

EE 633, Quiz –II
30-MAR-2012

1. Consider an **M/G/1/2** queue where the average arrival rate is λ and the service time is $X+k\Delta$ if the previous departure left k customers in the system. Assume that Δ is fixed while X is random with mean \overline{X} , variance σ_X^2 , pdf $b(x)$, cdf $B(x)$ and L.T. of pdf $L_B(s)$.

(a) Find the equilibrium state probabilities of the system at the customer departure instants. [3]

(b) If the system is examined at an arbitrary instant of time, what will be the probability that the server will be found to be idle? [2]

(c) What will be the mean length of the Busy Period? [2]

Note: For (b), you can leave expressions with the probabilities you found in (a) without simplifying them further.

2. In a three priority M/G/1 system, Class 3 and Class 2 have pre-emptive resume priority over Class 1 but Class 3 has only non-preemptive priority over Class 2.

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. [3]