Name:Hemanth Thatavarthi
Batch:COMETFWC033
Date:06 August 2025

GATE EE 2018 PAPER

Question 18

Let f be a real-valued function of a real variable defined as

$f(x) = x - \lfloor x \rfloor$,

where $\lfloor x \rfloor$ denotes the largest integer less than or equal to x.

Compute

$\int_{0.25}^{1.25} f(x)\,dx$ (up to 2 decimal places).

Solution

Lets splite the integral

$\int_{0.25}^{1.25} (x - \lfloor x \rfloor)\,dx = \int_{0.25}^{1} x\,dx + \int_{1}^{1.25} (x-1)\,dx$

Lets compute 1st part of intergal

$\int_{0.25}^{1} x\,dx = \frac{x^2}{2}\Big|_{0.25}^{1} = \frac{1}{2} - \frac{0.25^2}{2} = 0.5 - 0.03125 = 0.46875$

Lets compute 2nd part of integral

$\int_{1}^{1.25} (x-1)\,dx = \frac{x^2}{2}\Big|_{1}^{1.25} - x\Big|_{1}^{1.25} = (0.78125 - 0.5) - 0.25 = 0.03125$

Add the individually computed values.

$\int_{0.25}^{1.25} f(x)\,dx = 0.46875 + 0.03125 = 0.5$

The final answer is $\boxed{0.50}$