MEMORY BASED QUESTIONS JEE–MAIN EXAMINATION – APRIL 2026

(HELD ON MONDAY 06th APRIL 2026) **TIME : 3:00 PM TO 6:00 PM**

MATHEMATICS — TEST PAPER WITH SOLUTION

1. Let $(n^2 - 2n + 2)x^2 - 3x + (n^2 - 2n + 2)^2 = 0$ be a quadratic equation. If α is the minimum value of product of roots and β is the maximum value of sum of roots, then the sum of first six terms of geometric progression whose first term is α and common ratio is $\left(\frac{\alpha}{\beta}\right)$, is

(1) $\frac{364}{243}$ (2) $\frac{343}{243}$

(3) $\frac{256}{81}$ (4) $\frac{364}{81}$

Ans. (1)

Sol. $\alpha = n^2 - 2n + 2$

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

$\therefore$ minimum value of α is 1

Similarly $\beta = \frac{3}{(n-1)^2+1}$

$\therefore$ maximum value of β is 3

required G.P. is $1, \frac{1}{3}, \frac{1}{3^2}, \ldots$

$$S_6 = \frac{1\left(1-\left(\frac{1}{3}\right)^6\right)}{1-\frac{1}{3}} = \frac{3}{2}\left[1-\left(\frac{1}{3}\right)^6\right] = \frac{364}{243}$$

2. The sum of series

$1+\frac{1}{2}(1^2+2^2)+\frac{1}{3}(1^2+2^2+3^2)+\ldots$ upto 10 terms is

(1) $\frac{313}{2}$ (2) $\frac{315}{2}$

(3) $\frac{325}{2}$ (4) $\frac{335}{2}$

Ans. (2)

Sol. $T_n = \frac{1}{n}(1^2+2^2+\ldots+n^2)$

$$T_n = \frac{n(n+1)(2n+1)}{6n}$$

$$T_n = \frac{1}{6}[2n^2+3n+1]$$

$$S_n = \Sigma T_n = \frac{1}{6}[2\Sigma n^2 + 3\Sigma n + \Sigma 1]$$

$$\Sigma T_n = \frac{1}{6}\left[2.\frac{n(n+1)(2n+1)}{6} + \frac{3n(n+1)}{2} + n\right]$$

$$S_{10} = \frac{1}{6}\left[\frac{2\times 10\times 11\times 21}{6} + \frac{3}{2}\times 10\times 11 + 10\right]$$

$$= \frac{10}{6}\left[77 + \frac{33}{2} + 1\right] = \frac{315}{2}$$

3. $\int_{-1}^{1} \frac{x^3+|x|+1}{x^2+|x|+1}dx$ is equal to

(1) $\ell n3 - \frac{\pi}{3\sqrt{3}}$ (2) $\frac{\pi}{3\sqrt{3}}$

(3) $\ell n3 + \frac{\pi}{3\sqrt{3}}$ (4) $\frac{-\pi}{3\sqrt{3}}$

Ans. (1)

Sol. $\int_{-1}^{1} \frac{x^3+|x|+1}{x^2+|x|+1}dx$

$$= \int_{-1}^{1}\frac{x^3}{x^2+|x|+1}dx + \int_{-1}^{1}\frac{|x|+1}{x^2+|x|+1}dx$$

$$= 0 + 2\int_0^1 \frac{x+1}{x^2+x+1}dx$$

$$= \int_0^1 \frac{(2x+1)+1}{x^2+x+1}dx$$

$$= \int_0^1 \frac{2x+1}{x^2+x+1}dx + \int_0^1 \frac{1}{x^2+x+1}dx$$

$$= \left[\ell n|x^2+x+1|\right]_0^1 + \left[\frac{2}{\sqrt{3}}\tan^{-1}\left(\frac{2x+1}{\sqrt{3}}\right)\right]_0^1$$

$$= \ell n3 - \frac{2}{\sqrt{3}}\left[\tan^{-1}\sqrt{3} - \tan^{-1}\frac{1}{\sqrt{3}}\right]$$

$$= \ell n3 - \frac{2}{\sqrt{3}}\left(\frac{\pi}{3} - \frac{\pi}{6}\right)$$

$$= \ell n3 - \frac{\pi}{3\sqrt{3}}$$

4. Let $\lim_{x\to 2}\frac{\tan(x-2)[rx^2+(p-2)x-2p]}{(x-2)^2} = 5$ for some r, p ∈ R. If the set of all possible values of q, such that the roots of the equation $rx^2 - px + q = 0$ lie in (0, 2) be the interval (α, β], then 4(α + β) is equal to

(1) 11 (2) 21

(3) 17 (4) 13

Ans. (3)

Sol. $\lim_{x\to 2}\frac{\tan(x-2)}{x-2}\cdot\frac{[rx^2+(p-2)x-2p]}{x-2} = 5$

$\Rightarrow \lim_{x\to 2}\frac{rx^2-2x+p(x-2)}{x-2} = 5$

$\because D^r \to 0 \therefore N^r \to 0 \Rightarrow r = 1$

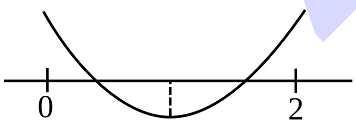
$\Rightarrow \lim_{x\to 2}\frac{x(x-2)+p(x-2)}{x-2} = 5$

$\Rightarrow 2 + p = 5$

$\Rightarrow p = 3$

Now, quadratic equation is $x^2 - 3x + q = 0$

its both roots lie in (0, 2)



$D \geq 0,\quad 0 < \frac{-b}{2a} < 2,\quad f(0) > 0,\quad f(2) > 0$

$\Rightarrow 9 - 4q \geq 0$ and $q > 2$

$\Rightarrow q \in \left(2, \frac{9}{4}\right]$

$\alpha = 2,\ \beta = \frac{9}{4} \Rightarrow 4\left(2+\frac{9}{4}\right) = 17$

5. If matrix $\begin{bmatrix}1 & 3 & 1\\ 2 & 1 & \alpha\\ 0 & 1 & -1\end{bmatrix}$ is singular. Given a function $f(x) = \int_0^x (t^2+2t+3)\,dt\ \ \forall\ x \in [1, \alpha]$ & m and n are maximum and minimum value of function f(x), then the value of 3(m – n) is

(1) 550 (2) 510

(3) 490 (4) 540

Ans. (4)

Sol. $|m| = 7 - \alpha = 0 \Rightarrow \alpha = 7$

given $f(x) = \int_0^x (t^2+2t+3)\,dt$

$\Rightarrow f(x) = \frac{x^3}{3} + x^2 + 3x$ and

$f'(x) = x^2 + 2x + 3 > 0\ \ \forall\ x$

$\therefore$ y = f(x) is strictly increasing function

$\Rightarrow m = f(7) = \frac{553}{3}$

$\&\ n = f(1) = \frac{13}{3}$

$\therefore 3(m - n) = 540$

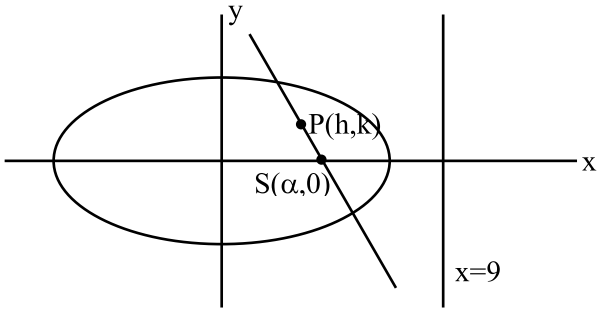
6. Let x = 9 be a directrix of an ellipse centred at (0, 0) and having eccentricity $\frac{1}{3}$. If focus at (α, 0) (α > 0), then locus of the mid-point of the chord passing through the focus (α, 0) is

(1) $8y^2 = 9x(1 + x)$ (2) $9y^2 = 8x(1 + x)$

(3) $9y^2 = 8x(1 - x)$ (4) $8y^2 = 9x(1 - x)$

Ans. (3)

Sol.



$\frac{a}{e} = 9 \Rightarrow a = 3$

$b^2 = a^2(1 - e^2) = 9\left(1 - \frac{1}{9}\right) = 8$

$\frac{x^2}{9} + \frac{y^2}{8} = 1$

$S(\alpha, 0) \equiv S(1, 0)$

$T = S_1 \Rightarrow \frac{hx}{9} + \frac{ky}{8} = \frac{h^2}{9} + \frac{k^2}{8}$

$(1, 0) \Rightarrow \frac{h}{9} + 0 = \frac{h^2}{9} + \frac{k^2}{8}$

$h = h^2 + \frac{9}{8}k^2$

$9y^2 = 8x(1 - x)$

7. The value of x which satisfies the equation

$\sin^{-1}\left(\frac{2}{3}\sqrt{1-x^2}\right) = \cot^{-1}\left(2\sqrt{x}\right)$, is

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

(3) $\frac{1}{8}$ (4) $\frac{1}{9}$

Ans. **(1)**

Sol. Taking sine on both the sides,

$\sin\left(\sin^{-1}\frac{2}{3}\sqrt{1-x^2}\right) = \sin\left(\cot^{-1}2\sqrt{x}\right)$

$\Rightarrow \frac{2}{3}\sqrt{1-x^2} = \frac{1}{\sqrt{1+4x}}$

$\Rightarrow (1 - x^2)(1 + 4x) = \frac{9}{4}$

$\Rightarrow x = \frac{1}{2}$

8. Let $f : R \to R$, $f(x) = \frac{2x^2 - 3x + 2}{3x^2 + x + 3}$, then f(x) is

(1) one-one and onto (2) one-one and into

(3) many-one and into (4) many-one and onto

Ans. **(3)**

Sol. $\frac{2x^2 - 3x + 2}{3x^2 + x + 3} = y$

$(3y-2)x^2 + (y + 3)x + (3y - 2) = 0$

$D \geq 0$

$(7y - 1)(5y - 7) \leq 0$

$y \in \left[\frac{1}{7}, \frac{7}{5}\right]$

Hence f(x) is into

obviously f(x) is many-one because f(x) is non-monotonic

9. An ellipse has directrix x = 9 & eccentricity = $\frac{1}{3}$.

If one of its focus is $(\alpha,0)$, $\alpha > 0$, then locus of the mid-point of the chord passing through $P(\alpha,0)$ is

(1) $\frac{x^2}{9} + \frac{y^2}{8} = \frac{x}{9}$ (2) $\frac{x^2}{9} + \frac{y^2}{2} = \frac{x}{9}$

(3) $\frac{x^2}{8} + \frac{y^2}{2} = \frac{x}{8}$ (4) $\frac{x^2}{9} + \frac{y^2}{8} = \frac{x}{4}$

Ans. **(1)**

Sol. e = 1/3

x = 9 is the directrix

$\therefore \frac{a}{e} = 9$

a = 3

focus $(\alpha,0) \equiv (ae, 0) \equiv (1, 0)$

let mid-point of the chord is m(h,k)

Also $b^2 = a^2(1-e^2) = 9\left(1 - \frac{1}{9}\right) = 8$

Eqn. of ellipse is $\frac{x^2}{9} + \frac{y^2}{8} = 1$

By $T = S_1$

$$\frac{hk}{9}+\frac{ky}{8}-1=\frac{h^2}{9}+\frac{k^2}{8}-1$$

$$\Rightarrow 1\ \frac{hk}{9}+\frac{ky}{8}=\frac{h^2}{9}+\frac{k^2}{8}$$

It is passing through P(1, 0)

$$\therefore \frac{h}{9}+0=\frac{h^2}{9}+\frac{k^2}{8}$$

$$\therefore \text{Req. locus is } \frac{h^2}{9}+\frac{y^2}{8}=\frac{x}{9}$$

10. A lift of a 10 floor building contains 9 persons and group of 4 and 5 leave the lift on different floor and there is no stoppage of lift at 1^{st} and 2^{nd} floor, then find number of ways this can be done.

(1) 7056 (2) 7656

(3) 7066 (4) 7057

Ans. **(1)**

Sol. Form group of 4 and 5 person $\frac{9!}{4!5!}=126$

choose two floor out of 8 floor ${}^8C_2 = 28$

Total ways in which 4 & 5 persons can leave at different floor 126 × 28 × 2 = 7056

11. Let R be a relation such that

$R = \{\ell n(x+y)\le 2,(x,y)\in N\times N\}$.

Minimum no. of elements to be added in R so that it becomes transitive is_____

(1) 10 (2) 15

(3) 14 (4) 16

Ans. **(2)**

Sol. $x + y \le e^2$ ($e^2 \simeq 7.29$)

R = {(1, 1), (1,2), (1, 4), (1,5), (1,6)}

(2, 1), (2,2), (2,3), (2,4), (2,5)

(3,1), (3,2), (3,3), (3,4)

(4,1), (4,2), (4,3)

(5,1), (5,2)

(6,1)

For R to be transitive we have to add

(6,2), (6,3), (6,4), (6,5), (6,6)

(5,3), (5,4), (5,5), (5,6)

(4,4), (4,5), (4,6)

(3,5), (3,6)

(2,3)

= 15 elements

12. The shortest distance between the lines

$$\frac{x-3}{-1}=\frac{y-2}{4}=\frac{z-1}{2}\ \&\ \frac{x-1}{2}=\frac{y-1}{1}=\frac{z-2}{5}$$

(1) $\sqrt{6}$ (2) $6\sqrt{6}$

(3) $\sqrt{5}$ (4) $5\sqrt{5}$

Ans. **(1)**

Sol. $\vec{a}=3i+2j+k\ \ \&\ \vec{b}=i+j+2k$

$\vec{r}_1=-\hat{i}+4j+2k$

$\vec{r}_2=2i+j+5k$

$$\vec{r}_1\times\vec{r}_2=\begin{vmatrix} i & j & k\\ -1 & 4 & 2\\ 2 & 1 & 5\end{vmatrix}=18i+9j-9k$$

$$\Rightarrow \left|\vec{r}_1\times\vec{r}_2\right|=9\sqrt{6}$$

Now

$$\left[\vec{a}-\vec{b}\ \ \vec{r}_1\ \ \vec{r}_2\right]=\begin{vmatrix} 2 & 1 & -1\\ -1 & 4 & 2\\ 2 & 1 & 5\end{vmatrix}=54$$

$$\text{shortest distance}=\frac{\left[\vec{a}-\vec{b}\ \ \vec{r}_1\ \ \vec{r}_2\right]}{\left|\vec{r}_1\times\vec{r}_2\right|}=\frac{54}{9\sqrt{6}}=\sqrt{6}$$

13. A bag contains 6 Red and 6 black balls. 6 pair of balls are selected one by one without replacement then the probability that each of the 6 pairs contains 1 red and 1 black ball.

(1) $\frac{15}{231}$ (2) $\frac{14}{231}$

(3) $\frac{13}{231}$ (4) $\frac{16}{231}$

Ans. **(4)**

Sol. $$\text{probability}=\frac{\lfloor 6\times\lfloor 6}{\left(\frac{\lfloor 12}{(\lfloor 2)^6\lfloor 6}\right)\times\lfloor 6}=\frac{16}{231}$$

14. The area (in square units) of the region $\{(x, y) : x^2 - 8x \le y \le -x\}$, is

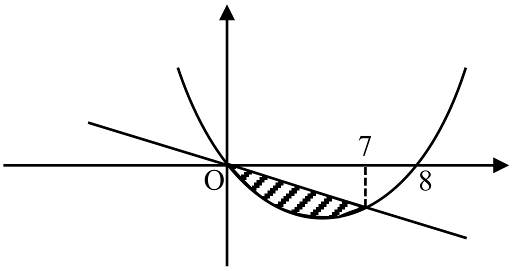
(1) $\frac{343}{6}$ (2) $\frac{343}{2}$

(3) $\frac{1715}{6}$ (4) $\frac{340}{3}$

Ans. **(1)**

Sol. Required area = $\int_0^7 (7x - x^2)\,dx$

$$= \left[\frac{7x^2}{2} - \frac{x^3}{3}\right]_0^7 = \frac{343}{6}$$



15. If system of equations

$x\cos3\theta - 8y - 12z = 0$

$x\cos2\theta + y + 3z = 0$

$x + y + 3z = 0$ has non-trivial solution, then find sum of values of θ (where $\theta \in [0, 2\pi]$)

(1) π (2) 2π (3) 3π (4) 4π

Ans. **(3)**

Sol. For Non-trivial solution

$$\begin{vmatrix} \cos3\theta & -8 & -12 \\ \cos2\theta & 1 & 3 \\ 1 & 1 & 3 \end{vmatrix} = 0$$

$$\Rightarrow \begin{vmatrix} \cos3\theta & -8 & 12 \\ \cos2\theta & 1 & 0 \\ 1 & 1 & 0 \end{vmatrix} = 0$$

$\cos2\theta = 1$

$\theta = 0, \pi, 2\pi$

$\therefore$ sum of values of θ is 3π

16. Let $\vec{a} = 2\hat{i} + 3\hat{j} + 3\hat{k}, \vec{b} = 6\hat{i} + 3\hat{j} + 3\hat{k}$. If $2\vec{a} + 3\vec{b}$ and $\vec{a} - \vec{b}$ are two adjacent sides of a triangle then square of area of the triangle is

(1) 1800 (2) 1600

(3) 2000 (4) 2200

Ans. **(1)**

Sol. $2\vec{a} + 3\vec{b} = 2(2\hat{i} + 3\hat{j} + 3\hat{k}) + 3(6\hat{i} + 3\hat{j} + 3\hat{k})$

$\Rightarrow 22\hat{i} + 15\hat{j} + 15\hat{k}$

$\vec{a} - \vec{b} = -4\hat{i}$

$\text{Area} = \frac{1}{2}\left|(2\vec{a} + 3\vec{b}) \times (\vec{a} - \vec{b})\right|$

$= \frac{1}{2}\left|-60\hat{j} + 60\hat{k}\right| = \frac{1}{2}\sqrt{(60)^2 \times 2}$

$A = \frac{60}{\sqrt{2}}$

Square of area is $A^2 = 1800$

17. Consider the observations : 2, 4, α, β, 6, 12, 14. If their mean is 8 and variance = 16, then the quadratic equation whose roots are 3α + 2 & 2β + 1, is

(1) $x^2 - 49x + 544 = 0$ (2) $x^2 - 49x - 544 = 0$

(3) $x^2 - 23x - 512 = 0$ (4) $x^2 + 23x - 512 = 0$

Ans. **(1)**

Sol. $S = 2 + 4 + \alpha + \beta + 6 + 12 + 14$

$= \alpha + 38 + \beta$

$$\text{Mean} = \frac{\alpha+\beta+38}{7} = 8$$

$\alpha + b = 18$

$$\text{Variance} = \sum\frac{x_i^2}{n} - \left(\frac{\sum x_i}{n}\right)^2$$

$$\Rightarrow \frac{1}{7}(4+16+\alpha^2+\beta^2+36+144+196) - 64 = 16$$

$$\Rightarrow \frac{1}{7}(\alpha^2+\beta^2+396) = 80$$

$\alpha^2 + \beta^2 + 396 = 560$

$\alpha^2 + \beta^2 = 164$

$(\alpha + \beta)^2 - 2\alpha\beta = 164$

$324 - 164 = 2\alpha\beta \Rightarrow \alpha\beta = 80$

$\alpha = 10, \beta = 8$

Sum = $(3\alpha + 2) + (2\beta + 1) = 32 + 17 = 49$

Product = $(3\alpha + 2) + (2\beta + 1) = 32 \times 17 = 544$

Required quadratic equation is $x^2 - 49x + 544 = 0$

18. Let a hyperbola be $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ & ellipse be $\frac{x^2}{9} + \frac{y^2}{8} = 1$. If length of latus rectum of hyperbola is equal to minor axis of ellipse & eccentricity of hyperbola is equal to semi-major axis of ellipse, then 2ae is equal to

(where 'e' is the eccentricity of hyperbola)

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

Ans. **(2)**

Sol. $$\frac{2b^2}{a} = 4\sqrt{2} = b^2 = 2\sqrt{2}a$$

$$e_H = \sqrt{1+\frac{b^2}{a^2}} = 3 \Rightarrow 1 + \frac{b^2}{a^2} = 9 \Rightarrow b^2 = 8a^2$$

$$a = \frac{\sqrt{2}}{4}, b^2 = 1 \Rightarrow b = 1$$

$$\therefore 2ae = 2 \times \frac{\sqrt{2}}{4} \times 3 = \frac{3\sqrt{2}}{2}$$

19. Let f(x) be a function satisfying the functional rule $f(xy) = f(x) f(y)$, $f(0) \neq 0$.

If $x^2 g(x) = \int_1^x (t^2 f(t) + t g(t))dt$, then g(2) is equal to

(1) $\frac{15}{32}$ (2) $\frac{3}{4}$ (3) $\frac{4}{3}$ (4) $\frac{32}{15}$

Ans. **(2)**

Sol. $\because f(xy) = f(x) f(y)$

$\therefore f(x) = x^n$ or $f(x) = k$

But $f(0) \neq 0 \Rightarrow f(x) \neq x^n$

For $f(x) = k \Rightarrow k = k.k \Rightarrow k = 1$ ($\because f(0) \neq 0$)

$f(x) = 1$

Now, $$x^2.g(x) = \int_1^x (t^2.1 + t.g(t))\,dt$$

Differentiating both the sides

$x^2.g'(x) + g(x).2x = x^2 + xg(x)$

$x^2g'(x) + xg(x) = x^2$

$xg'(x) + g(x) = x$

$$x.g(x) = \frac{x^2}{2} + c$$

$$\because g(1) = 0 \Rightarrow c = -\frac{1}{2}$$

$$\Rightarrow x.g(x) = \frac{x^2-1}{2}$$

$$\Rightarrow g(2) = \frac{3}{4}$$

SECTION-B

1. Let $A=\begin{bmatrix}1&0&0\\3&1&0\\9&3&1\end{bmatrix}$. If $B=[b_{ij}]_{3\times3}$ and $B=A^{99}-I$, then find $\frac{b_{31}-b_{21}}{b_{32}}$.

Ans. **(149)**

Sol. $A=P+I$

$$A=\begin{bmatrix}0&0&0\\3&0&0\\9&3&0\end{bmatrix}+\begin{bmatrix}1&0&0\\0&1&0\\0&0&1\end{bmatrix}$$

$A=P+I$ where $P^3=0$

$A^{99}=I+99P+{}^{99}C_2P^2$

$$A^{99}-I=99\begin{bmatrix}0&0&0\\3&0&0\\9&3&0\end{bmatrix}+{}^{99}C_2\begin{bmatrix}0&0&0\\0&0&0\\9&0&0\end{bmatrix}$$

$$=\begin{bmatrix}0&0&0\\99\times3&0&0\\44550&99\times3&0\end{bmatrix}$$

$b_{31}=44550,\ \ b_{21}=99\times3,\ \ b_{32}=99\times3$

$$\frac{44550-297}{297}=149$$

2. If $(1-x^3)^{10}=\sum_{r=0}^{10}a_rx^r.(1-x)^{30-2r}$, then find $\frac{9a_9}{a_{10}}$.

Ans. **(30)**

Sol. $(1-x)^3=1-x^3-3x(1-x)$

$(1-x)^3=1-x^3-3x+3x^2$

$(1-x)^3+3x-3x^2=1-x^3$

$(1-x^3)^{10}=[(1-x)^3+3x(1-x)]^{10}$

$\Rightarrow {}^{10}C_r(3x(1-x))^r.((1-)^3)^{10-r}$

$(1-x^3)^{10}={}^{10}C_r.3^r.x^r.(1-x)^{30-2r}$

$\therefore\ a_r={}^{10}C_r.3^r$

$$\frac{a_9}{a_{10}}=\frac{{}^{10}C_9 3^9}{{}^{10}C_{10}.3^{10}}$$

$$\frac{a_9}{a_{10}}=\frac{10}{3}$$

$$\therefore\ \frac{9a_9}{a_{10}}=30$$

3. If α & β are the roots of the equation $z^2-\sqrt{6}i\,z-3=0$, then find $\alpha^8+\beta^8$.

Ans. **(162)**

Sol. $z=\frac{\sqrt{6}i\pm\sqrt{-6+12}}{2}$

$$=\frac{\sqrt{6}i\pm\sqrt{6}}{2}$$

$$=\frac{\sqrt{6}}{2}(\pm1+i)$$

$$\alpha=\frac{\sqrt{6}}{2}(1+i),\beta=\frac{-\sqrt{6}}{2}(1-i)$$

$$\alpha=\frac{\sqrt{6}}{2}\times\sqrt{2}e^{i\pi/4},\beta=-\frac{\sqrt{6}}{2}\times\sqrt{2}^{-i\pi/4}$$

$$\alpha=\sqrt{3}e^{i\pi/4},\beta=-\sqrt{3}e^{-i\pi/4}$$

$$\alpha^8+\beta^8=81.e^{i2\pi}+81.e^{i(-2\pi)}$$

$=81\ (1+1)=162$

4. The line $x-y=4$ is a chord of the circle $(x-4)^2+(y+3)^2=9$, which cuts the circle at points Q & R. If $P(\alpha,\beta)$ lies on the circle such that $PQ=PR$, then find $(6\alpha+8\beta)^2$.

Ans. **(18)**

Sol. Solving $x-y=4$ & $(x-4)^2+(y+3)^2=9$

We get Q(4,0) & R(1,–3)

$PQ^2=PR^2$

$\Rightarrow(\alpha-4)^2+\beta^2=(\alpha-1)^2+(\beta+3)^2$

$\Rightarrow\ \ \alpha+\beta=1\qquad\ldots(1)$

Also $(\alpha-4)^2+(\beta+3)^2=9\qquad\ldots(2)$

Solving (1) & (2), we get

$$\alpha=4+\frac{3}{\sqrt{2}},\beta=-3-\frac{3}{\sqrt{2}}$$

and $\alpha = 4 - \frac{3}{\sqrt{2}}, \beta = -3 + \frac{3}{\sqrt{2}}$

For both pairs we get $(6\alpha + 8\beta)^2 = 18$

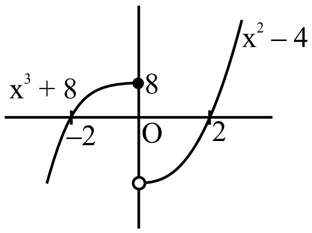
5. Let $f(x) = \begin{cases} x^3 + 8 & x < 0 \\ x^2 - 4 & x \geq 0 \end{cases}$

and $g(x) = \begin{cases} (x-8)^{1/3} & x < 0 \\ (x+4)^{1/2} & x \geq 0 \end{cases}$

then find number of points of discontinuity of g(f(x)).

Ans. **(3)**

Sol. $g(f(x)) = \begin{cases} (f(x)-8)^{1/3} & f(x) < 0 \\ (f(x)+4)^{1/2} & f(x) \geq 0 \end{cases}$



$$g(f(x)) = \begin{cases} (x^3)^{1/3} & , \quad x < -2 \\ (x^2 - 12)^{1/3}, & 0 < x < 2 \\ (x^3 + 12)^{1/2}, & -2 \leq x \leq 0 \\ (x^2)^{1/2} & , \quad x \geq 2 \end{cases}$$

$$g(f(x)) = \begin{cases} x & , \quad x < -2 \\ (x^3 + 12)^{1/2} & , \quad -2 \leq x \leq 0 \\ (x^2 - 12)^{1/3} & , \quad 0 < x < 2 \\ x & , \quad x \geq 2 \end{cases}$$

Number of points of discontinuity is equal to 3.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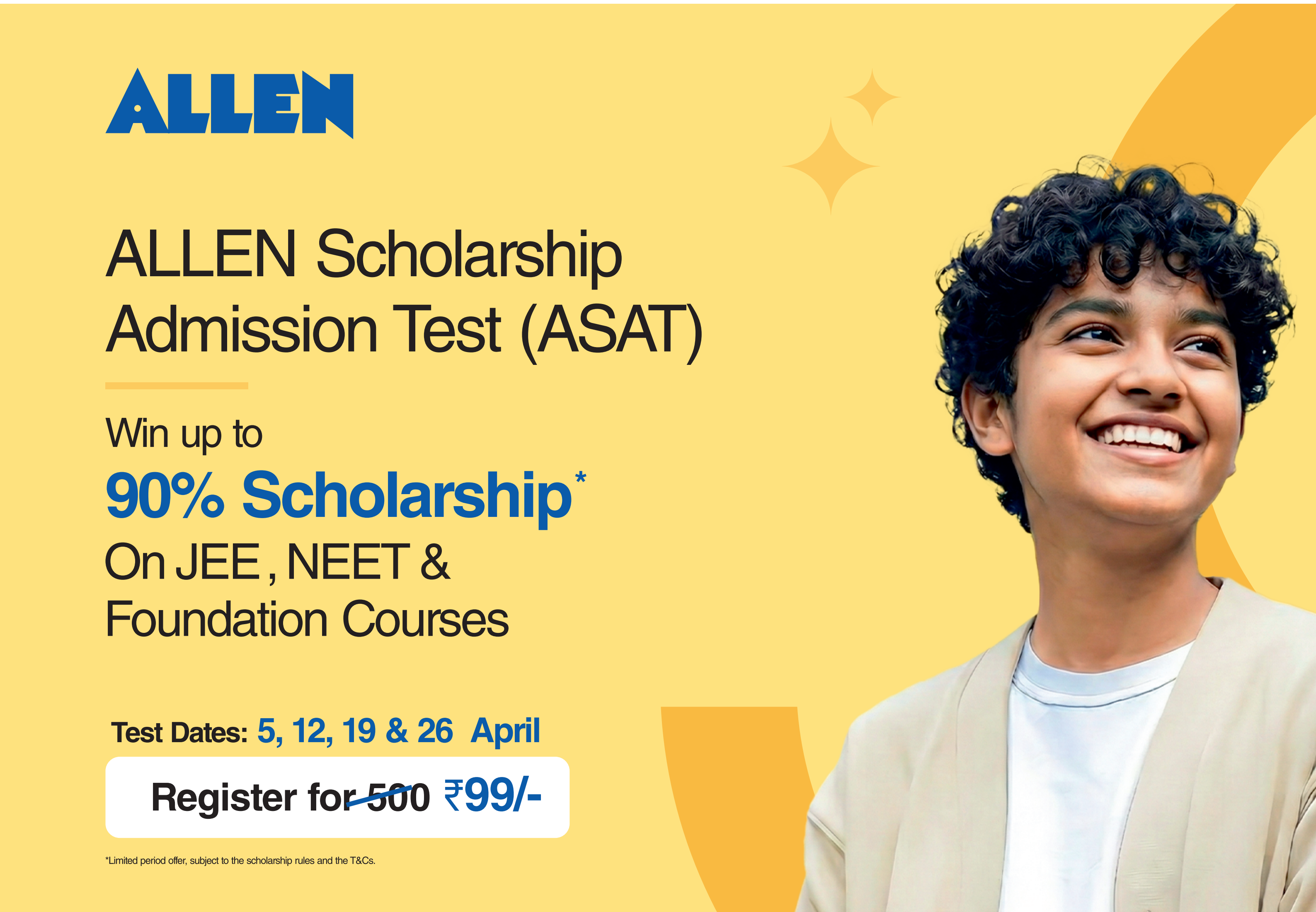
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