

4. Let the function $f : [0, 2] \rightarrow \mathbb{R}$ be defined as

$$f(x) = \begin{cases} e^{\min\{x^2, x-[x]\}}, & x \in [0, 1) \\ e^{[x - \log_e x]}, & x \in [1, 2] \end{cases}$$

where $[t]$ denotes the greatest integer less than or equal to t . Then the value of the integral

$$\int_0^2 xf(x) dx \text{ is}$$

- (1) $2e - 1$ (2) $1 + \frac{3e}{2}$
 (3) $2e - \frac{1}{2}$ (4) $(e-1)\left(e^2 + \frac{1}{2}\right)$

Official Ans. by NTA (3)

Ans. (3)

Sol. Minimum $\{x^2, \{x\}\} = x^2; x \in [0, 1)$

$$[x - \log_e x] = 1; x \in [1, 2)$$

$$\therefore f(x) = \begin{cases} e^{x^2}; x \in [0, 1) \\ e; x \in [1, 2) \end{cases}$$

$$\int_0^2 xf(x) dx = \int_0^1 xe^{x^2} dx + \int_1^2 ex dx$$

$$= \frac{1}{2}(e-1) + \frac{1}{2}(4-1)e$$

$$= 2e - \frac{1}{2}$$

5. Let $y = y(x)$ be the solution of the differential

equations $\frac{dy}{dx} + \frac{5}{x(x^5+1)}y = \frac{(x^5+1)^2}{x^7}, x > 0$. If

$y(1) = 2$, then $y(2)$ is equal to

- (1) $\frac{637}{128}$ (2) $\frac{679}{128}$
 (3) $\frac{693}{128}$ (4) $\frac{697}{128}$

Official Ans. by NTA (3)

Ans. (3)

Sol. I.F = $e^{\int \frac{5dx}{x(x^5+1)}} = e^{\int \frac{5x^{-6}dx}{(x^5+1)}}$

Put, $1+x^{-5} = t \Rightarrow -5x^{-6}dx = dt$

$$\Rightarrow e^{\int \frac{-dt}{t}} = \frac{1}{t} = \frac{x^5}{1+x^5}$$

$$y \cdot \frac{x^5}{1+x^5} = \int \frac{x^5}{(1+x^5)} \times \frac{(1+x^5)^2}{x^7} dx$$

$$= \int x^3 dx + \int x^{-2} dx$$

$$y \cdot \frac{x^5}{1+x^5} = \frac{x^4}{4} - \frac{1}{x} + c$$

Given that : $x = 1 \Rightarrow y = 2$

$$2 \cdot \frac{1}{2} = \frac{1}{4} - 1 + c$$

$$c = \frac{7}{4}$$

$$y \cdot \frac{x^5}{1+x^5} = \frac{x^4}{4} - \frac{1}{x} + \frac{7}{4}$$

Now put, $x = 2$

$$y \cdot \left(\frac{32}{33}\right) = \frac{21}{4}$$

$$y = \frac{693}{128}$$

6. If four distinct points with position vectors $\vec{a}, \vec{b}, \vec{c}$ and \vec{d} are coplanar; then $[\vec{a} \vec{b} \vec{c}]$ is equal to

- (1) $[\vec{d} \vec{c} \vec{a}] + [\vec{b} \vec{d} \vec{a}] + [\vec{c} \vec{d} \vec{b}]$
 (2) $[\vec{d} \vec{b} \vec{a}] + [\vec{a} \vec{c} \vec{d}] + [\vec{d} \vec{b} \vec{c}]$
 (3) $[\vec{a} \vec{d} \vec{b}] + [\vec{d} \vec{c} \vec{a}] + [\vec{d} \vec{b} \vec{c}]$
 (4) $[\vec{b} \vec{c} \vec{d}] + [\vec{d} \vec{a} \vec{c}] + [\vec{d} \vec{b} \vec{a}]$

Official Ans. by NTA (1)

Ans. (1)

Sol. $\vec{a}, \vec{b}, \vec{c}, \vec{d}$ are coplanar points.

$\vec{b} - \vec{a}, \vec{c} - \vec{a}, \vec{d} - \vec{a}$ are coplanar vectors.

So, $[\vec{b} - \vec{a} \vec{c} - \vec{a} \vec{d} - \vec{a}] = 0$

$$(\vec{b} - \vec{a}) \cdot ((\vec{c} - \vec{a}) \times (\vec{d} - \vec{a})) = 0$$

$$[\vec{b} \vec{c} \vec{d}] - [\vec{b} \vec{c} \vec{a}] - [\vec{b} \vec{a} \vec{d}] - [\vec{a} \vec{c} \vec{d}] = 0$$

$$\Rightarrow [\vec{a} \vec{b} \vec{c}] = [\vec{c} \vec{d} \vec{b}] + [\vec{b} \vec{d} \vec{a}] + [\vec{d} \vec{c} \vec{a}]$$

7. If $f : \mathbb{R} \rightarrow \mathbb{R}$ be a continuous function satisfying

$$\int_0^{\pi/2} f(\sin 2x) \cdot \sin x dx + \alpha \int_0^{\pi/4} f(\cos 2x) \cdot \cos x dx = 0,$$

then α is equal to

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

Official Ans. by NTA (4)

Ans. (4)

Sol. $I = \int_0^{\pi/4} f(\sin 2x) \sin x dx + \int_{\pi/4}^{\pi/2} f(\sin 2x) \sin x dx$

$$+ \alpha \int_0^{\pi/4} f(\cos 2x) \cos x dx = 0$$

Apply king in first part and put $x - \frac{\pi}{4} = t$ in second part.

$$I = \int_0^{\frac{\pi}{4}} f(\cos 2x) \sin\left(\frac{\pi}{4} - x\right) dx + \int_0^{\frac{\pi}{4}} f(\cos 2t) \sin\left(\frac{\pi}{4} + t\right) dt$$

$$+ \alpha \int_0^{\frac{\pi}{4}} f(\cos 2x) \cos x dx = 0$$

$$I = \int_0^{\frac{\pi}{4}} f(\cos 2x) \left[2 \sin \frac{\pi}{4} \cdot \cos x + \alpha \cos x \right] dx = 0$$

$$I = (\alpha + \sqrt{2}) \int_0^{\frac{\pi}{4}} f(\cos 2x) \cos x dx = 0$$

$$\therefore \alpha = -\sqrt{2}$$

8. If the system of linear equations

$$7x + 11y + \alpha z = 13$$

$$5x + 4y + 7z = \beta$$

$$175x + 194y + 57z = 361$$

has infinitely many solutions, then $\alpha + \beta + 2$ is equal to

(1) 4 (2) 3

(3) 5 (4) 6

Official Ans. by NTA (1)

Ans. (1)

Sol. $7x + 11y + \alpha z = 13$ (i)

$5x + 4y + 7z = \beta$ (ii)

$175x + 194y + 57z = 361$ (iii)

(i) $\times 10 +$ (ii) $\times 21 -$ (iii)

$$z(10\alpha + 147 - 57) = 130 + 21\beta - 361$$

$$\therefore 10\alpha + 90 = 0$$

$$\alpha = -9$$

$$130 - 361 + 21\beta = 0$$

$$\beta = 11$$

$$\alpha + \beta + 2 = 4$$

9. The domain of the function

$$f(x) = \frac{1}{\sqrt{[x]^2 - 3[x] - 10}}$$
 is (where $[x]$ denotes the

greatest integer less than or equal to x)

(1) $(-\infty, -2) \cup (5, \infty)$ (2) $(-\infty, -3) \cup [6, \infty)$

(3) $(-\infty, -2) \cup [6, \infty)$ (4) $(-\infty, -3) \cup (5, \infty)$

Official Ans. by NTA (3)

Ans. (3)

Sol. $[x]^2 - 3[x] - 10 > 0$

$$[x] < -2 \text{ or } [x] > 5$$

10. Let P be the plane passing through the points (5, 3, 0), (13, 3, -2) and (1, 6, 2). For $\alpha \in \mathbb{N}$, if the distances of the points A (3, 4, α) and B (2, α , a) from the plane P are 2 and 3 respectively, then the positive value of a is

(1) 6 (2) 4

(3) 3 (4) 5

Official Ans. by NTA (2)

Ans. (2)

Sol.
$$\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 8 & 0 & -2 \\ 4 & -3 & -2 \end{vmatrix} = \hat{i}(-6) + 8\hat{j} - 24\hat{k}$$

Normal of the plane = $3\hat{i} - 4\hat{j} + 12\hat{k}$

Plane : $3x - 4y + 12z = 3$

Distance from A (3, 4, α)

$$\left| \frac{9 - 16 + 12\alpha - 3}{13} \right| = 2$$

$$\alpha = 3$$

$$\alpha = -8 \text{ (rejected)}$$

Distance from B (2, 3, a)

$$\left| \frac{6 - 12 + 12a - 3}{13} \right| = 3$$

$$a = 4$$

11. The converse of the statement $((\sim p) \wedge q) \Rightarrow r$ is

(1) $(\sim r) \Rightarrow p \wedge q$ (2) $(\sim r) \Rightarrow ((\sim p) \wedge q)$

(3) $((\sim p) \vee q) \Rightarrow r$ (4) $(p \vee (\sim q)) \Rightarrow (\sim r)$

Official Ans. by NTA (4)

Ans. (4)

Sol. Converse of $((\sim p) \wedge q) \Rightarrow r$

$$\equiv r \Rightarrow (\sim p \wedge q)$$

$$\equiv \sim r \vee (\sim p \wedge q)$$

$$\equiv \sim r \vee (p \vee \sim q) \equiv (p \vee \sim q) \Rightarrow \sim r$$

12. The angle of elevation of the top P of a tower from the feet of one person standing due South of the tower is 45° and from the feet of another person standing due west of the tower is 30° . If the height of the tower is 5 meters, then the distance (in meters) between the two persons is equal to

(1) 10 (2) 5

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

Official Ans. by NTA (1)

Ans. (1)

Sol. Let $a = x_1 + iy_1$ $z = x + iy$

Now $\operatorname{Re}(a + \bar{z}) > \operatorname{Im}(\bar{a} + z)$

$$\therefore x_1 + x > -y_1 + y$$

$$x_1 = 2, y_1 = 10, x = -12, y = 0$$

Given inequality is not valid for these values.

S1 is false.

Now $\operatorname{Re}(a + \bar{z}) < \operatorname{Im}(\bar{a} + z)$

$$x_1 + x < -y_1 + y$$

$$x_1 = -2, y_1 = -10, x = 12, y = 0$$

Given inequality is not valid for these values.

S2 is false.

19. Let $A = \{1, 3, 4, 6, 9\}$ and $B = \{2, 4, 5, 8, 10\}$. Let R be a relation defined on $A \times B$ such that $R = \{(a_1, b_1), (a_2, b_2) : a_1 \leq b_2 \text{ and } b_1 \leq a_2\}$. Then the number of elements in the set R is

- (1) 26
- (2) 160
- (3) 180
- (4) 52

Official Ans. by NTA (2)

Ans. (2)

Sol. Let $a_1 = 1 \Rightarrow 5$ choices of b_2

$$a_1 = 3 \Rightarrow 4 \text{ choices of } b_2$$

$$a_1 = 4 \Rightarrow 4 \text{ choices of } b_2$$

$$a_1 = 6 \Rightarrow 2 \text{ choices of } b_2$$

$$a_1 = 9 \Rightarrow 1 \text{ choices of } b_2$$

For (a_1, b_2) 16 ways .

Similarly, $b_1 = 2 \Rightarrow 4$ choices of a_2

$$b_1 = 4 \Rightarrow 3 \text{ choices of } a_2$$

$$b_1 = 5 \Rightarrow 2 \text{ choices of } a_2$$

$$b_1 = 8 \Rightarrow 1 \text{ choices of } a_2$$

Required elements in $R = 160$

20. Let f and g be two functions defined by

$$f(x) = \begin{cases} x+1, & x < 0 \\ |x-1|, & x \geq 0 \end{cases} \text{ and } g(x) = \begin{cases} x+1, & x < 0 \\ 1, & x \geq 0 \end{cases}$$

Then $(g \circ f)(x)$ is

- (1) Differentiable everywhere
- (2) Continuous everywhere but not differentiable exactly at one point
- (3) Not continuous at $x = -1$
- (4) Continuous everywhere but not differentiable at $x = 1$

Official Ans. by NTA (2)

Ans. (2)

Sol. $f(x) = \begin{cases} x+1, & x < 0 \\ 1-x, & 0 \leq x < 1 \\ x-1, & 1 \leq x \end{cases}$

$$g(x) = \begin{cases} x+1, & x < 0 \\ 1, & x \geq 0 \end{cases}$$

$$g(f(x)) = \begin{cases} x+2, & x < -1 \\ 1, & x \geq -1 \end{cases}$$

$\therefore g(f(x))$ is continuous everywhere

$g(f(x))$ is not differentiable at $x = -1$

Differentiable everywhere else

SECTION-B

21. The number of points, where the curve

$f(x) = e^{8x} - e^{6x} - 3e^{4x} - e^{2x} + 1, x \in \mathbb{R}$ cuts x-axis, is equal to

Official Ans. by NTA (2)

Ans. (2)

Sol. Let $e^{2x} = t$

$$\Rightarrow t^4 - t^3 - 3t^2 - t + 1 = 0$$

$$\Rightarrow t^2 + \frac{1}{t^2} - \left(t + \frac{1}{t}\right) - 3 = 0$$

$$\Rightarrow \left(t + \frac{1}{t}\right)^2 - \left(t + \frac{1}{t}\right) - 5 = 0$$

$$\Rightarrow t + \frac{1}{t} = \frac{1 + \sqrt{21}}{2}$$

Two real values of t .

22. Let the probability of getting head for a biased coin be $\frac{1}{4}$. It is tossed repeatedly until a head appears.

Let N be the number of tosses required. If the probability that the equation $64x^2 + 5Nx + 1 = 0$

has no real root is $\frac{p}{q}$, where p and q are co-prime,

then $q - p$ is equal to

Official Ans. by NTA (27)

Ans. (27)

Sol. $64x^2 + 5Nx + 1 = 0$

$D = 25N^2 - 256 < 0$

$\Rightarrow N^2 < \frac{256}{25} \Rightarrow N < \frac{16}{5}$

$\therefore N = 1, 2, 3$

$\therefore \text{Probability} = \frac{1}{4} + \frac{3}{4} \times \frac{1}{4} + \frac{3}{4} \times \frac{3}{4} \times \frac{1}{4} = \frac{37}{64}$

$\therefore q - p = 27$

23. Let $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{k}$ and $\vec{b} = \hat{i} + \hat{j} - \hat{k}$. If \vec{c} is a vector such that $\vec{a} \cdot \vec{c} = 11$, $\vec{b} \cdot (\vec{a} \times \vec{c}) = 27$ and $\vec{b} \cdot \vec{c} = -\sqrt{3}|\vec{b}|$, then $|\vec{a} \times \vec{c}|^2$ is equal to

Official Ans. by NTA (285)

Ans. (285)

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

$\vec{b} \cdot (\vec{a} \times \vec{c}) = 27$, $\vec{a} \cdot \vec{b} = 0$

$\vec{b} \times (\vec{a} \times \vec{c}) = -3\vec{a}$

Let θ be angle between \vec{b} , $\vec{a} \times \vec{c}$

Then $|\vec{b}| \cdot |\vec{a} \times \vec{c}| \sin \theta = 3\sqrt{14}$

$|\vec{b}| \cdot |\vec{a} \times \vec{c}| \cos \theta = 27$

$\Rightarrow \sin \theta = \frac{\sqrt{14}}{\sqrt{95}}$

$\therefore |\vec{b}| \times |\vec{a} \times \vec{c}| = 3\sqrt{95}$

$\Rightarrow |\vec{a} \times \vec{c}| = \sqrt{3} \times \sqrt{95}$

24. Let $S = \left\{ z \in \mathbb{C} - \{i, 2i\} : \frac{z^2 + 8iz - 15}{z^2 - 3iz - 2} \in \mathbb{R} \right\}$. If

$\alpha - \frac{13}{11}i \in S$, $\alpha \in \mathbb{R} - \{0\}$, then $242\alpha^2$ is equal to

Official Ans. by NTA (1680)

Ans. (1680)

Sol. $\left(\frac{z^2 + 8iz - 15}{z^2 - 3iz - 2} \right) \in \mathbb{R}$

$\Rightarrow 1 + \frac{(11iz - 13)}{(z^2 - 3iz - 2)} \in \mathbb{R}$

Put $z = \alpha - \frac{13}{11}i$

$\Rightarrow (z^2 - 3iz - 2)$ is imaginary

Put $z = x + iy$

$\Rightarrow (x^2 - y^2 + 2xyi - 3ix + 3y - 2) \in \text{Imaginary}$

$\Rightarrow \text{Re}(x^2 - y^2 + 3y - 2 + (2xy - 3x)i) = 0$

$\Rightarrow x^2 - y^2 + 3y - 2 = 0$

$x^2 = y^2 - 3y + 2$

$x^2 = (y-1)(y-2) \therefore z = \alpha - \frac{13}{11}i$

Put $x = \alpha$, $y = \frac{-13}{11}$

$\alpha^2 = \left(\frac{-13}{11} - 1 \right) \left(\frac{-13}{11} - 2 \right)$

$\alpha^2 = \frac{(24 \times 35)}{121}$

$242\alpha^2 = 48 \times 35 = 1680$

25. For $k \in \mathbb{N}$, if the sum of the series

$1 + \frac{4}{k} + \frac{8}{k^2} + \frac{13}{k^3} + \frac{19}{k^4} + \dots$ is 10, then the value of k

is

Official Ans. by NTA (2)

Ans. (2)

Sol. $10 = 1 + \frac{4}{k} + \frac{8}{k^2} + \frac{13}{k^3} + \frac{19}{k^4} + \dots \text{upto } \infty$

$$9 = \frac{4}{k} + \frac{8}{k^2} + \frac{13}{k^3} + \frac{19}{k^4} + \dots \text{upto } \infty$$

$$\frac{9}{k} = \frac{4}{k^2} + \frac{8}{k^3} + \frac{13}{k^4} + \dots \text{upto } \infty$$

$$S = 9 \left(1 - \frac{1}{k} \right) = \frac{4}{k} + \frac{4}{k^2} + \frac{5}{k^3} + \frac{6}{k^4} + \dots \text{upto } \infty$$

$$\frac{S}{k} = \frac{4}{k^2} + \frac{4}{k^3} + \frac{5}{k^4} + \dots \text{upto } \infty$$

$$\left(1 - \frac{1}{k} \right) S = \frac{4}{k} + \frac{1}{k^3} + \frac{1}{k^4} + \frac{1}{k^5} + \dots \infty$$

$$9 \left(1 - \frac{1}{k} \right)^2 = \frac{4}{k} + \frac{1}{\left(1 - \frac{1}{k} \right)}$$

$$9(k-1)^3 = 4k(k-1) + 1$$

$$k = 2$$

- 26.** Let $A = \{1, 2, 3, 4, 5\}$ and $B = \{1, 2, 3, 4, 5, 6\}$. Then the number of functions $f : A \rightarrow B$ satisfying $f(1) + f(2) = f(4) - 1$ is equal to

Official Ans. by NTA (360)

Ans. (360)

Sol. $f(1) + f(2) + 1 = f(4) \leq 6$

$$f(1) + f(2) \leq 5$$

Case (i) $f(1) = 1 \Rightarrow f(2) = 1, 2, 3, 4 \Rightarrow 4$ mappings

Case (ii) $f(1) = 2 \Rightarrow f(2) = 1, 2, 3 \Rightarrow 3$ mappings

Case (iii) $f(1) = 3 \Rightarrow f(2) = 1, 2 \Rightarrow 2$ mappings

Case (iv) $f(1) = 4 \Rightarrow f(2) = 1 \Rightarrow 1$ mapping

$f(5)$ & $f(6)$ both have 6 mappings each

$$\text{Number of functions} = (4 + 3 + 2 + 1) \times 6 \times 6 = 360$$

- 27.** Let the tangent to the parabola $y^2 = 12x$ at the point $(3, \alpha)$ be perpendicular to the line $2x + 2y = 3$. Then the square of distance of the point $(6, -4)$ from the normal to the hyperbola $\alpha^2 x^2 - 9y^2 = 9\alpha^2$ at its point $(\alpha - 1, \alpha + 2)$ is equal to

Official Ans. by NTA (116)

Ans. (116)

Sol. $\therefore P(3, \alpha)$ lies on $y^2 = 12x$

$$\Rightarrow \alpha = \pm 6$$

But, $\left. \frac{dy}{dx} \right|_{(3, \alpha)} = \frac{6}{\alpha} = 1 \Rightarrow \alpha = 6 (\alpha = -6 \text{ reject})$

Now, hyperbola $\frac{x^2}{9} - \frac{y^2}{36} = 1$, normal at

$$Q(\alpha - 1, \alpha + 2) \text{ is } \frac{9x}{5} + \frac{36y}{8} = 45$$

$$\Rightarrow 2x + 5y - 50 = 0$$

Now, distance of $(6, -4)$ from $2x + 5y - 50 = 0$ is equal to

$$\left| \frac{2(6) - 5(4) - 50}{\sqrt{2^2 + 5^2}} \right| = \frac{58}{\sqrt{29}}$$

$$\Rightarrow \text{Square of distance} = 116$$

- 28.** Let the line $\ell : x = \frac{1-y}{-2} = \frac{z-3}{\lambda}, \lambda \in \mathbb{R}$ meet the plane $P : x + 2y + 3z = 4$ at the point (α, β, γ) . If the angle between the line ℓ and the plane P is

$$\cos^{-1} \left(\sqrt{\frac{5}{14}} \right), \text{ then } \alpha + 2\beta + 6\gamma \text{ is equal to}$$

Official Ans. by NTA (11)

Ans. (11)

Sol. $\ell : x = \frac{y-1}{2} = \frac{z-3}{\lambda}, \lambda \in \mathbb{R}$

DR's of line ℓ (1, 2, λ)

DR's of normal vector of plane P : $x + 2y + 3z = 4$ are (1, 2, 3)

Now, angle between line ℓ and plane P is given by

$$\sin \theta = \left| \frac{1+4+3\lambda}{\sqrt{5+\lambda^2} \cdot \sqrt{14}} \right| = \frac{3}{\sqrt{14}} \left(\text{given } \cos \theta = \sqrt{\frac{5}{14}} \right)$$

$$\Rightarrow \lambda = \frac{2}{3}$$

Let variable point on line ℓ is $\left(t, 2t+1, \frac{2}{3}t+3 \right)$

lies on plane P.

$$\Rightarrow t = -1$$

$$\Rightarrow \left(-1, -1, \frac{7}{3} \right) \equiv (\alpha, \beta, \gamma)$$

$$\Rightarrow \alpha + 2\beta + 6\gamma = 11$$

29. If the line $\ell_1 : 3y - 2x = 3$ is the angular bisector of the lines $\ell_2 : x - y + 1 = 0$ and $\ell_3 : \alpha x + \beta y + 17 = 0$, then $\alpha^2 + \beta^2 - \alpha - \beta$ is equal to

Official Ans. by NTA (348)

Ans. (348)

Sol. Point of intersection of $\ell_1 : 3y - 2x = 3$

$\ell_2 : x - y + 1 = 0$ is $P \equiv (0, 1)$

Which lies on $\ell_3 : \alpha x + \beta y + 17 = 0$,

$$\Rightarrow \boxed{\beta = -17}$$

Consider a random point $Q \equiv (-1, 0)$

on $\ell_2 : x - y + 1 = 0$, image of Q about

$\ell_2 : x - y + 1 = 0$ is $Q' \equiv \left(\frac{-17}{13}, \frac{6}{13} \right)$ which is

calculated by formulae

$$\frac{x - (-1)}{2} = \frac{y - 0}{-3} = -2 \left(\frac{-2+3}{13} \right)$$

Now, Q' lies on $\ell_3 : \alpha x + \beta y + 17 = 0$

$$\Rightarrow \boxed{\alpha = 7}$$

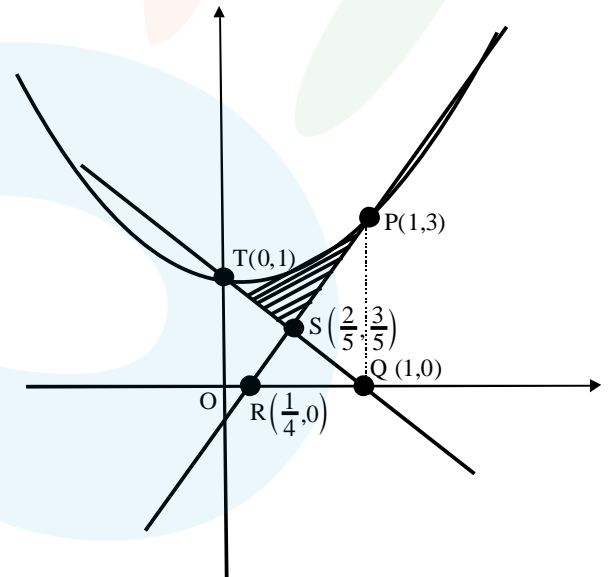
Now, $\alpha^2 + \beta^2 - \alpha - \beta = 348$

30. If A is the area in the first quadrant enclosed by the curve $C : 2x^2 - y + 1 = 0$, the tangent to C at the point (1, 3) and the line $x + y = 1$, then the value of $60A$ is

Official Ans. by NTA (16)

Ans. (16)

Sol.



$$y = 2x^2 + 1$$

Tangent at (1, 3)

$$y = 4x - 1$$

$$A = \int_0^1 (2x^2 + 1) dx - \text{area of } (\Delta QOT) - \text{area of}$$

$(\Delta PQR) + \text{area of } (\Delta QRS)$

$$A = \left(\frac{2}{3} + 1 \right) - \frac{1}{2} - \frac{9}{8} + \frac{9}{40} = \frac{16}{60}$$