Solution to Problem 2.16

The examination facility may once again be modeled as the service facility shown in Fig. 1.9 using $m=2$. The state diagram of the system may also be drawn as in Fig. 1.10 using $m=2$ except that for this problem, states will extend beyond (2,1) and (2,2) as well, i.e. one will also have states such as (3,1), (3,2), (4,1), (4,2) etc. up to ∞. (See earlier solutions for the figures indicated above.)

Solving the corresponding balance equations will give

$$p_{11} = p_0 \frac{l(l+2)}{l+4} \quad p_{12} = p_0 \frac{l(l+2)}{l+4} \quad p_1 = p_{11} + p_{12} = p_0 \frac{l(l+3)}{l+4}$$

$$p_{22} = p_0 \frac{l^2}{l+4} \quad p_{21} = p_0 \frac{l^2(l+1)}{l+4} \quad p_2 = p_{21} + p_{22} = p_0 \frac{l^2(l+2)}{l+4}$$