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Section - 3

Q1

Ans (i) $f(x) \geq 0$ for every 'x' in $(1,2)$ and

$$\int_{-\infty}^{\infty} f(x)\,dx = \int_{-\infty}^{0} 0 \cdot dx + \int_{0}^{\infty} e^{-x} \cdot dx = 1$$

Hence the function $f(x)$ satisfies the requirements for a density function.

(ii) Required probability $= P(1 \leq x \leq 2) = \int_{1}^{2} e^{-x}\,dx$

$$= e^{-1} = -e^{-2}$$
$$= 0.368 - 0.135$$
$$= 0.233 \text{ Ans}$$

This probability is equal to the shaped area in fig. (i)

(iii) Cumulative probability function $P(2)$.

$$\int_{-\infty}^{2} f(x)\,dx = \int_{-\infty}^{0} 0 \cdot dx + \int_{0}^{2} e^{-x} \cdot dx$$

$$\Rightarrow 1 - e^{-2}$$
$$\Rightarrow 1 - 0.135$$
$$\Rightarrow 0.865 \text{ Ans.}$$

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which is shown in fig. (2)

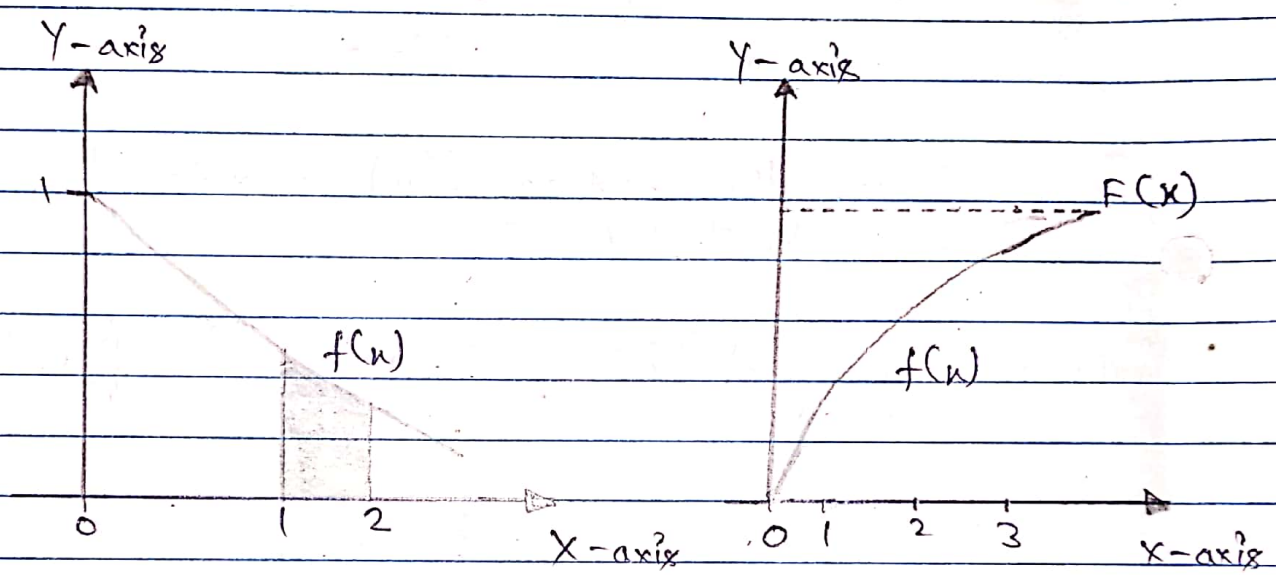

fig (1)

fig (2)