EE 679, Queueing Systems (2000-01F)
Test -4, October 23, 2000

Max. Marks = 25 **Time = 60 minutes**
Attempt both problems

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1. Consider an M/G/1 queue at equilibrium, where the server goes on a *single vacation* of random length whenever the system becomes empty. Let $f_V(t)$ be the pdf of the length of the vacation period with L.S.T. $\tilde{F}_V(s)$ and with $\overline{V}$ and $\overline{V^2}$ as its first and second moments respectively.

Use the Imbedded Markov Chain approach to find-

(a) The probability p_0 that the system is empty *(3*+3)*
(b) The *Generating Function P(z)* of the number in the system *(6)*

[*Note*: *3* marks in (a) above are for writing the correct equation(s) describing the Imbedded Markov Chain]

2. Consider an M/G/1 system with *exceptional first service*. We are given that the first and second moments of a normal service time are $\overline{X}$ and $\overline{X^2}$, respectively. However, the first and second moments of the *first service duration in a busy period* are $\overline{\tilde{X}}$ and $\overline{\tilde{X}^2}$, respectively.

Use the Residual Life approach to find the mean waiting time in queue $\overline{W_q}$ and the mean time spent in system $\overline{W}$ for a job arriving to the system under equilibrium conditions. *(9+4)*