

**Q.2** a. Explain the principle of crossbar switching and discuss the evolution of switching system

**Answer:** Page Number 66-69 of Text Book 1

b. Explain reed electronic systems in detail with suitable diagram.

**Answer:** Page Number 78-80 of Text Book 1

**Q.3** a. Explain the following:

- (i) Congestion
- (ii) Grade of Service
- (iii) Switch Count
- (iv) Queuing capacity

**Answer:** Page Number 90-91 of Text Book 1

b. In a mobile messaging system the messages are sent at the rate of 560 characters per second. The average number of characters per message are 120. How many messages can be handled per second if the mean delay does not exceed 300 msec.

**Answer:**

(Ch:4; Text:1)  
 $T' = Ah(1-A)$   
 $A = T' / (h + T')$   
 $h = (120/560) = 0.214 \text{ min}$   
 $A = 0.3 / (0.2 + 0.3) = 0.6 \text{ E}$   
 $C = A/h = 0.6 / 0.214 = 2.8 \text{ messages}$

**Q.4** a. What is meant by link systems, what are their advantages?

**Answer:** Page Number 126-129 of Text Book 1

b. Explain how blocking probability reduces in a three stage system.

**Answer:** Page Number 138-141 of Text Book 1

c. A three stage network is designed with the following parameters:

$M=N=512$ ,  $p=q=16$  and  $\alpha=0.7$ . Calculate the blocking probability of network for  $s=16$  and  $s=31$ .

**Answer:**

Blocking probability of a three stage switch is given by  $P_b = [1 - (1 - \alpha/k)^2]^s$

$k = \frac{\beta}{\alpha}$  also  $\beta = \frac{p\alpha}{s}$   $\therefore \beta_1 = \frac{16 \times 0.7}{16} = 0.7$   $\beta_2 = \frac{16 \times 0.7}{31} = 0.36$

$k_1 = \frac{0.7}{0.7} = 1$   $k_2 = \frac{0.36}{0.7} = 0.51$

$P_{b1} = [1 - (1 - \frac{0.7}{1})^2]^{16} = 0.04$   $P_{b2} = [1 - (1 - \frac{0.7}{0.51})^2]^{31} = 0.027$

- Q.5** a. Explain space switching and time switching as applicable to Electronic Exchanges in detail.

**Answer:** Page Number 158-161 of Text Book 1

- b. (i) What is the need of multiplexing? Explain how 24 channels are transmitted using PCM/TDM format.

**Answer:** Page Number 27-34 of Text Book 1

- (ii) Thirty voice channels have to be transmitted using PCM/TDM. What will be the rate of transmission and bandwidth requirement if sampling is done at 8KHz.

**Answer:**

$$\begin{aligned} \text{Sampling rate} &= f_s = 8\text{KHz} \\ \text{No. of bits per sample} &= n = 8 \\ \text{No. of Voice channels} &= N = 30 \\ \text{Transmission rate} &= R_b = (nN+1)f_s = (8 \times 30 + 1)8 = 1928\text{Kbps} \\ \text{Bandwidth} &= R_b/2 = 964\text{KHz} \end{aligned}$$

- Q.6** a. How a call is setup, explain the processes involved?

**Answer:** Page Number 176-181 of Text Book 1

- b. How contention is taken care by Central control. Draw the schematic of control bus.

**Answer:** Page Number 186-190 of Text Book 1

- c. An SPC switching system having two processors, during the busy hour offers a total traffic 1000E and the average holding time of calls is 3 minutes. The call processing time has a mean time of 162 msec. Find the Traffic offered and probability of delay?

**Answer:**

$$\begin{aligned} \text{Traffic offered } A &= Ch/T \\ \text{Total calls per hour for 1000E; } C &= AT/h = 1000 \times 3/60 = 20000 \text{ calls/hr} \\ \text{Traffic offered by processor} &= A = 20000 \times 132 \times 10^{-3} / 3600 = 0.73E \\ \text{Probability of delay} &= [(A^2)/2!][2/(2-A)]P(0) \\ 1/P(0) &= \frac{A^x}{x!} + \frac{2A^2}{2!(2-A)} = 1 + 0.73 + \frac{0.73^2}{1.27} = 2.14 \\ \text{Probability of delay} &= [(A^2)/2!][2/(2-A)]P(0) = [0.73^2/2][2/(2-0.73)][1/2.14] \\ &= 0.19 \text{ in order that the call goes through second server.} \end{aligned}$$

- Q.7** a. What is meant by Common channel signalling, what are its advantages?

**Answer:** Page Number 218-219 of Text Book 1

- b. Explain the layered structure of SS7.

**Answer:** Page Number 221-223 of Text Book 1

**Q.8** a. How packet switching takes place between two packet switched exchanges?

**Answer:** Page Number 230-232 of Text Book 1

b. What are the advantages and disadvantages of Bus and Ring Networks.

**Answer:** Page Number 235-241 of Text Book 1

c. How a virtual call is setup? Explain the process.

**Answer:** Page Number 242-245 of Text Book 1

**Q.9** a. Compare the architecture of an Analog Network and a Digital Network.

**Answer:** Page Number 255-261 of Text Book 1

b. What is the principle of working of ISDN? What are its objectives and benefits? What services does it provide? Explain these services.

**Answer:** Page Number 263-266 of Text Book 1

### **TEXT BOOKS**

1. Telecommunications Switching, Traffic and Networks, J.E.Flood, Pearson Education-2006.

2. Telecommunication Switching Systems and Networks, Thiagarajan Viswanathan, Prentice Hall of India Pvt. Ltd, 2007.