Topics Covered in Lecture 30

24-October-2002

- $\nu = \nu \mathrm{P}$
  ν is a row vector, here it is $[\nu_{1,1}, \nu_{1C}, \nu_{1,0}, \nu_{1D}, \nu_{0,0}]$.

$$\sum \nu_i = 1$$
$$\nu I = \nu P$$
$$\nu(P - I) = 0$$

  Here $(P - I)$ has the characteristics of CTMC.

$$P = \frac{Q}{q} + I$$
$$q = max_i |q_{ii}|$$
$$\pi Q = 0$$
$$\frac{\pi Q}{q} = 0$$
$$\frac{\pi Q}{q} + \pi = \pi$$
$$\pi \left(I + \frac{Q}{q} \right) = \pi$$

- In CTMC $\pi_i T$ is the average time spent in steady state in state i during the interval of length T. In DTMC $\nu_i N$ means if we observe the system N times then system will be in state i for $\nu_i N$ times on the average.

$$\pi_i = \frac{\nu_i h_i}{\sum_j \nu_j h_j}$$
$$h_i = \int_0^\infty (1 - H_i(t))dt.$$

- **8.4.2 Performance Models**
  Example 8.29 (M / M / 2 Queue with Heterogeneous Servers) [BHAT 1984]