Indefinite Integrals Ex 19.2 Q47

We have,

$$f'(x) = 8x^3 - 2x$$

$$\Rightarrow \quad f(x) = \int f'(x)dx = \int \left(8x^3 - 2x\right)dx$$

$$\Rightarrow \quad f(x) = \int \left(8x^3 - 2x\right)dx$$

$$= \int 8x^3 dx - \int 2x dx$$

$$= \frac{8x^4}{4} - \frac{2x^2}{2} + c$$

$$= 2x^4 - x^2 + c$$

$$\Rightarrow \quad f(x) = 2x^4 - x^2 + c \qquad ---(i)$$

Since, $f(2) = 8$

$$\therefore \quad f(2) = 2(2)^4 - (2)^2 + c = 8$$

$$\Rightarrow \quad 32 - 4 + c = 8$$

$$\Rightarrow \quad 28 + c = 8$$

$$\Rightarrow \quad c = -20$$

Putting $c = -20$ in equation (i), we get

$$f(x) = 2x^4 - x^2 - 20$$

Hence, $f(x) = 2x^4 - x^2 - 20$.

Indefinite Integrals Ex 19.2 Q48

We have,

$$f(x) = \int f'(x)\,dx$$

$$\Rightarrow \quad f(x) = \int (a\sin x + b\cos x)\,dx$$

$$= -a\cos x + b\sin x + c$$

$$\therefore \quad f(x) = -a\cos x + b\sin x + c \qquad \text{---(i)}$$

Since,

$$f'(0) = 4$$

$$\therefore \quad f'(0) = a\sin 0 + b\cos 0 = 4$$

$$\Rightarrow \quad a \times 0 + b \times 1 = 4$$

$$\Rightarrow \quad b = 4$$

Now,

$$f(0) = 3$$

$$\therefore \quad f(0) = -a\cos 0 + b\sin 0 + c = 3$$

$$\Rightarrow \quad -a + 0 + c = 3$$

$$\Rightarrow \quad c - a = 3 \qquad \text{---(ii)}$$

and, $f\left(\frac{\pi}{2}\right) = 5$

$$\therefore \quad f\left(\frac{\pi}{2}\right) = -a\cos\left(\frac{\pi}{2}\right) + b\sin\left(\frac{\pi}{2}\right) + c = 5$$

$$\Rightarrow \quad -a \times 0 + b \times 1 + c = 5$$

$$\Rightarrow \quad b + c = 5$$

$$\Rightarrow \quad 4 + c = 5 \qquad [\because b = 4]$$

$$\Rightarrow \quad c = 5 - 4$$

$$\Rightarrow \quad c = 1$$

Putting $c = 1$ in equation (ii), we get

$$1 - a = 3$$

$$\Rightarrow \quad -a = 3 - 1$$

$$\Rightarrow \quad -a = 2$$

$$\Rightarrow \quad a = -2$$

Putting $a = -2$, $b = 4$ and $c = 1$ in equatio (i), we get

$$f(x) = -(-2)\cos x + 4\sin x + 1$$

$$\Rightarrow \quad f(x) = 2\cos x + 4\sin x + 1$$

Hence, $f(x) = 2\cos x + 4\sin x + 1$

Indefinite Integrals Ex 19.2 Q49

We have,

$$f(x) = \sqrt{x} + \frac{1}{\sqrt{x}}$$

$$\Rightarrow \quad \int f(x) = \int\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)dx$$

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

$$= \frac{2}{3}x^{\frac{3}{2}} + 2x^{\frac{1}{2}} + c$$

Hence, the primitive or anti-derivative of $f(x) = \frac{2}{3}x^{\frac{3}{2}} + 2x^{\frac{1}{2}} + c.$

*********** END **********