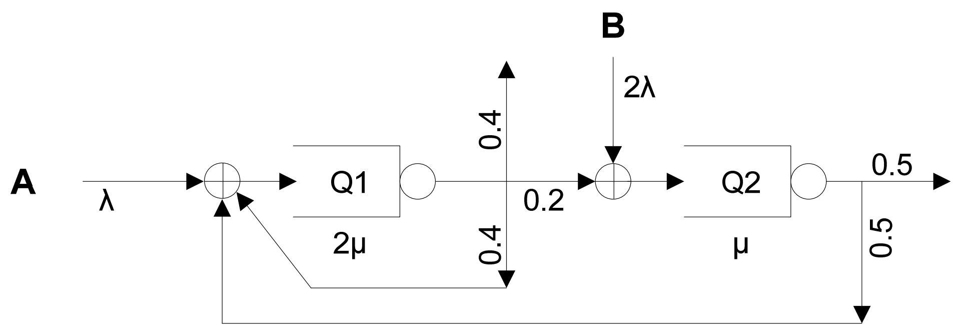
EC633 Quiz-2 (01-APR-2011)

Maximum Marks = 20 *Time: 50 minutes*

1.



In the queueing network shown, the single-server, infinite-buffer queues Q1 and Q2 provide exponentially distributed service times with means $1/(2\mu)$ and $1/\mu$, respectively. Jobs enter the system from outside from two points A and B as shown. The job arrival processes at A and B are independent Poisson processes with average arrival rates λ and 2λ, respectively. The routing probabilities are as shown in the figure. **For notational convenience, USE $\rho=\lambda/\mu$.**

(a) What is the condition that λ and μ must satisfy for the system to be in equilibrium? **[2]**

(b) For any job entering the system (either from A or from B), what will be the mean time spent in the system when $\lambda=0.3\mu$? **[3]**

(c) When $\lambda=0.3\mu$, calculate the mean time spent in the system by a job which enters the system at B. **[5]**

2. In a three priority M/G/1 system, Class 3 has pre-emptive priority over both Class 2 and Class 1 but Class 2 has only non-preemptive priority over Class 1. Assume that arrivals of Class *j* come to the queue at rate λ_j from a Poisson process and require a service time with mean $\overline{X_j}$ and second moment $\overline{X_j^2}$. Use the *Residual Life* approach to find the **mean time spent in system** by a job of each class. **[2+4+4]**