AI1103-Assignment 3

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Latex codes :

https://github.com/CS20BTECH11004/AI1103/blob/main/Assignment%203/Assignment%203.tex

QUESTION: GATE EC Q32

A probability density function is of the form

$$p(x) = Ke^{-\alpha|x|}, x \in (-\infty, \infty)$$

The value of K is

(A) 0.5
(B) 1
(C) 0.5α
(D) α

SOLUTION

$$\int_{-\infty}^{\infty} p(x)dx = \int_{-\infty}^{\infty} Ke^{-\alpha|x|}dx \tag{0.0.1}$$

$$= 2K\int_{0}^{\infty} e^{-\alpha|x|}dx \tag{0.0.2}$$

$$= 2K\frac{-e^{-\alpha|x|}}{\alpha}\Big|_0^{\infty} \tag{0.0.3}$$

$$= 2K\left(0 - \left(-\frac{1}{\alpha}\right)\right) \tag{0.0.4}$$

$$= \frac{2K}{\alpha} \tag{0.0.5}$$

We know

$$\int_{-\infty}^{\infty} p(x)dx = 1 \tag{0.0.6}$$

From (0.0.5) and (0.0.6), we have

$$K = 0.5\alpha \tag{0.0.7}$$

$\therefore$ **Solution:** Option C