Master Definite Integration and Ace Your Math Exams with this Comprehensive Book!

Ex.16 Evaluate $\int\limits_0^{\pi/2} \log\tan x\, dx$

Sol. Let $I = \int\limits_0^{\pi/2} \log\tan x\, dx$ ..(i)

Then, $I = \int\limits_0^{\pi/2} \log\tan\left(\dfrac{\pi}{2}-x\right) dx \Rightarrow I = \int\limits_0^{\pi/2} \log\cot x\, dx$ ..(ii)

Adding (i) and (ii), we get

$2I = \int\limits_0^{\pi/2} (\log\tan x + \log\cot x)dx = \int\limits_0^{\pi/2} \log(\tan x \cdot \cot x)dx$

$= \int\limits_0^{\pi/2} \log 1. dx = \int\limits_0^{\pi/2} 0. dx = 0$

$\Rightarrow I = 0$

Ex.17 Evaluate $\int\limits_0^{\pi/4} \log(1+\tan x)dx$

Sol. Let $I = \int\limits_0^{\pi/4} \log(1+\tan x)dx$ ..(i)

Then $I = \int\limits_0^{\pi/4} \log\left(1+\tan\left(\dfrac{\pi}{4}-x\right)\right) dx$

$\Rightarrow I = \int\limits_0^{\pi/4} \log\left(1+\dfrac{\tan\pi/4 - \tan x}{1+\tan\pi/4\tan x}\right) dx$

$= \int\limits_0^{\pi/4} \log\left(1+\dfrac{1-\tan x}{1+\tan x}\right) dx$

$= \int\limits_0^{\pi/4} \log\left(\dfrac{1+\tan x+1-\tan x}{1+\tan x}\right) dx = \int\limits_0^{\pi/4} \log\left(\dfrac{2}{1+\tan x}\right) dx$

$= \int\limits_0^{\pi/4} \{\log 2 - \log(1+\tan x)\} dx$

$= \int\limits_0^{\pi/4} \log 2 dx - \int\limits_0^{\pi/4} \log(1+\tan x)dx$
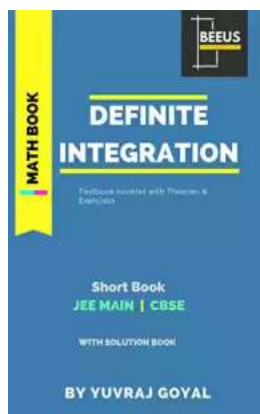
$\Rightarrow I = (\log 2) [x]_0^{\pi/4} - I$

$\Rightarrow I = \dfrac{\pi}{4} \log 2 \Rightarrow I = \dfrac{\pi}{8} \log 2$

Are you a student preparing for IIT JEE or CBSE Math exams? Do you find definite integration challenging and confusing? Look no further! Introducing our latest book, "Definite Integration for IIT JEE and CBSE Math," designed to help you grasp the concepts of definite integration and excel in your exams.

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★★★★★ 5 out of 5

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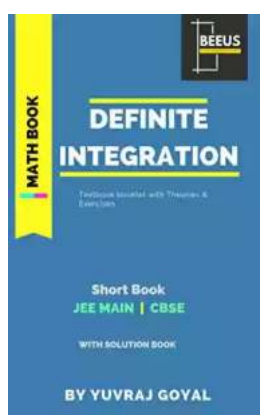
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