AREA UNDER THE CURVE- PYQ

1. The area enclosed between the curves $y^2 = x$ and $y = |x|$ is- **[AIEEE-2007]**

(1) $\frac{2}{3}$ (2) 1 (3) $\frac{1}{6}$ (4) $\frac{1}{3}$

2. The area of the plane region bounded by the curves $x + 2y^2 = 0$ and $x + 3y^2 = 1$ is equal to- **[AIEEE-2008]**

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

3. The area of the region bounded by the parabola $(y - 2)^2 = x - 1$, the tangent to the parabola at the point (2, 3) and the x–axis is :- **[AIEEE-2009]**

(1) 9 (2) 12 (3) 3 (4) 6

4. The area bounded by the curves $y = \cos x$ and $y = \sin x$ between the ordinates $x = 0$ and $x = \frac{3\pi}{2}$ is :- **[AIEEE-2010]**

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

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

5. The area of the region enclosed by the curves $y = x$, $x = e$, $y = \frac{1}{x}$ and the positive x-axis is:- **[AIEEE-2011]**

(1) $\frac{3}{2}$ square units (2) $\frac{5}{2}$ square units

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

6. The area bounded by the curves $y^2 = 4x$ and $x^2=4y$ is : **[AIEEE-2011]**

(1) 0 (2) $\frac{32}{3}$ (3) $\frac{16}{3}$ (4) $\frac{8}{3}$

7. The area bounded between the parabolas $x^2 = \frac{y}{4}$ and $x^2 = 9y$, and the straight line $y = 2$ is : **[AIEEE-2012]**

(1) $10\sqrt{2}$ (2) $20\sqrt{2}$ (3) $\frac{10\sqrt{2}}{3}$ (4) $\frac{20\sqrt{2}}{3}$

8. The area (in square units) bounded by the curves $y = \sqrt{x}$, $2y - x + 3 = 0$, x-axis and lying in the first quadrant is : **[JEE(Main)-2013]**

(1) 9 (2) 36 (3) 18 (4) $\frac{27}{4}$

9. The area bounded by the curve $y = ln(x)$ and the lines $y = 0$, $y = ln\,(3)$ and $x = 0$ is equal to : **[JEE-Main (On line)-2013]**

(1) $3\,ln\,(3) - 2$ (2) 3

(3) 2 (4) $3\,ln\,(3) + 2$

10. The area of the region (in sq. units), in the first quadrant, bounded by the parabola $y = 9x^2$ and the lines $x = 0$, $y = 1$ and $y = 4$, is :- **[JEE-Main (On line)-2013]**

(1) 7/9 (2) 14/3 (3) 14/9 (4) 7/3

11. The area under the curve $y = |\cos x - \sin x|$, $0 \le x \le \frac{\pi}{2}$, and above x-axis is : **[JEE-Main (On line)-2013]**

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

(3) 0 (4) $2\sqrt{2} - 2$

12. The area of the region described by $A = \{(x, y) : x^2 + y^2 \le 1 \text{ and } y^2 \le 1 - x\}$ is : **[JEE(Main)-2014]**

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

13. The area (in sq. units) of the region described by $\{(x, y) : y^2 \le 2x \text{ and } y \ge 4x - 1\}$ is : **[JEE (Main) 2015]**

(1) $\frac{15}{64}$ (2) $\frac{9}{32}$ (3) $\frac{7}{32}$ (4) $\frac{5}{64}$

14. The area (in sq. units) of the region $\{(x, y) : y^2 \ge 2x \text{ and } x^2 + y^2 \le 4x, x \ge 0, y \ge 0\}$ is :- **[JEE(Main)-2016]**

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

(3) $\pi-\frac{8}{3}$ (4) $\pi-\frac{4\sqrt{2}}{3}$

15. The area (in sq. units) of the region $\{(x, y) : x \ge 0, x + y \le 3, x^2 \le 4y \text{ and } y \le 1 + \sqrt{x}\}$ is : **[JEE(Main)-2017]**

(1) $\frac{5}{2}$ (2) $\frac{59}{12}$ (3) $\frac{3}{2}$ (4) $\frac{7}{3}$

16. Let $g(x) = \cos x^2$, $f(x) = \sqrt{x}$ and α, β ($\alpha < \beta$) be the roots of the quadratic equation $18x^2 - 9\pi x + \pi^2 = 0$. Then the area (in sq. units) bounded by the curve $y = (gof)(x)$ and the lines $x = \alpha$, $x = \beta$ and $y = 0$ is- **[JEE(MAIN)-2018]**

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

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

17. The area of the region between the curves $y = \sqrt{\frac{1+\sin x}{\cos x}}$ and $y = \sqrt{\frac{1-\sin x}{\cos x}}$ bounded by the lines x = 0 and $x = \frac{\pi}{4}$ is- **[IIT-2008]**

(1) $\int_0^{\sqrt{2}-1} \frac{t}{(1+t^2)\sqrt{1-t^2}}dt$ (2) $\int_0^{\sqrt{2}-1} \frac{4t}{(1+t^2)\sqrt{1-t^2}}dt$

(3) $\int_0^{\sqrt{2}+1} \frac{4t}{(1+t^2)\sqrt{1-t^2}}dt$ (4) $\int_0^{\sqrt{2}+1} \frac{t}{(1+t^2)\sqrt{1-t^2}}dt$

***18.** Area of the region bounded by the curve $y = e^x$ and lines x = 0 and y = e is :- **[IIT-2009]**

(1) e – 1 (2) $\int_1^e \ln(e+1-y)dy$

(3) $e - \int_0^1 e^x dx$ (4) $\int_1^e \ln y\, dy$

19. Let the straight line x = b divide the area enclosed by $y = (1 - x)^2$, y = 0 and x = 0 into two parts $R_1(0 \le x \le b)$ and $R_2(b \le x \le 1)$ such that $R_1 - R_2 = \frac{1}{4}$. Then b equals **[IIT-2011]**

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

20. Let $f:[-1,2] \to [0,\infty)$ be a continuous function such that $f(x) = f(1-x)$ for all $x \in [-1,2]$. Let $R_1 = \int_{-1}^{2} x f(x)dx$, and R_2 be the area of the region bounded by y = f(x), x=–1, x=2, and the x-axis. Then - **[IIT-2011]**

(1) $R_1 = 2R_2$ (2) $R_1 = 3R_2$
(3) $2R_1 = R_2$ (4) $3R_1 = R_2$

21. The area enclosed by the curve y = sinx + cosx and y = | cosx – sinx | over the interval $\left[0, \frac{\pi}{2}\right]$ is **[JEE(Adv.)-2013]**

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

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

22. Let $F(x) = \int_x^{x^2+\frac{\pi}{6}} 2\cos^2 t\,dt$ for all $x \in \mathbb{R}$ and $f:\left[0,\frac{1}{2}\right] \to [0,\infty)$ be a continuous function. For $a \in \left[0,\frac{1}{2}\right]$, if F'(a) + 2 is the area of the region bounded by x = 0, y = 0, y = f(x) and x = a, then f(0) is **[JEE 2015]**

***23.** If the line x = α divides the area of region $R = \{(x, y) \in \mathbb{R}^2 : x^3 \le y \le x, 0 \le x \le 1\}$ into two equal parts, then **[JEE(Advanced)-2017]**

(1) $\frac{1}{2} < \alpha < 1$ (2) $\alpha^4 + 4\alpha^2 - 1 = 0$

(3) $0 < \alpha \le \frac{1}{2}$ (4) $2\alpha^4 - 4\alpha^2 + 1 = 0$

***24.** Let $f : [0, \infty) \to \mathbb{R}$ be a continuous function such that $f(x) = 1 - 2x + \int_0^x e^{x-t} f(t)dt$ for all $x \in [0, \infty)$. Then, which of the following statement(s) is (are) TRUE ? **[JEE(Advanced)-2018]**

(1) The curve y = f(x) passes through the point (1, 2)
(2) The curve y = f(x) passes through the point (2, –1)
(3) The area of the region $\{(x, y) \in [0, 1] \times \mathbb{R} : f(x) \le y \le \sqrt{1-x^2}\}$ is $\frac{\pi-2}{4}$
(4) The area of the region $\{(x, y) \in [0, 1] \times \mathbb{R} : f(x) \le y \le \sqrt{1-x^2}\}$ is $\frac{\pi-1}{4}$

* **Marked Questions are multiple answer**

PREVIOUS YEARS QUESTIONS — **ANSWER KEY** — Exercise-II

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	3	4	1	1	1	3	4	1	3	3
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	4	1	2	3	1	4	2	2,3,4	2	3
Que.	21	22	23	24						
Ans.	2	3	1,4	2,3						