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CSE - 407

SET - B

Ans to the Q No - 2

Binrth rate ~~notation~~ define as λ_k which describes the rate at which binrth occur when the population size k.

Death rate define as μ_k which is the rate at which deaths occur when the population size k.

Ans to the Q No - 3

Given $\lambda = 0.9$,
$\mu = 0.5$
server number $M = 8$
population $k = 12$

$\rho = \frac{\lambda}{m\mu}$
$= \frac{0.9}{8 \times 0.5}$
$= 0.225$

Soln,
$P_k = \frac{(m\rho)^k}{k!} P_0$

$P_k = \frac{\lambda^k}{k!\,\mu^k} \cdot P_0$

$= \frac{0.9^{12}}{12! \times 0.5^{12}} (1-\rho)$

$= \frac{(0.9)^{12}}{12! \times (0.5)^{12}} \times 0.775$

$= 1.87 \times 10^{-6}$

Mean number of jobs : $\bar{N} = \bar{N}_q + \bar{N}_s$

$=$

Expected jobs : $\bar{N}_s = m\rho$

$= 8 \times 0.225$

$= 1.8$

$\therefore \bar{N} =$

Mean waiting time :

$$\bar{w} = \frac{\rho}{m\mu(1-\rho)}$$

$$= \frac{0.225}{8 \times 0.5 (1 - 0.225)}$$

$$= \frac{0.225}{4.775} = 0.0471$$

Ans to the Q No - 1

$$\cancel{P_k(t+\Delta t) = P_k(t) - \lambda_k \Delta t\, P_k(t) - \mu_k \Delta t\, P_k(t) + \lambda_{k-1} \Delta t\, P_{k-1}(t) + \mu_{k+1} \Delta t\, P_{k+1} + o(\Delta t)}$$

~~where k>0~~

$\therefore P_k(t+\Delta t)$

$= P_k(t) - \lambda_k \cdot \Delta t \cdot P_k(t) - \mu_k \Delta t\, P_k(t) + \lambda_{k-1} \cdot \Delta t\, P_{k-1}(t) + \mu_{k+1} \cdot \Delta t\, {}_{k+1} + o(\Delta t)$

where $k > 0$