DPP
DAILY PRACTICE PROBLEMS

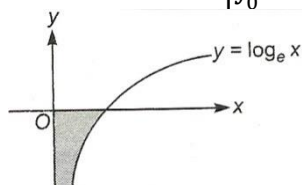|		
Class : XIth Date :	**Solutio**	Subject : Maths DPP No. : 2

Topic :-Applications of integrales

2 **(a)**

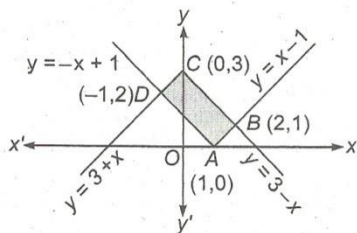Required area $= \left|\int_0^{-\infty} e^y \; dy\right|$

$= |[e^y]|_0^{-\infty} = 1$ sq unit

5 **(c)**

Given, $y = |x - 1| = \begin{cases} x - 1, x > 1 \\ -x + 1, x \le 1 \end{cases}$

and $y = 3 - |x| = \begin{cases} 3 + x, x \le 0 \\ 3 - x, x > 0 \end{cases}$

On solving $y = x - 1$ and $y = 3 - x$, we get $x = 2, y = 1$

Now, $AB^2 = (2 - 1)^2 + (1 - 0)^2 = 2$

$\Rightarrow AB = \sqrt{2}$

and $BC^2 = (0 - 2)^2 + (3 - 1)^2 = 8$

$\Rightarrow BC = 2\sqrt{2}$

$\therefore$ Area of rectangle $ABCD = AB \times BC$

$= \sqrt{2} \times 2\sqrt{2} = 4$ sq units

6 **(a)**

Required area $= \int_1^2 (x^3 - x^2) dx$

$= \left(\frac{x^4}{4} - \frac{x^3}{3}\right)_1^2$

$= \left(4 - \frac{8}{3}\right) - \left(\frac{1}{4} - \frac{1}{3}\right) = \frac{17}{22}$

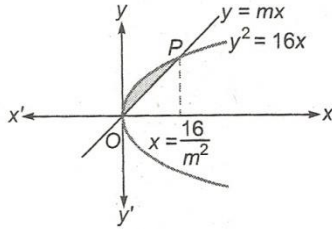**7** **(b)**

Required area $= \int_{-2}^3 | [x - 3]| dx$

$= \int_{-2}^{-1} | [x - 3]| dx + \int_1^0 |[x - 3]| dx$

$$+ \int_0^1 |[x-3]| dx + \int_1^2 |[x-3]| dx + \int_2^3 |[x-3]| dx$$

$$= \int_{-2}^{-1} 5 \cdot dx + \int_{-1}^0 4 \cdot dx + \int_0^{-1} 3 \cdot dx + \int_1^2 2 \cdot dx + \int_2^3 1 \cdot dx$$

$$= 5(1) + 4(1) + 3(1) + 2(1) + 1(1)$$

$$= 15 \text{ sq unit}$$

8 **(b)**

$$\text{Area} = \int_0^{16/m^2} (\sqrt{16x} - mx) dx = \frac{2}{3}$$

$$\Rightarrow \left[4 \cdot \frac{2}{3} x^{3/2} - \frac{mx^2}{2} \right]_0^{16/m^2} = \frac{2}{3}$$

$$\Rightarrow \frac{1}{m^3} \left[\frac{512}{3} - \frac{256}{2} \right] = \frac{2}{3}$$

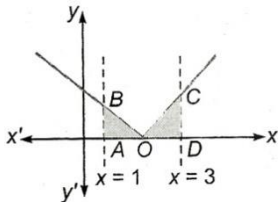$$\Rightarrow m^3 = \frac{128}{3} \times \frac{3}{2} = 64$$

$$\Rightarrow m = 4$$

9 **(d)**

$$\text{Required area} = \int_3^5 (3x - 5) dx$$

$$= \left(\frac{3x^2}{2} - 5x \right)_3^5 = \left(\frac{75}{2} - 25 \right) - \left(\frac{27}{2} - 15 \right)$$

$$= \frac{75}{2} - 25 - \frac{27}{2} + 15 = \frac{48}{2} - 10 = 14 \text{ sq units}$$

10 **(a)**

$$\text{Required area} = \int_1^3 |x - 2| dx$$

$$= \int_1^2 (2 - x) dx + \int_2^3 (x - 2) dx$$

$$= \left[2x - \frac{x^2}{2} \right]_1^2 + \left[\frac{x^2}{2} - 2x \right]_2^3$$

$$= 2 - \frac{3}{2} - \frac{3}{2} + 2 = 1 \text{ sq unit}$$

Alternate

Area= Area of ΔAOB + Area of ΔODC

$$= \frac{1}{2} \times 1 \times 1 + \frac{1}{2} \times 1 \times 1$$
$$= 1 \text{ sq unit}$$

13 **(a)**

We have, $\frac{dy}{dx} = 2x + 1$
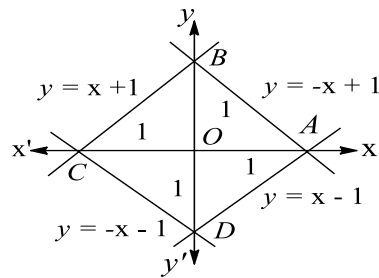
$\Rightarrow y = x^2 + x + c$, it passes through (1, 2)

$\therefore c = 0$

Then, $y = x^2 + x$

$\therefore$ Required area $= \int_0^1 (x^2 + x)dx = \frac{5}{6}$ sq unit

14 **(b)**

The lines are $y = x - 1, x \geq 0$

$y = -x - 1, x < 0 = -x + 1, x \geq 0$ and $y = x + 1, x < 0$

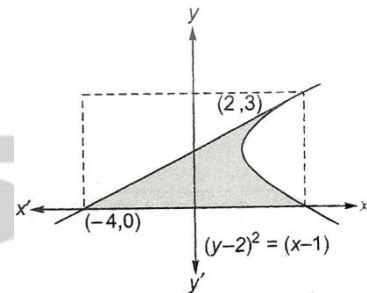Required area $= (4 \times \text{area of } \Delta AOB)$

$$= 4 \times \left(\frac{1}{2} \times 1 \times 1\right)$$
$$= 2 \text{ sq unit}$$

17 **(b)**

The equation of tangent at (2,3) to the given parabola is

$x = 2y - 4$

$\therefore$ Required area

$$= \int_0^3 \{(y-2)^2 + 1 - 2y + 4\}dy$$
$$= \left[\frac{(y-2)^3}{3} - y^2 + 5y\right]_0^3$$
$$= \frac{1}{3} - 9 + 15 + \frac{8}{3}$$
$$= 9 \text{ sq units}$$

19 **(a)**

The equation of latusrectum of the parabola $y^2 = 12x$ is $x = 3$

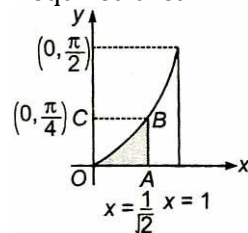Coordinates of end points of latuserectum are (3,6) and (3,-6)

Required length $= 2 \int_0^3 \sqrt{1 + \left(\frac{dy}{dx}\right)^2} \, dx$

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$$= 2\int_0^3 \sqrt{1+\left(\frac{6}{y}\right)^2} = 2\int_0^3 \sqrt{\frac{12x+36}{12x}}\, dx = 2\int_0^3 \frac{x+3}{\sqrt{x^2+3x}}\, dx$$

$$= 2\left[\int_0^3 \frac{2x+3}{2\sqrt{x^2+3x}}\, dx + \frac{3}{2}\int_0^3 \frac{1}{\sqrt{\left(x+\frac{3}{2}\right)^2 - \left(\frac{3}{2}\right)^2}}\, dx\right]$$

$$= 2\left[\sqrt{x^2+3x} + \frac{3}{2}\log\left|\left(x+\frac{3}{2}\right) + \sqrt{x^2+3x}\right|\right]_0^3$$

$$= 2\left[3\sqrt{2} + \frac{3}{2}\log\left(\frac{9}{2}+3\sqrt{2}\right) - \frac{3}{2}\log\left(\frac{3}{2}\right)\right]$$

$$= 2\left[3\sqrt{2} + 3\log\left(3+2\sqrt{2}\right)^{\frac{1}{2}}\right]$$

$$= 2\left[3\sqrt{2} + 3\log(\sqrt{2}+1)\right]$$

$$= 6\left[\sqrt{2} + \log\left(1+\sqrt{2}\right)\right]$$

20 **(d)**

Required area

$$= \text{Area of recangle } OABC - \text{Area of curve } OABO$$

$$= \frac{\pi}{4\sqrt{2}} - \int_0^{\pi/4} \sin y\, dy$$

$$= \frac{\pi}{4\sqrt{2}} + [\cos y]_0^{\pi/4} = \left[\frac{\pi}{4\sqrt{2}} + \left\{\frac{1}{\sqrt{2}} - 1\right\}\right] \text{ sq unit}$$

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	C	A	B	C	C	A	A	B	D	A
Q.	11	12	13	14	15	16	17	18	19	20
A.	B	B	A	B	D	D	B	D	A	D