AMIETE – ET (NEW SCHEME) – Code: AE6

Subject: TELECOMMUNICATION SWITCHING SYSTEMS

Time: 3 Hours   Max. Marks: 100

DECEMBER 2010

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. Crossbar switching system employs a _____system.

    (A) Direct control   **(B)** Indirect control
    (C) No control   **(D)** Both **(A)** & **(B)**

b. In a folder network with N-subscribers, there can be a maximum of _____ simultaneous calls or information interchanges.

    (A) N   **(B)** N/2
    (C) N^2 **(D)** 2N

c. In a 10,000 line strowger exchange, number of group selector stages required is _____

    (A) 1   **(B)** 2
    (C) 3   **(D)** 4

d. In a lost call system, the traffic actually carried is _____ the traffic offered to the system.

    (A) more than   **(B)** less than
    (C) equal to   **(D)** two times

e. If sequential selection is used for the group of trunks, the traffic carried by the first choice trunk is _____.

    (A) A Erlangs   **(B)** $\dfrac{1}{1+A}$ Erlangs

    (C) $\dfrac{A}{1+A}$ Erlangs   **(D)** $\dfrac{A^2}{1+A}$ Erlangs

f. The total number of crosspoints C_3 employed in the fully connected three network which uses N incoming trunks and N outgoing trunks is given by _____

(A) $2\sqrt{2}\,N^{3/2}$ (B) $\sqrt{2}\,N^{3/2}$

(C) $2\,N^{3/2}$ (D) $2\sqrt{2}\,N^{1/2}$

g. In time division switching, the number of switching elements used to transmit speech samples from N number of inlets to the corresponding N number of outlets is _____

(A) 1   (B) N
(C) N/2   (D) 2N

h. In the telephony system, status or call progress signal is a _____

(A) Forward signal   (B) backward signal
(C) Voltage signal   (D) Current signal

i. In a PCM signalling system, 2 M bits/sec has _____ eight bits time slot.

(A) 8   (B) 16
(C) 32   (D) 64

j. In CCITT signalling system no: 7, the level 1 is _____ layer.

(A) physical level   (B) Data link level
(C) signalling-network level   (D) user part

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

Q.2 a. Explain how selection hunter and Line finder can be used as line equipment in step by step switching system. **(8)**

b. Explain the evolution of digital switching systems. **(8)**

Q.3 a. Derive an expression for second erlang distribution and probability of delay for queuing systems. Also list the assumptions made in obtaining this expression. **(11)**

b. Four junctions are arranged in a full availability group. If the traffic offered to the group in the busy hour is 0.8E. Find

(i) Grade of service
(ii) Probability that only one trunk is busy. **(5)**

Q4 a. Design a progressive grading system for connecting 20 trunks to switches having ten outlets. Also draw the best grading diagram from the possible gradings obtained. **(6)**

    b. Derive an expression for the minimum number of cross points for a three stage network with M-incoming and N-outgoing trunks. **(6)**

    c. Briefly explain how graph theory is used in the link systems. **(4)**

Q.5 a. With the help of diagram, explain the working of time multiplexed space switch. **(10)**

    b. A T-S-T network has 10 incoming and 10 outgoing PCM highways, each conveying 30 channels. The required grade of service is 0.01. Find the traffic capacity of the network if:
    (i) Connection is required to a particular free channel on a selected outgoing highway (mode 1)
    (ii) Connection is required to a particular outgoing highway, but any free channel on it may be used (mode 2) **(6)**

Q.6 a. Explain the sequence of operations for a simple telephone call between customers whose lines terminate on the same exchange. **(7)**

    b. Explain the three levels of processing employed in distributed SPC system. **(9)**

Q.7 a. With sketches explain inband and outband signalling. **(8)**

    b. Explain the following signal units in CCITT no: 7 with their formats.
    (i) MSU (ii) LSSU (iii) FISO **(8)**

Q.8 a. Explain the Bus and Ring Topology used in LAN and WAN. **(10)**

    b. Explain the standards used in large scale networks. **(6)**

Q.9 a. Explain the principle of cellular radio networks. **(8)**

    b. Explain the features of integrated digital networks. **(8)**