Numerical Problem 5 – Model I (M/M/1) : (∞/FCFS)

Q: In a public telephone booth, the arrivals on an average are 15 per hour. A call on an average takes three minutes. If there is just one phone, find

(i) The expected no. of callers in the booth at any time.

(ii) The proportion of the time, the booth is expected to be idle ?

Solution : $\lambda = 15$ per hour

$\mu = \frac{1}{3}$ per min. $= \frac{1}{3} \times 60 = 20$ per hour.

(i) Expected length of non-empty queue, $= \frac{\mu}{\mu - \lambda} = \frac{20}{20-15} = \frac{20}{5} = 4$

(ii) The service is busy $= \frac{\lambda}{\mu} = \frac{15}{20} = \frac{3}{4}$

$\therefore$ The booth is expected to be idle for $1 - \frac{3}{4} = \frac{1}{4}$ hour

$= 15$ min.