# JEE-Main-24-01-2026 (Memory Based)
# [EVENING SHIFT]
# Maths

**Question: If words arranged in a dictionary alphabetically then find the rank of UDAIPUR.**
**Answer: (1922)**

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | 2 | 1 | 2 | 4 | 6 | 5 |
| U | D | A | I | P | U | R |
| 5 | 1 | 0 | 0 | 0 | 1 | 0 |
| $\frac{6!}{2!}$ | 5! | 4! | 3! | 2! | 1! | 0! |

$$\Rightarrow \frac{5(6!)}{2} + 1(5!) + 0(41) + 0(31) + 0(21) + 1(11) + 0(0)$$
$$\Rightarrow \frac{5(720)}{2} + 120 + 0 + 0 + 0 + 1$$
$$\Rightarrow \frac{3600}{2} + 120$$
$$1800 + 120 + 1 = 1921 + 1 = 1922$$

**Question: Maximum value of n for which $40^n$ circulates 60! = ?**
**Answer: (18)**

$40 = 2^3 \times 5$

$40^n = 2^{8n} 5^n$

$\sum_n (n!) = \sum_{k=1}^{\in_0} \left[\frac{n}{p^k}\right]$

Exporment 1:- $\left[\frac{60}{5}\right] + \left[\frac{60}{25}\right]$

$= 12 + 2 = 14$

$Exporment 2 : -\left[\frac{60}{2}\right] + \left[\frac{60}{4}\right] + \left[\frac{60}{8}\right] + \left[\frac{60}{1}\right] + \left[\frac{60}{32}\right]$

$= 30 + 15 + 7 + 3 + 1$

$= 56$

Riquest power 56

$3n = 56$

$n = \frac{56}{3} \simeq 18.86$

$n = 18$

**Question: The image of parabola $x^2 = 4y$ in the line x - y = 1 is**
**Options:**
(a) $(y - 1)^2 = 4(x + 1)$
(b) $(y + 1)^2 = 4(x - 1)$
(c) $(y + 1)^2 = 4(x + 1)$

(d) $(y - 1)^2 = 4(x - 1)$

**Answer: (b)**

Let $P(-2t, t^2)$

$$\frac{x-2t}{1} = \frac{y-t^2}{-1} = \frac{2(2t-t^2-1)}{2}$$

$$x = -2t + t^2 + 1 + 2t : y - t^2 = 2t - t^2 - 1$$

$$x = t^2 + 1 \qquad y = 2t - 1$$

$$x - 1 = \left(\frac{y+1}{2}\right)^2$$

$$4(x-1) = (y+1)^2$$

**Question: Let the equation $x^4 - ax^2 + 9 = 0$ have four real and distinct roots then the minimum integral value of a?**

**Answer: (6)**

$$ax^2 = x^4 + 9$$

$$a = x^2 + \frac{9}{x^2}$$

$$Am \geq Gm$$

$$\Leftrightarrow \frac{x^2 + \frac{9}{x^2}}{2} \geq \sqrt{x^2 \cdot \frac{9}{x^2}}$$

$$x^2 + \frac{9}{x^2} \geq 6$$

$$\therefore a \geq 6$$

Minimum integral value of a is 6

**Question: $Z = (1 + i)(1 + 2i)(1 + 3i) ---- (1 + ni)$; $n \in N$ and $|z|^2 = 44200$ then n is = ?**

**Answer: (n=5)**

$$|z| = |1+i||1+2i||1+3i| --- |1+ni|$$

$$|z|^2 = (2)(5)(10) --- (1+n^2)$$

Given $|z|^2 = 44200$

Check $n = 1(1+1^2) = 2$

$n = 2(1+2^2) = 5$

$n = 3(1+9) = 10$

$n = 4(1+16) = 17$

$n = 5(1+25) = 26$

$2 \times 5 \times 10 \times 17 \times 26 = 44200,$

so $n = 5$

**Question: Value of sum** $s = \left(\frac{1}{3} + \frac{4}{7}\right) + \left(\left(\frac{1}{3}\right)^2 + \left(\frac{4}{7}\right)^2 + \left(\frac{1}{3}\right)\left(\frac{4}{7}\right)\right) + \left(\left(\frac{1}{3}\right)^3 + \left(\frac{1}{3}\right)^2\left(\frac{4}{7}\right) + \left(\frac{1}{3}\right)\left(\frac{4}{7}\right)^2 + \left(\frac{4}{7}\right)^3\right) + \ldots\ldots$

**Options:**

(a) $\frac{3}{2}$

(b) $\frac{5}{2}$

(c) $\frac{1}{2}$
(d) 2
**Answer: (b)**
$a=\frac{1}{3}, b=\frac{4}{7}$
$s(a+b)+\left(a^2+ab+b^2\right)+\left(a^3+a^2b+ab^2+b^3\right)-----$
$T_n=\frac{a^{k+1}-b^{k+1}}{a-b}$
$$s=\sum_{k=1}^{\infty}\frac{a^{k+1}-b^{k+1}}{a-b}$$
$$\frac{1}{a-b}\left[\sum_{k=1}^{\infty}a^{k+1}-\sum_{k=1}^{\infty}b^{k+1}\right]$$
$\frac{1}{a-b}\left[\left(a^2+a^3+-----\right)-\left(b^2+b^3+-----\right)\right]$
$\frac{1}{a-b}\left[\frac{a^2}{1-a}-\frac{b^2}{1-b}\right]$
$\frac{1}{\frac{1}{3}-\frac{4}{7}}\left[\frac{\left(\frac{1}{3}\right)^2}{\frac{2}{3}}-\frac{\left(\frac{4}{7}\right)}{1-\frac{4}{7}}\right]$
$=\frac{21}{5}\left[\frac{\frac{1}{9}}{\frac{2}{3}}-\frac{\frac{16}{45}}{\frac{3}{7}}\right]-\frac{21}{5}\left[\frac{7}{42}-\frac{32}{42}\right]\Rightarrow-\frac{21}{5}\times\frac{-25}{42}=\frac{5}{2}\Rightarrow s=\frac{5}{2}$

**Question: Domain of** $\sin^{-1}\left(\frac{1}{x^2-2x-1}\right)$ **is (-∞,** $\alpha$**] ∪ [**$\beta, \boldsymbol{\delta}$**] ∪ [**$\lambda$**, ∞) the value of** $\alpha+\beta+\boldsymbol{\delta}+\lambda=$ **?**
**Options:**
(a) 17
(b) 4
(c) 3
(d) 6
**Answer: (b)**
$-1\leq\frac{1}{x^2-2x-1}\leq 1$
$x^2-2x-1\in(-\infty,-1]\cup[1,\infty)$
$x^2-2x-1\leq-1\&x^2-2x-1\geq 1$
$x^2-2x\leq 0 \qquad x^2-2x-2\geq 0$
$x\in[0,2] \qquad x\in\left(-\infty,1-\sqrt{3}\right]\cup\left[1+\sqrt{3},\infty\right)$
$$x\in\left(-\infty,1-\sqrt{3}\right]\cup[0,2]\cup\left\{1+\sqrt{3},\infty\right)$$
$$1.\sqrt{3}+0+2+1+\sqrt{3}=4$$

**Question: f(x) = |ln x| - |x - 1|**
**(i) f(x) is different from all n > 0**
**(ii) f(x) is increasing in (1, ∞)**
**(iii) f(x) is decreasing in (0, 1)**
**Options:**
(a) (i) and (ii) is there

(b) (i), (ii) and (iii) are correct
(c) (i) and (ii) are correct
(d) (i), (ii) and (iii) are incorrect
**Answer: (a)**

$$f(x)=\begin{cases}\ln x-x+1; & x\geq 1\\ -\ln x+n-1; & 0<x<1\end{cases}$$

$$f'(x)=\begin{cases}\frac{1}{x}-1, & x\geq 1\\ -\frac{1}{x}+1, & 0<x<1\end{cases}$$

$$f'(1^+)=f'(1^-)=0$$

$$f''(x)<0 \qquad \forall n>1\ o<x<1$$

**Question:** $\frac{x}{\alpha}=\frac{y+1}{2}=\frac{z-4}{-\alpha}$, $\frac{x-1}{\alpha}=\frac{y-2}{8}=\frac{z-1}{-2\alpha}$ **Shortest distance is** $\sqrt{2}$ **then** $\alpha$ **= ?**
**Answer: (0)**

$\frac{x}{\alpha}=\frac{y+1}{2}=\frac{z-4}{-\alpha}$ $\quad A(0,-1.4),\bar{b}_1(\alpha,2,-\alpha)$

$\frac{x-1}{\alpha}=\frac{y-2}{8}=\frac{z-1}{-2\alpha}$ $\quad \overline{B}(1,2,1)\bar{b}_2(\alpha,8,-2\alpha)$

$\overline{AB}=\hat{i}+3\hat{j}-3\hat{k}$

$$\bar{b}_1\times\bar{b}_2=\begin{vmatrix}\hat{i} & \hat{j} & \hat{k}\\ \alpha & 2 & -\alpha\\ \alpha & 8 & -2\alpha\end{vmatrix}$$

$\bar{b}_1\times\bar{b}_2=4\alpha\hat{i}+\alpha\hat{j}+6\alpha\hat{k}$

$|\bar{b}_1\times\bar{b}_2|=\sqrt{16\alpha^2+\alpha^4+36\alpha^2}$

$=\sqrt{\alpha^4+52\alpha^2}$

$|\bar{b}_1\times\bar{b}_2|=|\alpha|\sqrt{\alpha^2+52}$

$d=\left|\frac{AB\cdot(\bar{b}_1\times\bar{b}_2)}{|\bar{b}_1\times\bar{b}_2|}\right|$

$$\sqrt{2}=\left|\frac{4\alpha+3\alpha^2-18\alpha}{|\alpha|\sqrt{\alpha^2+52}}\right|$$

$$2=\frac{(3\alpha-14)}{\alpha^2+52}$$

$$2\alpha^2+104=9\alpha^2-84\alpha+196$$

$$7\alpha^2-84\alpha+92=0$$

$$\alpha=\frac{8+\pm\sqrt{7056-2576}}{19}$$

$$\frac{84\pm\sqrt{4480}}{14}$$

$$\alpha=\frac{84\pm 8\sqrt{70}}{14}$$

$$\alpha=\frac{42\pm 4\sqrt{70}}{7}$$

$$\alpha=6\pm\frac{4\sqrt{70}}{7}$$

**Question:** $\lim\limits_{x\to 0}\frac{\tan(\tan x)-\tan(\sin x)}{\tan x-\sin x}$
**Options:**
(a) 1
(b) 2
(c) ½

(d) -1

**Answer: (a)**

$$\lim_{x\to 0}\frac{\tan(\tan x)-\tan(\sin x)}{\tan x-\sin x}$$

$$\frac{(\tan(\tan x)+\tan\sin x)}{(\tan(\tan x)+\tan(\sin x))}$$

$$=(1)(1)=1$$

**Question: If $4x^2 + y^2 < 52$, x, y $\in$ I**
**No of ordered pairs (x, y) is**

**Options:**

(a) 38
(b) 77
(c) 67
(d) 87

**Answer: (b)**

$$\left.\begin{array}{l} x=0\Rightarrow y^2<52 \\ -7\le y\le 7\end{array}\right\}15\times 1=15$$

$$\left.\begin{array}{l} x=\pm 1\Rightarrow y^2<48 \\ -6\le y\le 6\end{array}\right\}13\times 2=26$$

$$\left.\begin{array}{l} x=\pm 2\Rightarrow y^2<36 \\ -5\le y\le 5\end{array}\right\}11\times 2=22$$

$$\left.\begin{array}{l} x=\pm 3\Rightarrow y^2<16 \\ -3\le y\le 3\end{array}\right\}7\times 2=14$$

Total: $15+26+22+14$

=77

**Question: $a_1$, $a_2$, $a_3$, $a_4$, AP $a_1 + a_2 + a_3 + a_4 = 48$ $\ell \rightarrow$ c.d what will be largest value in A.P**
**Answer: (27)**

Let $a-3d, a-d, a+d, a+3d$

$a_1 = a-3d, a_1 = a+3d(\text{last term})$

$l = 2d \Rightarrow \boxed{d = \frac{\ell}{2}}$

$S = (a-3d)+(a-d)+(a+d)+(a+3d) = 98$

$4a = 48$

$\boxed{a = 12}$

$12-3d, 12-d, 12+d, 12+3d$

$a_1 \cdot a_2 \cdot a_3 \cdot a_4 + \ell^4 = \sqrt{361}$

$(144-9d^2)(144-d^2)+16d^4 = 361$

$(144)^2 - 144d^2 - 1296d^2 + 9d^4 + 16d^4 = 361$

$20736 - 1440d^2 + 25d^2 = 361$

$(144-5d^2)^2 = 316$
$(144-5d^2) = \sqrt{361}$
$144-5d^2 = \pm 19$
$125 = 5d^2$
$d = 5$
Common difference $\ell = 2d = 10$
$a-3d = 12-15 = -3$
$a-d = 12-5 = 7$
$a+d = 12+5 = 17$
$a+3d = 12+15 = 27$
27.

**Question: If** $\int \frac{7x^{10}+9x^8}{(1+x^2+2x^9)^2}dx = f(x)+C \text{ and } f(1) = \frac{1}{4}$ **then f(x) ?**
**Options:**

(a) $\frac{x^9}{2x^2+9+x^9}$

(b) $\frac{x^9}{2+x^2+x^9}$

(c) $\frac{x^9}{1+x^2+2x^9}$

(d) $\frac{x^9}{1+x^9+2x^2}$

**Answer: (c)**

$$\int \frac{\left(\frac{9}{x^8}+\frac{9}{x^{10}}\right)dx}{\left(\frac{1}{x^9}+\frac{1}{x^7}+2\right)^2}$$

Let $x^{-9}+x^{-7}+2=t$

$$\Rightarrow -\int \frac{dt}{t^2} = -\int t^{-2}dt = \frac{-t^{-1}}{-1}+C = \frac{1}{t}+C$$

$$\frac{1}{x^{-9}+x^{-7}+2}+C$$

$$\frac{x^9}{1+x^2+2x^9}+C$$

**Question: x : {1, 2, 3, - - - - 19}**
**Y : {y; : yi = axi + b, xi $\in$ x}**
**Mean and variance of y is 30 and 120 respectively then sum of value(s) of b?**
**Answer: (50)**

$$\frac{\sum yi}{19} = a\frac{\sum xi}{19}+b$$

$$\Leftrightarrow 30 = a\cdot\frac{19\times 20}{19\times 2}+b$$

$$10a+b=30$$

Original variance

$$\frac{1^2+2^2+------+19^2}{19} - \left(\frac{\sum xi}{19}\right)^2$$

$$\frac{19\times 20\times 39}{19\times 6}-100=30$$

$$\Leftrightarrow \text{Variance}(yi) = 30a^2 = 120$$

$$\Leftrightarrow a^2=4$$

$$a=2 \Rightarrow b=10$$

$$a=-2 \Rightarrow b=50$$

**Question:**
**Options:**
(a)
(b)
(c)
(d)
**Answer: ()**

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**Options:**
(a)
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