Scatter-4

Sol·① Mean $\lambda = 4$, Number of days $N = 100$

(i) $P(r=0) = \frac{e^{-4}4^0}{0!} = e^{-4} = 0.01831$

∴ Required number of days $= N \cdot P(r=0)$

$= 100 \times 0.01831 = 1.831 \approx 2$

(ii) $P(r \geq 2) = 1 - P(r<2) = 1 - [P(r=0) + P(r=1)]$

$= 1 - \left(e^{-4} + \frac{e^{-4}(4)^1}{1!}\right) = 1 - 5e^{-4} = 0.90842$

∴ Required number of days $= N \cdot P(r \geq 2)$

$= 100 \times 0.90842 = 90.842 = 91$

(iii) $P(r \leq 3) = P(r=0) + P(r=1) + P(r=2) + P(r=3)$

$= \frac{e^{-4}(4)^0}{0!} + \frac{e^{-4}(4)^1}{1!} + \frac{e^{-4}(4)^2}{2!} + \frac{e^{-4}(4)^3}{3!}$

$= e^{-4} + 4e^{-4} + 8e^{-4} + \frac{64}{6}e^{-4} = 0.43347$

∴ Required number of days $= N \cdot P(r \leq 3)$

$= 100 \times 0.43347 = 43.347 = 43$

(iv) $P(2<r<5) = P(r=3) + P(r=4) = \frac{e^{-4}(4)^3}{3!} + \frac{e^{-4}(4)^4}{4!}$

$\Rightarrow \left(\frac{64}{6} + \frac{256}{24}\right)e^{-4} = 0.3907$

∴ Required no. of days $= N \cdot P(2<r<5) = 100 \times 0.3907 = 39.07 = 39$ Ans