DiplETE – ET (NEW SCHEME) – Code: DE62

Subject: TELECOMMUNICATION SWITCHING SYSTEMS

Time: 3 Hours

DECEMBER 2010

Max. Marks: 100

NOTE: There are 9 Questions in all.
- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after half an hour of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1 **Choose the correct or the best alternative in the following:** (2×10)

a. In a busy hour 300 calls arrive and the message duration of a call is 3 minutes, then the offered traffic in Erlangs is _____

(A) 90   (B) 15
(C) 9   (D) 3

b. The ideal Grade of Service (GOS) in telephone system is _____

(A) 0   (B) 0.5
(C) 1   (D) 100

c. SDL Stands for _____

(A) Sequential Digital Logic
(B) Specification and Description language
(C) State Detection Level
(D) Sound Description Language

d. Availability of the equipment is _____

(A) $\text{Availability} = \dfrac{\text{MTTF}}{\text{MTTF} + \text{MTTR}}$

(B) $\text{Availability} = \dfrac{\text{MTTR}}{\text{MTTF} + \text{MTTR}}$

(C) $\text{Availability} = \dfrac{\text{MTTF} + \text{MTTR}}{\text{MTTF}}$

(D) $\text{Availability} = \dfrac{\text{MTTF} + \text{MTTR}}{\text{MTTR}}$

e. If two lines are to be connected in tandem, and the probability of one being busy is 'a' and of other being busy is 'b', then the probability of the path being blocked is _____

(A) $(1-a)(1-b)$ **(B)** ab

(C) $1-(1-a)(1-b)$ **(D)** a/b

f. The number of trunks that can be supported on a time multiplexed space switch is _____. If 32 channels are multiplexed in each space and the total switching time is 200 ns.

(A) 20   **(B)** 10

(C) 30   **(D)** 90

g. If a high speed data link is employed between the processors, it can provide a channel for all signals between two exchanges and this is known as _____

(A) Common-channel Signaling   **(B)** Overlap Signaling

(C) Time by time Signaling   **(D)** Center register Signaling

h. IBCN Stands for _____

(A) Integrated Broadband Communication Network
(B) International Broadband Communications Network
(C) International Business Communication Network
(D) Integrated Business Communication Network

i. Basic Rate Access type of ISDN require a bit rate of _____

(A) 64 Kbits/sec   **(B)** 144 Kbits/sec

(C) 1.5 Mbits/sec   **(D)** 2 Mbits/sec

j. Cost Capacity Index (CCI), one of the design parameters of switching system is the ratio of _____.

(A) Maximum load to switching capacity
(B) Switching capacity to theoretical maximum load
(C) Cost to switching capacity
(D) Switching capacity to cost per subscriber line

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. Describe with neat diagrams, the Strowger Switching Components **(8)**

b. Explain various design parameters of a switching system **(8)**

Q.3 a. Derive an expression for the probability of Queuing System. **(8)**

b. A PBX has three operators on duty and receives 400 calls during the busy hour. Incoming calls enter a queue and are dealt with in order of arrival. The average time taken by an operator to handle a call is 18 seconds. Call arrivals are poissonian and operator service times have a negative exponential distribution.

   (i) What percentage of calls have to wait for an operator to answer them?
   (ii) What is the average delay, for all calls and for those which encounter delay?
   (iii) What percentage of calls are delayed for more than 30 seconds?

(8)

Q.4 a. Design a two stage switching network for connecting 200 incoming trunks to 200 outgoing trunks. **(8)**

b. Explain the principle involved in gradings and mention the applications of gradings. **(8)**

Q.5 a. Explain with diagram, Time Multiplexed Time Switching system. **(10)**

b. Calculate the maximum access time that can be permitted for the data and control memories in a TSI switch with a single input and single output trunk multiplexing 2500 channels. Also, estimate the cost of the switch and compare it with that of a single stage Space Division Switch. **(6)**

Q.6 a. Explain call processing functions. **(9)**

b. Explain the terms (i) Reliability (ii) Availability and (iii) Security of Switching Systems. **(7)**

Q.7 a. What is Common Channel Signalling and what are its advantages. **(7)**

b. Explain CCITT signalling system no.6 with a neat block diagram. **(9)**

Q.8 a. Compare Datagram service and Virtual Circuit service offered by Packet networks. **(5)**

b. Explain Asynchronous Transfer Mode (ATM) Switches with suitable diagrams. **(6)**

c. An ATM network uses transmission links that operate at 150 Mbits/s and have a propagation delay of 5 μs per km. It uses cells of length 53 octets, consisting of a 5-octet header and a 48-bit information field. The maximum delay introduced by a switching centre is 300 cells. Find the maximum delay encountered by a telephone cell over a connection of length 500 km that passes through six switching centres. **(5)**

Q.9 Explain the following:-

   (i) Intelligent Networks. (ii) Analog Networks **(2×8)**