Here

$M/M/1:2$

$\lambda = 8/hr$
$\mu = 9/hr$
$N = 2$

$P_0 = \frac{1-\rho}{1-\rho^{n+1}}$ $\rho = \lambda/\mu$

$= \frac{1-8/9}{1-(8/9)^3} = \frac{1-0.888}{(1-0.888)^3} = \frac{0.1112}{0.297} = \underline{0.3732}$

$P_1 = \rho P_0 = 8/9 \times 0.3732 = \underline{0.317}$

$P_2 = \rho^2 P_0 = (0.888)^2 \times 0.3732$

$= 0.7899 \times 0.3732$

$= \underline{0.2948}$

Probability of Joining the system

$= 1 - 0.2948 = 0.7052$

effective arrivals rate

$\lambda_e = \lambda \times 0.7052$

$= 8 \times 0.7052$

$= \underline{5.646}$

Load of system, $L_s = \frac{\rho\,(1 + N\rho^{(N+1)} - (N+1)\rho^n)}{(1-\rho)(1-\rho^{n+1})}$

$= \frac{0.888(1+2\times(0.8888)^3 - 3\times(0.8888))}{(1-0.8888)(1-(0.8888)^3)}$

$= \frac{0.888(1+1.404-2.3656)}{0.112 \times 0.2978}$

$= \frac{0.888 \times 0.0384}{0.0331} = \underline{1.019}$

$N_s = L_s/\lambda_e = \frac{1.019}{5.641} = 0.1806$