DPP
DAILY PRACTICE PROBLEMS

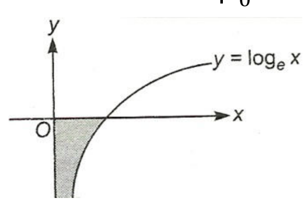
Class : XIth | **Solutions** | **Subject : Maths**

Date : | | **DPP No. : 2**

Topic :-Applications of integrales

2 **(a)**

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

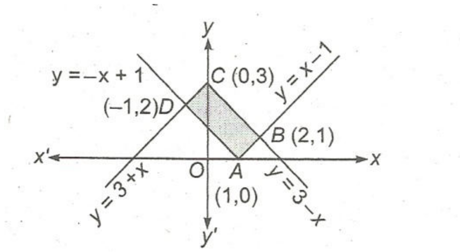


$= |[e^y]|_0^{-\infty} = 1$ sq unit

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

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

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

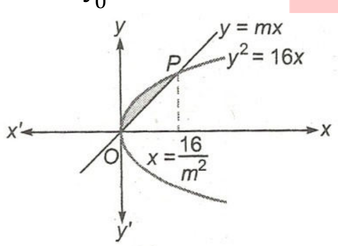
$= \int_{-2}^{-1} 5 \cdot dx + \int_{-1}^{0} 4 \cdot dx + \int_{0}^{-1} 3 \cdot dx + \int_{1}^{2} 2 \cdot dx + \int_{2}^{3} 1 \cdot dx$

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

$= 15$ sq unit

8 **(b)**

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)**

Requred area $= \int_3^5 (3x-5)dx$

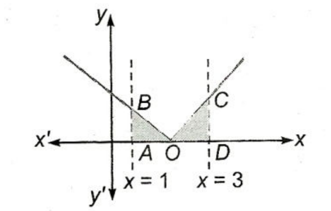
$= \left(\frac{3x^2}{2} - 5x\right)_3^5 = \left(\frac{75}{2} - 25\right) - \left(\frac{27}{2} - 15\right)$

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

10 **(a)**

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

$= \frac{1}{2} \times 1 \times 1 + \frac{1}{2} \times 1 \times 1$

$= 1$ sq unit

13 **(a)**

We have, $\frac{dy}{dx} = 2x + 1$

$\Rightarrow y = x^2 + x + c$, it passes through (1, 2)

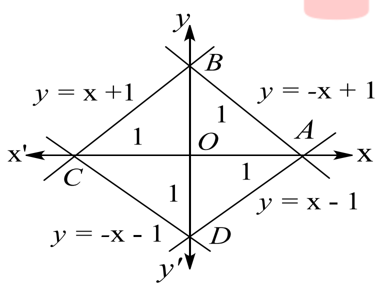
$\therefore \; c = 0$

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

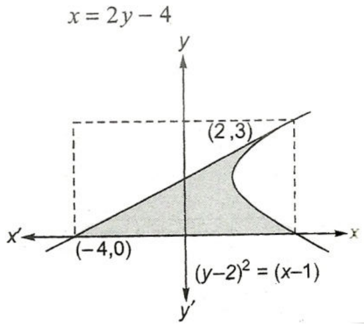
$= 4 \times \left(\frac{1}{2} \times 1 \times 1\right)$

$= 2$ sq unit

17 **(b)**

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

$x = 2y - 4$



∴ Required area

$= \int_0^3 \{(y-2)^2 + 1 - 2y + 4\}dy$

$= \left[\frac{(y-2)^3}{3} - y^2 + 5y\right]_0^3$

$= \frac{1}{3} - 9 + 15 + \frac{8}{3}$

$= 9$ 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 $= 2\int_0^3 \sqrt{1 + \left(\frac{dy}{dx}\right)^2} dx$

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

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

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

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

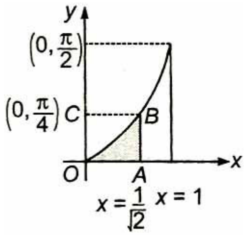
$= 2\left[3\sqrt{2} + 3\log\left(3 + 2\sqrt{2}\right)^{\frac{1}{2}}\right]$

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

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

20 **(d)**

Required area



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

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

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