

Code: AE64/AE115

Subject: TELECOMMUNICATION SWITCHING SYSTEMS

AMIETE – ET (Current & New Scheme)

Time: 3 Hours

JUNE 2017

Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

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 45 minutes 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. If number of outgoing trunk (n) = 10, the number of columns of singles (s) = 4 and the number of commons is (c) = 2, then switches having availability $k = ?$
- (A) 16 (B) 6
(C) 80 (D) 20
- b. Members of staff of an organization can work at home and communicate with colleagues as if they were using the same PBX in the same building. They can exchange documents as faxes and have full access to their company's databases and computing facilities, by help of_____.
- (A) DMSU (B) VF
(C) VPN (D) SDL
- c. In the case of long-distance direct-current (LDDC) signaling systems, symmetrical wave forms is obtained using _____.
- (A) Guard circuit (B) General circuit
(C) Double-current working (D) None of these
- d. The general expression for the blocking probability of a TST switch is given by,
- (A) $P_B = (1 - (1 + \frac{c}{L})^2)^{M_1}$ (B) $P_B = (1 + (1 - \frac{c}{L})^2)^{M_1}$
(C) $P_B = (1 + (1 + \frac{c}{L})^2)^{M_1}$ (D) $P_B = (1 - (1 - \frac{c}{L})^2)^{M_1}$
- e. Estimation of traffic from the observations (11, 10, 8, 8, 7, 5, 11, 10, 8, 9, 7, 5) were made of busy lines in a group of junctions at intervals of 5 minutes during the busy hour. The results obtained should be:
- (A) 8E (B) 5E
(C) 96E (D) 11E
- f. An important property of the network which is displayed by the channel graph is its connectivity. This may be defined as
- (A) The maximum number of disjoint paths joining the non-adjacent vertices.
(B) The maximum number of disjoint paths joining the adjacent vertices.
(C) The minimum number of disjoint paths joining the adjacent vertices.
(D) The minimum number of disjoint paths joining the non-adjacent vertices.

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- g. In a functional sense, a TST switch is identical to a _____ network.
 (A) Two-stage space division (B) Two-stage time division
 (C) Three-stage space division (D) Three-stage time division
- h. For the larger value of switching network connectivity, the probability of blocking is _____.
 (A) Remain unchanged (B) Increase
 (C) Decrease (D) May be increase or decrease
- i. The first generation of CCS systems (CCITT no.6) used modems to transmit at _____ over analog telephone channels.
 (A) 1.4 kbit/s or 2.8 kbit/s (B) 2.4 kbit/s or 4.8 kbit/s
 (C) 3.4 kbit/s or 6.8 kbit/s (D) All the these
- j. Error control, link initialization, error-rate monitoring, flow control and delineation of messages is perform in _____.
 (A) Level 1: The physical level (B) Level 2: The data-link level
 (C) Level 3: The signaling (D) Level 4: The user part.

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

- Q.2** a. (i) What are the advantages of digital switches over electromechanical switches? (4)
 (ii) Give a brief overview of contact and contactless switching system. (4)
- b. Explain the operation principle of reed-electronic systems. How this can be used as an alternative design of cross point? (5+3)
- Q.3** a. Define Erlang (E)? What are the different reasons of switching network traffic measurement? (3+5)
- b. Assume that the traffic carried by the last trunk is 0.01982E and the grade of service given by a group of 20 trunks carrying 10.07E is 0.002, for 500 calls calculate (2)
 (i) the traffic offered, (3)
 (ii) the total traffic carried when the group is reduced to 19 trunks, (3)
 (iii) Grade of service of the new system.
- Q.4** a. (i) Explain grading and graded groups. (2+2)
 (ii) How the numbers of graded groups are decided? (4)
- b. How graph theory is applied to represent link systems? Explain using suitable diagram. (8)

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- Q.5** a. What is time multiplexed space switching? With the help of neat diagram explain its operation. (2+6)
- 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. (4+4)
- Q.6** a. With help of a diagram discuss briefly interrupt processing techniques in a centralized SPC. (8)
- b. With help of a diagram discuss briefly CCITT State transition diagrams. (8)
- Q.7** a. Draw a state transition diagram using SDL symbols for a local telephone call. (8)
- b. With the help of neat sketch explain Inband (VF) signaling. (8)
- Q.8** a. What is the major drawback of ring network? Explain briefly with the help of suitable diagram of self-healing techniques to overcome this drawback. (2+6)
- b. An ATM network uses transmission links that operate at 50 Mbit/s and have a propagation delay of $5\mu\text{s}$ 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 400 cells. The speech encoder produces a PCM signal at 64kbit/s. Find the maximum delay encountered by a telephone call over a connection of length 500 km that passes through six switching centers. Is this network satisfactorily operated? (8)
- Q.9** a. Explain briefly private networks and virtual private network. (4+4)
- b. A small exchange A has a direct route to exchange B and a final route to exchange C, which carries traffic to all other destinations. The total traffic from A is 5 E, of which 1E is to exchange B. The grade of service is required to be not worse than 0.01. (8)

Given : Trunk Vs Traffic handling capability at 0.01 grade of service for full availability group

No of Trunk	1	2	3	4	5	6	7	8	9	10	11	12
Traffic (E)	0.010	0.15	0.45	0.9	1.4	1.9	2.5	3.2	3.8	4.5	5.2	5.9

Find the total number of outgoing trunks from A that is required if:

- (i). All traffic from A to B is carried on the direct route.
- (ii). There are two trunks on the direct route and traffic overflows from these to the final route.