Q.1 Ans

SECTION - 4

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

i) No accident:-

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

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

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

ii) at least 2 accidents:-

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

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

$\therefore$ Required no. of days $= N \cdot P(r \geq 2)$

$$= 100 \times 0.90842 = 90.842 \approx 91$$

iii) at most 3 accidents:-

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

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

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

$\therefore$ Required No. of days $= \cancel{\frac{e^{-4}(4)^3}{3!} + \frac{e^{-4}(4)^4}{4!}}$ $N \cdot P(r \leq 3)$

$$= 100 \times 0.43347 = 43.437 \approx 43$$

4) between 2 & 5 accidents.

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

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

$$= 0.3907$$

Required No. of day:-

$$= N \cdot P(2 < r < 5) = 100 \times 0.3907 = 39.07 \approx 39.$$