AI 1103 Assignment-3

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Download all latex-tikz codes from

`https://github.com/Shantanu467/AI1103/blob/main/Assigment_3/main.tex`

Problem

Gate 2010 (MA): QUESTION-48
Let X and Y be continuous random variables with joint probability density function

$$f(x,y) = \begin{cases} a \times e^{-2y} & 0 < x < y < \infty \\ 0 & otherwise \end{cases}$$

The value of a is

(A) 4

(B) 2

(C) 1

(D) 0.5

Solution

Using, Total PDF $(\Pr(-\infty < X < \infty)) = 1$
So,

$$\iint_{-\infty}^{+\infty} f(x,y)\,dx\,dy = 1 \tag{1}$$

$$0 + \iint_{0}^{+\infty} a \times e^{-2y}\,dx\,dy = 1 \tag{2}$$

Upon further solving

$$\frac{a}{4} = 1 \tag{3}$$

$$\text{So, } a = 4 \tag{4}$$

Therefore, the correct option is (A).