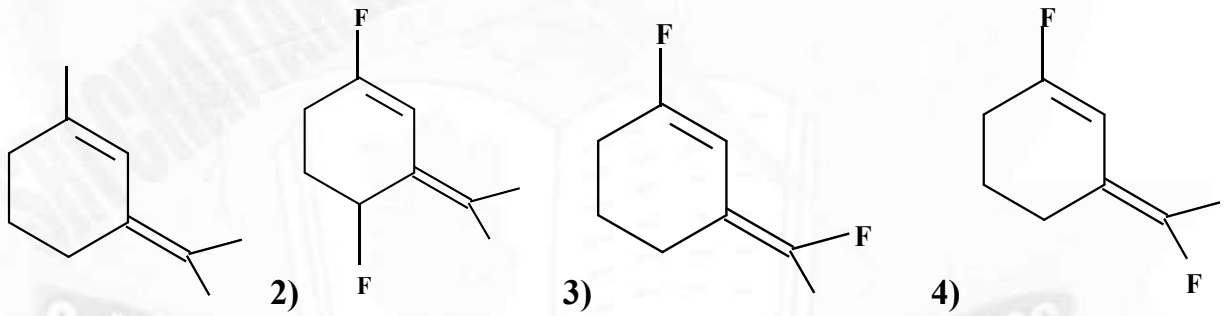
55. The correct order of stability for the following alkoxides is:



(A) (B) (C)

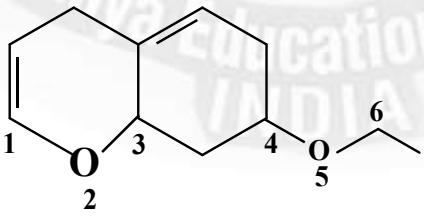
1) (B) > (A) > (C) **2)** (C) > (B) > (A) **3)** (C) > (A) > (B) **4)** (B) > (C) > (A)

56. The most polar compound among the following is:



1) **2)** **3)** **4)**

57. On the treatment of the following compound with a strong acid, the least susceptible site for bond cleavage is:



1) O2 – C3 **2)** O5 – C6 **3)** C4 – O5 **4)** C1 – O2

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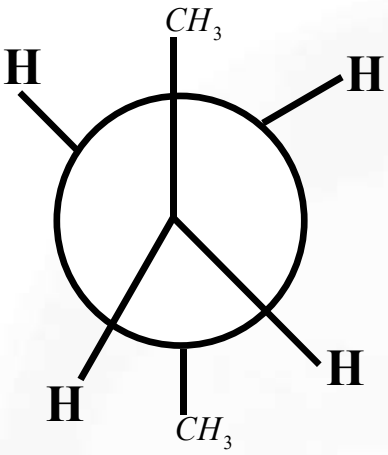
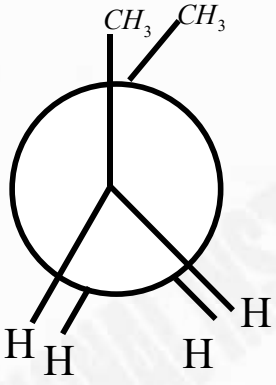
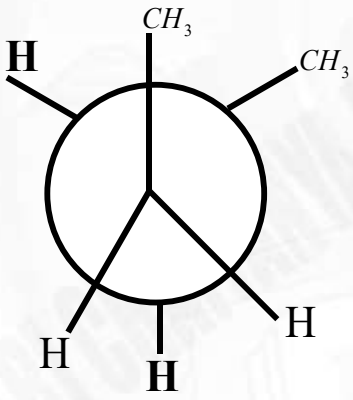
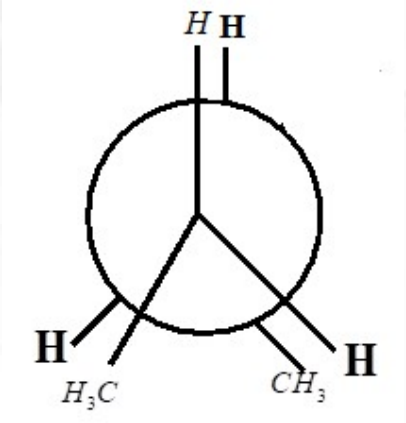
58. Arrange the following conformational isomers of n – butane in order of their increasing potential energy:

I) 

II) 

III) 

IV) 

1) II < III < IV < I **2)** I < IV < III < II **3)** II < IV < III < I **4)** I < III < IV < II

59. At 300 K and 1 atmospheric pressure, 10 mL of a hydrocarbon required 55 mL of O_2 for complete combustion, and 40 mL of CO_2 is formed. The formula of the hydrocarbon is:

1) C_4H_{10} **2)** C_4H_6 **3)** C_4H_7Cl **4)** C_4H_8

60. The major product obtained in the photo catalysed bromination of 2-methylbutane is:

1) 1-bromo- 2-methylbutane **2)** 1- bromo - 3-methylbutane

3) 2- bromo - 3-methylbutane **4)** 2- bromo - 2-methylbutane

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61. Among the following isomeric hexanes, the isomer which can give only two monochlorinated compounds is

1) 2-methylpentane **2)** 2, 2-dimethylbutane

3) 2, 3-dimethtylbutane **4)** n-hexane

62. Assertion (A) : Chlorination of isobutane in the presence of light called as homopolar reactions

Reason (R) : In this reaction homolysis of bonds takes place

1) If Assertion is true, Reason is true; Reason is the correct explanation for Assertion.

2) If Assertion is true, Reason is true; Reason is not correct explanation for Assertion.

3) If Assertion is true; Reason is false.

4) If Assertion is false; Reason is true.

63. Assertion (A); In $CH_3 - CH_2 - CH_2 - Br$, C_3 carbon atom is more positive than C_2 carbon atom

Reason(R): As distance increases between substituted group & carbon , inductive effect decreases

1) If Assertion is true, Reason is true; Reason is the correct explanation for Assertion.

2) If Assertion is true, Reason is true; Reason is not correct explanation for Assertion.

3) If Assertion is true; Reason is false.

4) If Assertion is false; Reason is true.

64. Statement –I: Canonical structures individually represents the stable structure of a given molecule or ion

Statement –II: The two N – O bond length of nitro methane are same.

1) Statement I false but Statement II is true

2) Both Statement I and Statement II are false

3) Both Statement I and Statement II are true

4) Statement I true but Statement II is false

65. **Statement – I:** The SP^3 $C - H$ bond in propene possessing partial ionic character due to resonance

Statement – II: Propene has three alpha hydrogens

1) Statement I false but Statement II is true

2) Both Statement I and Statement II are false

3) Both Statement I and Statement II are true

4) Statement I true but Statement II is false

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66.

List – I Reaction			List – II Reagent or possible product
(A)	$CH_4 + I_2 \xrightarrow{(X)} CH_3 - I + HI$	P	Na/dry ether
(B)		Q	CH_4 formed
(C)	$C_6H_{14} \xrightarrow{773K}$	R	H_2 formed
(D)	Wurtz reaction	S	HIO_3
		T	$Anhy.AlCl_3(HCl)$

1) A – S; B – T; C – Q,R; D – P **2)** A – S; B – P; C – T; D – Q

3) A – T; B – S; C – Q; D – P **4)** A – S; B – T; C – P; D – Q

67. Identify incorrect reaction from the following (Possible products)

1) $C_2H_5Cl \xrightarrow[H_2]{Zn/HCl} C_2H_6$

2) $2C_2H_5\ Br \xrightarrow[dry\ ether]{Na} C_4H_{10}$

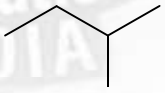
3) $CH_3COO^- \xrightarrow{electrolysis} C_2H_6$

4) $CH_3COONa + NaOH \xrightarrow[\Delta]{CaO} CH_3 - CH_3$

68. Which one of the following has highest boiling point

1) Pentane **2)** 2-methylbutane **3)** 2, 2-dimethylpropane **4)** Hexane

69. Arrange the following in increasing order of melting points

(A) C_2H_6 (B) C_3H_8 (C)  (D)

1) B < A < C < D **2)** A < B < C < D **3)** B < A < D < C **4)** D < A < C < B

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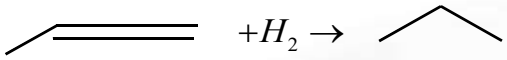
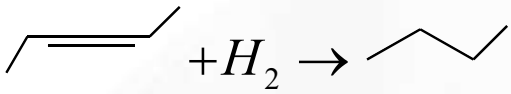
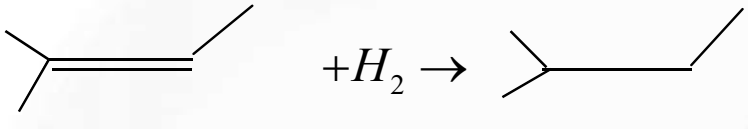
70. Least ΔH was shown by (only magnitude)

1) $CH_2 = CH_2 + H_2 \rightarrow CH_3 - CH_3$

2) 

3) 

4) 

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

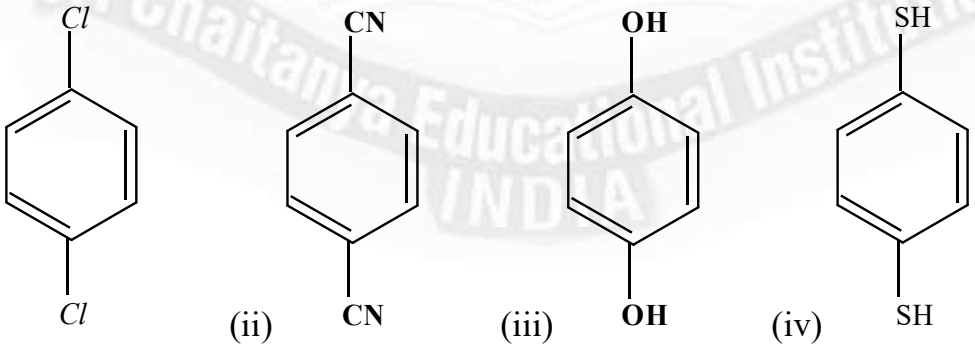
71. Volume of CO_2 (at STP) gas liberated at anode when 164 grams of sodium acetate present in aqueous solution is electrolysed (in lit) is _____

72. When 6 g of carbon and 27 gm of Al are reacts with each other to form aluminum carbide. Which involves hydrolysis to form a combustible gas. Find the weight (in grams) of gas formed _____ gm

73. Total number of isomers (including stereoisomers) obtained on monochlorination of methyl cyclohexane is _____

74. The dihedral angle (in degrees) in staggered form of Newman projection for 1, 1, 1 – Trichloroethane is _____ (Round off to the nearest integer)

75. No. of following compounds shows $\mu = 0$ are _____



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DLP/AITS STUDENT

SAKSHAM JINDAL
APP. NO. 250310236696
DLP/AITS STUDENT

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31	95	10	98	579
ALL INDIA OPEN CATEGORY RANKS	ALL INDIA OPEN CATEGORY RANKS	ALL INDIA CATEGORY RANKS COUNT	ALL INDIA CATEGORY RANKS COUNT	ALL INDIA CATEGORY RANKS COUNT

TOTAL QUALIFIED RANKS FOR JEE ADVANCED-2025 22,094

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H.T.No. 252016104*

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H.T.No. 254065055*

BELOW 100	BELOW 500	BELOW 1000	BELOW 1000	NUMBER OF QUALIFIED RANKS
ALL INDIA OPEN CATEGORY RANKS	ALL INDIA OPEN CATEGORY RANKS	ALL INDIA OPEN CATEGORY RANKS	ALL INDIA CATEGORY RANKS COUNT	
29	113	205	745	4,212

*DLP/AITS