Exercise - Week 1

P9. (a) 1 Gbps link

~~p = 0.1~~ Data generation probability = 0.1

Data generation rate = 100 Kbps

a) $N = \frac{10^9 \text{ (1 Gbps)}}{10^5 \text{ (100 Kbps)}} = 10^4$

b) $P(\text{No. of users} > N) = \sum_{i=N}^{M} (p)^i (1-p)^{M-i}$

P13. a) Queueing delay for packet 1 = 0

" " " " 2 = $1 \times \frac{L}{R}$

" " " " 3 = $2 \times \frac{L}{R}$

⋮

" " " " N = $(N-1) L/R$

∴ Total queueing delay = $\frac{L}{R} \cdot \frac{N(N-1)}{2}$

Avg. queueing delay = $\frac{L(N-1)}{2R}$

b) N packets arrive every LN/R seconds. Queueing delay for the ~~N~~ N^{th} packet is $(N-1)L/R$.

⇒ All the N ~~packets~~ packets are transmitted before the arrival of other N packets.

⇒ Answer remains the same.

P16. Total no. of packets in the system = No. of packets in buffer + the packet being transmitted.

$= 10 + 1$

$= 11$

$\therefore N = 11$

$N = a \cdot d.$

$d =$ transm delay + queuing delay

$d = 10\,msec + 1/100 = 0.02$

$\therefore 11 = a \times \frac{2}{100}$

$a = 550$ packets/sec

P1.