MEMORY BASED QUESTIONS JEE–MAIN EXAMINATION – JANUARY 2026

(HELD ON FRIDAY 23rd JANUARY 2026) **TIME : 3:00 PM TO 6:00 PM**

MATHEMATICS — TEST PAPER WITH SOLUTION

1. If $\sum_{k=1}^{n} a_k = \alpha n^2 + \beta n$ & $a_{10} = 59$, $a_6 = 7a_1$, then find $\alpha + \beta$:

(1) 5 (2) 10

(3) 8 (4) 3

Ans. **(1)**

Sol. $\because S_n = \alpha n^2 + \beta n$

$\therefore a_n = S_n - S_{n-1} = \alpha(n^2 - (n-1)^2) + \beta(1)$

$= (2n - 1)\alpha + \beta$

$\because a_{10} = 59 \Rightarrow 19\alpha + \beta = 59 \quad \ldots(1)$

$a_1 = \alpha + \beta$

$a_6 = 11\alpha + \beta$

$\because a_6 = 7a_1$

$11\alpha + \beta = 7\alpha + 7\beta$

$4\alpha = 6\beta$

$2\alpha = 3\beta \quad \ldots(2)$

From (1) & (2)

$$19\alpha + \frac{2\alpha}{3} = 59$$

$\boxed{\alpha = 3 \Rightarrow \beta = 2}$

$\therefore \boxed{\alpha + \beta = 5}$

2. The minimum value of

$\cos^2\theta + 6\sin\theta\cos\theta + 3\sin^2\theta + 3$ is :

(1) –1 (2) 1

(3) $5 + \sqrt{10}$ (4) $5 - \sqrt{10}$

Ans. **(4)**

Sol. $3(2\sin\theta\cos\theta) + 2\sin^2\theta + (\cos^2\theta + \sin^2\theta) + 3$

$= 3\sin 2\theta + (1 - \cos 2\theta) + 4$

$= 5 + (3\sin 2\theta - \cos 2\theta)$

So, minimum value $= 5 - \sqrt{9+1}$

$= 5 - \sqrt{10}$

3. If matrices A & B are such that $A = \begin{bmatrix} 0 & -2 & 3 \\ -2 & 0 & 1 \\ -1 & 1 & 0 \end{bmatrix}$,

B (I – A) = (I + A), then find B.

(1) $B = \begin{bmatrix} -1 & 2/3 & 2/3 \\ -2 & 5/3 & -10/3 \\ -2 & 2 & -3 \end{bmatrix}$

(2) $B = \begin{bmatrix} -1 & 1/3 & 1/3 \\ -2 & 5/3 & -10/3 \\ -2 & 2 & -3 \end{bmatrix}$

(3) $B = \begin{bmatrix} -1 & 0 & 2/3 \\ 0 & 5/3 & -10/3 \\ 2 & 2 & -3 \end{bmatrix}$

(4) $B = \begin{bmatrix} -1 & 2/3 & 2/3 \\ -2/3 & 1 & 5/3 \\ -2 & 2 & -3 \end{bmatrix}$

Ans. **(1)**

Sol. $I - A = \begin{bmatrix} 1 & 2 & -3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}, I + A = \begin{bmatrix} 1 & -2 & 3 \\ -2 & 1 & 1 \\ -1 & 1 & 1 \end{bmatrix}$

$|(I - A)| = 1(0) - 2(3) - 3(-3)$

$= -6 + 9 = 3$

$$(I - A)^{-1} = \frac{1}{3}\begin{bmatrix} 0 & 1 & 1 \\ -3 & 4 & -5 \\ -3 & 3 & -3 \end{bmatrix}$$

$B = (I + A)(I - A)^{-1}$

$$B = \frac{1}{3}\begin{bmatrix} 1 & -2 & 3 \\ -2 & 1 & 1 \\ -1 & 1 & 1 \end{bmatrix}\begin{bmatrix} 0 & 1 & 1 \\ -3 & 4 & -5 \\ -3 & 3 & -3 \end{bmatrix}$$

$$B = \frac{1}{3}\begin{bmatrix} -3 & 2 & 2 \\ -6 & 5 & -10 \\ -6 & 6 & -9 \end{bmatrix}$$

$$B=\begin{bmatrix}-1 & 2/3 & 2/3\\ -2 & 5/3 & -10/3\\ -2 & 2 & -3\end{bmatrix}$$

4. If $\cot\theta=-\frac{1}{2\sqrt{2}}$ where $\theta\in\left(\frac{3\pi}{2},2\pi\right)$ then value of $\sin\left(\frac{15\theta}{2}\right)(\sin 8\theta+\cos 8\theta)+\cos\left(\frac{15\theta}{2}\right)(\cos 8\theta-\sin 8\theta)$ is :

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

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

Ans. **(2)**

Sol. $\cos\left(8\theta-\frac{15\theta}{2}\right)+\sin\left(\frac{15\theta}{2}-8\theta\right)$

$$\cos\frac{\theta}{2}-\sin\frac{\theta}{2}=-\sqrt{1-\sin\theta}$$

$$=-\sqrt{1+\frac{2\sqrt{2}}{3}}$$

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

5. Sum of solutions of the equation $\log_{x+3}(6x^2+28x+30)=5-2\log_{6x+10}(x^2+6x+9)$, are :

(1) 0 (2) 1

(3) 2 (4) 3

Ans. **(1)**

Sol. $\log_{x+3}[(x+3)(6x+10)]=5-2\log_{6x+10}(x+3)^2$

$1+\log_{x+3}(6x+10)=5-4\log_{6x+10}(x+3)$

Let $\log_{6x+10}(x+3)=t$

$$1+\frac{1}{t}=5-4t$$

$t+1=5t-4t^2\Rightarrow 4t^2-4t+1=0$

$\Rightarrow(2t-1)^2=0\Rightarrow t=\frac{1}{2}$

$\therefore \log_{6x+10}(x+3)=\frac{1}{2}\Rightarrow x+3=(6x+10)^{1/2}$

$\Rightarrow x^2+6x+9=6x+10$

$\Rightarrow x=1,-1$

So, sum of solution = 0

6. If PQ is a chord perpendicular to the transverse axis of $\frac{x^2}{4}-\frac{y^2}{b^2}=1$ of eccentricity $\sqrt{3}$ such that ΔOPQ is equilateral Δ(where O is the origin), then area of ΔOPQ is :

(1) $\frac{4}{5}\sqrt{3}$ (2) $\frac{2}{5}\sqrt{3}$

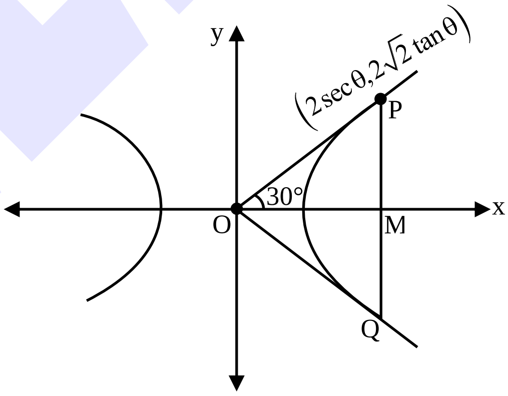
(3) $\frac{8}{5}\sqrt{3}$ (4) $\frac{16\sqrt{3}}{5}$

Ans. **(3)**

Sol. $e=\sqrt{1+\frac{b}{4}}=\sqrt{3}$

$\Rightarrow b=8$

$\therefore$ Hyperbola $\frac{x^2}{4}-\frac{y^2}{8}=1$



$$\frac{PM}{OM}=\tan 30^\circ$$

$$\Rightarrow\frac{2\sqrt{2}\tan\theta}{2\sec\theta}=\frac{1}{\sqrt{3}}\Rightarrow\sin\theta=\frac{1}{\sqrt{6}}$$

Area $=2\times\frac{1}{2}\times OM\times MP$

$=2\sec\theta\times 2\sqrt{2}\tan\theta$

$$= 4\sqrt{2}\frac{\sin\theta}{\cos^2\theta} = 4\sqrt{2}\times\frac{1}{\sqrt{6}\times\left(1-\frac{1}{6}\right)} = \frac{8\sqrt{3}}{5}$$

7. If $\vec{a},\vec{b},\vec{c}$ are three vectors such that $\vec{a}\times\vec{b} = 2(\vec{a}\times\vec{c})$, $|\vec{a}|=1, |\vec{b}|=4, |\vec{c}|=2$ and angle between $\vec{b}\,\&\,\vec{c}$ is $60°$, then find $|\vec{a}\cdot\vec{c}|$:

(1) 4 (2) 1

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

Ans. **(2)**

Sol. $\vec{a}\times\vec{b} - 2(\vec{a}\times\vec{c}) = 0$

$\vec{a}\times(\vec{b}-2\vec{c}) = 0 \Rightarrow \vec{b}-2\vec{c} = \lambda\vec{a}$ ...(1)

$|\lambda a|^2 = |\vec{b}-2\vec{c}|^2 \Rightarrow \lambda^2|\vec{a}|^2 = b^2 + 4c^2 - 4\vec{b}.\vec{c}$

$\lambda^2 = 16 + 16 - 4.4.2\cdot\frac{1}{2}$

$\lambda^2 = 16$

$\lambda = \pm 4$

$\because\ \vec{b}-2\vec{c} = \pm 4\vec{a}$

Dot with $\vec{c} \Rightarrow \vec{b}.\vec{c} - 2|\vec{c}|^2 = \pm 4(\vec{a}.\vec{c})$

$4.2.\frac{1}{2} - 2.4 = \pm 4(\vec{a}.\vec{c})$

$|\vec{a}.\vec{c}| = 1$

8. The system of linear equations

$x + y + z = 6$

$2x + 5y + az = 36$

$x + 2y + 3z = b$

(1) Infinitely many solutions for $a = 8$ & $b = 16$

(2) Unique solution for $a = 8$ & $b = 16$

(3) Unique solution for $a = 8$ & $b = 14$

(4) Infinitely many solutions for $a = 8$ & $b = 14$

Ans. **(4)**

Sol. If $D = \begin{vmatrix} 1 & 1 & 1 \\ 2 & 5 & a \\ 1 & 2 & 3 \end{vmatrix} = 0 \Rightarrow a = 8$

If $D_1 = \begin{vmatrix} 6 & 1 & 1 \\ 36 & 5 & a \\ b & 2 & 3 \end{vmatrix} = 0 \Rightarrow ab - 5b - 12a + 54 = 0$

If $D_2 = \begin{vmatrix} 1 & 6 & 1 \\ 2 & 36 & a \\ 1 & b & 3 \end{vmatrix} = 0 \Rightarrow ab - 6a - 2b - 36 = 0$

If $D_3 = \begin{vmatrix} 1 & 1 & 6 \\ 2 & 5 & 36 \\ 1 & 2 & b \end{vmatrix} = 0 \Rightarrow b = 14$

For $a = 8$ & $b = 14 \Rightarrow D_1$ & D_2 are also zero

For $a = 8$ & $b = 14 \Rightarrow D = D_1 = D_2 = D_3 = 0$

$\Rightarrow$ infinitely many solutions.

9. Number of ways of distributing 16 identical oranges among 4 persons such that each one gets atleast one oranges is

(1) 435 (2) 455

(3) 470 (4) 489

Ans. **(2)**

Sol. $x_1 + x_2 + x_3 + x_4 = 16$

Number of positive integral solution

$= {}^{15}C_3 = 455$

10. $\int_0^x t^2\sin(x-t)\,dt = x^2$, then sum of values of x where $x \in [0, 100]$

(1) 300π (2) 272π

(3) 200π (4) 240π

Ans. **(4)**

Sol. $\int_0^x (x-t)^2\sin t\,dt = x^2$

$\int_0^x (x^2 - 2xt + t^2)\sin t\,dt = x^2$

$x^2\left(-\cos t\right)_0^x - 2x\int_0^x t\sin t\,dt + \int_0^x t^2\sin t\,dt = x^2$

$-x^2(\cos x - 1) - 2x\left(-t\cos t + \sin t\right)_0^x + \left(t^2(-\cos t)\right)_0^x + \int_0^x 2t\cos t\,dt = x^2$

$-x^2\cos x + x^2 - 2x(-x\cos x + \sin x) - x^2\cos x + 2(t\sin t + \cos t)_0^x = x^2$

$-x^2\cos x + x^2 + 2x^2\cos x - 2x\sin x - x^2\cos x + 2(x\sin x + \cos x - 1) = x^2$

$x^2 + 2\cos x - 2 = x^2$

$\cos x = 1$

$x = 2m\pi,\ m \in I$

$0 + 2\pi + 4\pi + \ldots + 30\pi$

$= 2\pi(1 + 2 + \ldots + 15)$

$= 2\pi.\dfrac{15.16}{2} = 240\pi$

11. If $y = f(x)$ satisfies the differential equation $(x^2 - 4)y' - 2xy + 2x(4 - x^2)^2 = 0$ and $f(3) = 15$, then find local maximum value of $f(x)$

(1) 16 (2) 20

(3) 25 (4) 30

Ans. (1)

Sol. $\dfrac{(x^2-4)\dfrac{dy}{dx} - 2xy}{(4-x^2)^2} = -2x$

$\dfrac{d}{dx}\left(\dfrac{y}{x^2-4}\right) = -2x$

$\therefore\ \dfrac{y}{x^2-4} = -x^2 + C$

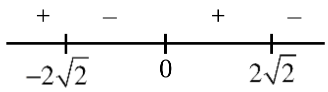
$\{(3, 15) \Rightarrow \dfrac{15}{5} = -9 + C \Rightarrow C = 12\}$

$\Rightarrow \dfrac{y}{x^2-4} = 12 - x^2$

$\Rightarrow y = (x^2 - 4)(12 - x^2)$

$y' = (x^2 - 4)(-2x) + (12 - x^2).2x$

$= -4x\left(x - 2\sqrt{2}\right)\left(x + 2\sqrt{2}\right)$



Local maximum value of

$f(x) = f\left(\pm 2\sqrt{2}\right)$

$= (8 - 4)(12 - 8) = 16$

12. Let $A = \{1, 2, 3, \ldots, 9\}$: x R y, if $|(x - y)|$ is multiple of 3.

S_1 : Number of elements in R is 36

S_2 : R is equivalence relation.

(1) S_1 & S_2 both correct

(2) S_1 & S_2 is correct, but S_2 not correct

(3) S_2 is correct, but S_1 is not correct

(4) S_1 & S_2 both incorrect

Ans. (3)

Sol. Number of numbers of form $3n \Rightarrow 3$

Number of numbers of form $3n + 1 \Rightarrow 3$

Number of numbers of form $3n + 2 \Rightarrow 3$

Number of ordered pairs $(x, y) = 3(3 \times 3) = 27$

S_1 false

$\Rightarrow x\,R\,y \Leftrightarrow y\,R\,x$

$\Rightarrow (x - y) = 3\lambda,\ (y - z) = 3\mu$

$\Rightarrow (x - z) = 3(\lambda + \mu)$

R is reflexive, symmetric & transitive

S_2 is true

Ans. S_1 is false but S_2 is true

13. $f(x)=\begin{cases}\dfrac{a|x|+2x^2-2\sin|x|\cos|x|}{x} & ; \quad x\neq 0\\ b & ; \quad x=0\end{cases}$

If f(x) is continuous then value of a + b is equal to

(1) 2 (2) 3

(3) 4 (4) 5

Ans. (1)

Sol. $\lim\limits_{x\to 0}\left(\dfrac{a|x|+2x^2-2\sin|x|\cos|x|}{x}\right)$

$f(0^+) = a - 2$

$f(0^-) = -a + 2$

for continuity

$a - 2 = -a + 2 = b \Rightarrow a = 2 \;\&\; b = 0$

so $a + b = 2$

14. Let sets A : $\{x : ||x - 3| - 3| \le 1\}$, $x \in z$.

set B : $\left\{x : x\in R\ (x\neq 1,2)\ \dfrac{(x-2)(x-4)}{(x-1)}\log_e|x-2| = 0\right\}$

then number of onto functions from $A \to B$.

(1) 61 (2) 62

(3) 63 (4) 64

Ans. (2)

Sol. A : $||x - 3| - 3| \le 1$

$\Rightarrow -1 \le |x - 3| - 3 \le 1$

$2 \le |x - 3| \le 4$

$2 \le (x - 3) \le 4$ or $-4 \le (x - 3) \le -2$

$5 \le x \le 7$ or $-1 \le x \le 1$

$A = \{-1, 0, 1, 5, 6, 7\}$

$B \Rightarrow x = 4$, $|x - 2| = 1 \Rightarrow x = 3$ or 1(reject) +

$B = \{4, 3\}$

Number of onto functions from A to B $= 2^6 - 2 = 62$

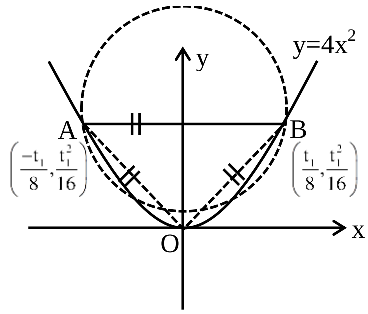
15. An equilateral triangle OAB is inscribed in the parabola $y = 4x^2$ whose vertex is O. Find the least distance of the circle described on AB as diameter from the origin.

(1) $\dfrac{6-\sqrt{3}}{2}$ (2) $\dfrac{3-\sqrt{3}}{4}$

(3) $\dfrac{6+\sqrt{3}}{2}$ (4) $\dfrac{3+\sqrt{3}}{2}$

Ans. (2)

Sol.



$OB^2 = AB^2$

$\Rightarrow \dfrac{t_1^2}{64}+\dfrac{t_1^4}{256}=\dfrac{t_1^2}{16}$

$\Rightarrow 4t_1^2 + t_1^4 = 16t_1^2$

$\Rightarrow t_1 = 2\sqrt{3}$

$\therefore A\left(\dfrac{-\sqrt{3}}{4},\dfrac{3}{4}\right) \;\&\; B\left(\dfrac{\sqrt{3}}{4},\dfrac{3}{4}\right)$

Midpoint of AB i.e. centre of circle is $\left(0,\dfrac{3}{4}\right)$ and radius $=\dfrac{\sqrt{3}}{4}$

$\therefore OP = OM - r = \dfrac{3}{4}-\dfrac{\sqrt{3}}{4}=\dfrac{3-\sqrt{3}}{4}$

16. If the point of intersection of ellipses $x^2 + 2y^2 - 6x - 12y + 23 = 0$ and $4x^2 + 2y^2 - 20x - 12y + 35 = 0$ lie on a circle of radius r and centre (a, b), then the value of $ab + 18r^2$ is

(1) 90 (2) 95 (3) 85 (4) 100

Ans. (2)

Sol. $4x^2+2y^2-20x-12y+35=0$

$\underline{2(x^2+2y^2-6x-12y+23)=0}$

$6x^2+6y^2-32x-36y+81=0$

$x^2+y^2-\dfrac{16}{3}x-6y+\dfrac{27}{2}=0$

$(a,b)\equiv\left(\dfrac{8}{3},3\right)$

$r=\sqrt{\dfrac{64}{9}+9-\dfrac{27}{2}}=\sqrt{\dfrac{87}{18}}$

$r^2=\dfrac{87}{18} \Rightarrow 18r^2 = 87$

Now, $ab + 18r^2 = 8 + 87 = 95$

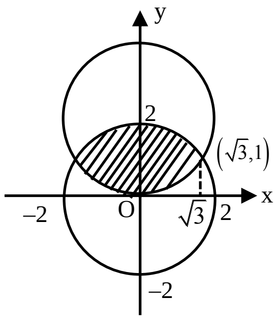
17. Find the area bounded by the curves $x^2 + y^2 = 4$ & $x^2 + (y-2)^2 = 4$

(1) $\frac{8\pi}{3} - 2\sqrt{3}$ Sq. units (2) $\frac{8\pi}{3} + \sqrt{3}$ Sq. units

(3) $\frac{4\pi}{3} - 2\sqrt{3}$ Sq. units (4) $\frac{4\pi}{3} + 2\sqrt{3}$ Sq. units

Ans. **(1)**

Sol.



$$A = 2\int_0^{\sqrt{3}}\left[\sqrt{4-x^2} - \left(2-\sqrt{4-x^2}\right)\right]dx$$

$$= 2\int_0^{\sqrt{3}}\left(2\sqrt{4-x^2} - 2\right)dx$$

$$= 4\int_0^{\sqrt{3}}\left(\sqrt{4-x^2} - 1\right)dx$$

$$= \left[4\left[\frac{1}{2}\left(x\sqrt{4-x^2} + 4\sin^{-1}\frac{x}{2}\right) - x\right]\right]_0^{\sqrt{3}}$$

$$= 4\left[\frac{1}{2}\left(\sqrt{3} + 4\times\frac{\pi}{3}\right) - \sqrt{3}\right] = 4\left[\frac{2\pi}{3} - \frac{\sqrt{3}}{2}\right]$$

$$= \frac{8\pi}{3} - 2\sqrt{3} \text{ (Sq. units)}$$

18. If $z = \frac{\sqrt{3}}{2} + \frac{i}{2}$, then $\left(z^{201} - i\right)^8$ is -

(1) 0 (2) 256

(3) 1 (4) –1

Ans. **(2)**

Sol. $z = \cos\frac{\pi}{6} + i\sin\frac{\pi}{6}$

$$z^{201} = \cos\left(201\frac{\pi}{6}\right) + i\sin\left(201\frac{\pi}{6}\right) = -i$$

$$(z^{201} - i)^8 = (-2i)^8 = 256$$

19. If $I(x) = 3\int\frac{dx}{(4x+6)\sqrt{4x^2+8x+3}}$, $I(0) = \frac{\sqrt{3}}{4}$, then $I(1) =$

(1) $\frac{3\sqrt{15}}{20}$ (2) $\frac{3\sqrt{15}}{10}$

(3) $\frac{\sqrt{15}}{10}$ (4) $\frac{\sqrt{15}}{20}$

Ans. **(1)**

Sol. Let $4x + 6 = \frac{1}{t}$

$$dx = \frac{-dt}{4t^2}$$

$$I = \frac{-3}{4}\int\frac{dt}{t^2\times\frac{1}{t}\times\sqrt{4\left(\frac{\frac{1}{t}-6}{4}\right)^2 + 2\left(\frac{1}{t}-6\right) + 3}}$$

$$= \frac{-3}{4}\int\frac{dt}{t\sqrt{\frac{1}{4}\left(\frac{1-6t}{t}\right)^2 + \frac{2}{t} - 9}}$$

$$= \frac{-3}{2}\int\frac{dt}{\sqrt{1-4t}}$$

$$= \frac{-3}{2}\times\frac{-1}{4}\times\frac{(1-4t)^{\frac{1}{2}}}{\frac{1}{2}} + C$$

$$= \frac{3}{4}\sqrt{1-4t} + C = \frac{3}{4}\sqrt{1-\frac{4}{4x+6}} + C$$

$$I(0) = \frac{3}{4}\sqrt{1-\frac{2}{3}} + C = \frac{\sqrt{3}}{4} \Rightarrow C = 0$$

$$I(x) = \frac{3}{4}\sqrt{1-\frac{4}{4x+6}}$$

$$\therefore I(1) = \frac{3}{4}\times\sqrt{\frac{6}{10}} = \frac{3\sqrt{6}}{4\sqrt{10}} = \frac{3\sqrt{60}}{40} = \frac{3\sqrt{15}}{20}$$

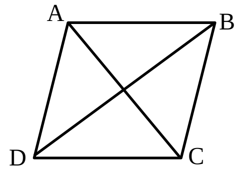
20. Rhombus ABCD is given with vertices A(1,2), C(–3,–6) and sides AD & BC are parallel to the line $7x - y = 14$. If coordinates of B & C are (α,β) & (γ, δ) respectively, then find $\alpha + \beta + \gamma + \delta = ?$

(1) –4 (2) 5

(3) –6 (4) –7

Ans. (3)

Sol. Mid points of BD & AC are same



As $\dfrac{\alpha+\gamma}{2} = \dfrac{1+(-3)}{2}, \dfrac{\beta+\delta}{2} = \dfrac{2+(-6)}{2}$

$\alpha + \gamma = -2, \quad \beta + \delta = -4$

$\alpha + \beta + \gamma + \delta = -6$

21.

Class	4-8	8-12	12-16	16-20
Freq.(f_i)	3	λ	4	7

The mean and variance of following data is μ & 19 respectively & μ is an integer. The value of $(\lambda+\mu)$ is

(1)19 (2) 20

(3) 13 (4) 17

Ans. (1)

Sol. $\mu = \dfrac{\sum f_i x_i}{\sum f_i} = \dfrac{18+10\lambda+56+126}{14+\lambda}$

$= \dfrac{200+10\lambda}{\lambda+14} = 10 + \left(\dfrac{60}{\lambda+14}\right)$

$\lambda + 14$ is multiply of 60 $\Rightarrow \lambda = 1$ or 6 or 16.

$\sigma^2 = \dfrac{\sum x_i^2}{\lambda+14} - (\mu)^2$

$\sigma^2 = \dfrac{6^2(3)+10^2(\lambda)+14^2(4)+(18)^2(7)}{\pi+14} - \mu^2$

for $\lambda = 6$, $\mu = 10 + 3 = 13$

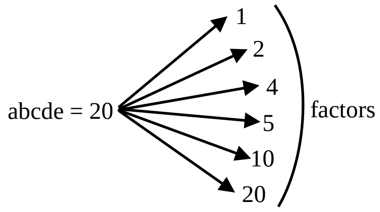
$\lambda + \mu = 19$

22. Let S = number of 4 digit numbers abcd, where $a > b > c > d$ & P = number of 5 digit numbers abcde, where product of digits is 20, then S + P =

Ans. (260)

Sol. $S = {}^{10}C_4 = 210$

For P $\therefore$



$\therefore$ Case -(1) 5 4 1 1 1 $\Rightarrow \dfrac{5!}{3!} = 20$

Case -(2) 5 2 2 1 1 $\Rightarrow \dfrac{5!}{2!2!} = 30$

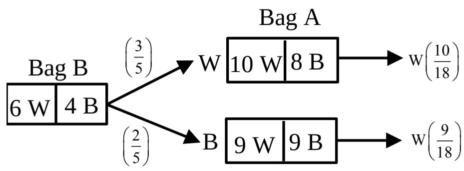
$\therefore$ P = 20 + 30 = 50

$\therefore$ S + P = 260

23. Bag A contains 9 White & 8 Black balls and bag B contains 6 White & 4 Black balls. A ball is randomly transferred from bag B to bag A then a ball is drawn from bag A. If probability that drawn ball is White, is $\dfrac{p}{q}$ (Where p & q are coprime), then (p + q) is

Ans. (23)

Sol.



$\therefore$ P(Drawn ball is white) $= \dfrac{3}{5} \times \dfrac{10}{18} + \dfrac{2}{5} \times \dfrac{9}{18}$

$= \dfrac{48}{90} = \dfrac{8}{15} = \dfrac{p}{q}$

$\therefore$ p + q = 23

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