BACHELOR OF ENGINEERING IN ELECTRONICS & TELECOMMUNICATION ENGINEERING EXAMINATION – 2017

(3rd Year 2nd Semester)

COMMUNICATION SWITCHING SYSTEMS

Full marks: 100 Time: Three Hours

The figures in the margin indicate full marks.

Answer any *five* questions taking at least *two* from each group.

GROUP – A

1. In a 3 stage matrix switching structure, 2048 input callers are to be connected to 2048 output terminals.
   (a) Calculate the input n and output k of a switching module of the first stage, to minimize the number of cross points. Determine the minimum number of cross-points required for non-blocking condition. 6
   (b) How much will be the reduction factor in the middle stage blocks if each user generates 10 percent traffic on an average and the switching system has to maintain Grade of Service within 0.002. 6
   (c) Deduce the formulae you use. 8

2. (a) In a PAM-TDM switching system, there are 48 subscriber lines which are capable of connection with a different set of 24 subscribers. Draw a block diagram and justify your answers to the following
   i. How many simultaneous calls can occur in this case?
   ii. What is the duration τ that each connection can persist?
   iii. What is the capacity of Read/Write memory?
   iv. What is the clock rate? 10
   (b) If Time switch has T=128 inputs, Space switch has N=16 inputs, and the number of input subscribers is only 0.1 NT, what is the probability of blocking. Assume that all input connections are made at the same time. 10

3. (a) A PABX has to support 200 extensions. Each extension generates 3 external calls per 8 hour working day. Average call duration is 2 minutes. If lost call returned model is used ($\lambda' = \lambda/(1 - GOS)$), how many external servers will be needed to maintain GOS below 0.005? No internal calls are allowed. Justify your answer. 10
   (b) What is a B-D process? Derive an expression for service time distribution in a pure death process from the steady state equation of a B-D process. 10

4. An exchange uses 8 small call processors, each capable of serving requests that arrive at the rate of 16 requests per second. All processors are to be replaced by a single higher capacity processor.
   i. Characterize with derivation, the arrival process of the new system 10
   ii. Characterize with derivation, the delay performance of the new system when compared to the old one 10

GROUP - B

5. (a) 8192 bit message is to be transmitted over a 10 link path to its destination. Packet switching is to be used and overhead/packet is 256 bits. Neglect the processing time and propagation time. If the bit rate is 1Mbps,
   i. Find the number of packets that the message should be divided into if the time from transmission to reception has to be minimized.
   ii. Determine the minimum time from transmission to reception.
   iii. Compare it to the result obtained for message switching.
   iv. Which move more quickly and why? 10

   (b) A group of terminals are to be connected to a central site using Slotted ALOHA scheme over a 9600 bps channel. Frame length is 200 bits. Terminals generate on an average one frame every two minutes. For maximum throughput condition, estimate the number of terminals that can be supported. Deduce the formula you use. 10

6. (a) An Ethernet LAN has a cable distance of 4 km between extreme nodes. If the data rate is 100 Mbps what is the lower bound of the frame size. What is the channel utilization of this frame size if there is no collision? Deduce the formulae you use. 10

   (b) i) What are the types of fundamental channels in ISDN?
   ii) What is the mechanism of rate adaptation and where is it applied?
   iii) What schemes of multiplexing are done in ISDN? How does it differ from rate adaptation? 10

7. (a) What do you mean by common channel signaling? What are the advantages of it? Describe the SS-7 architecture. 10

   (b) Describe with a frame format User level signaling of ISDN 10

8. Write short notes on *any two* of the following
   i) M/M/R queue system
   ii) Time Slot Interchange technique in switching.
   iii) P-persistent CSMA-CD
   iv)In-channelsignaling 2x10