

**DiplETE – ET**

Time: 3 Hours

**JUNE 2014**

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. In a single stage network having N inlets and N outlets consisting of matrix of cross points, the number of cross points is
- (A) N (B) N/2  
(C) N<sup>2</sup> (D) 2N
- b. In a message-switched system, calls that arrive during congestion wait in a queue until an outgoing trunk becomes free. Such systems are called
- (A) Delayed Systems (B) Congested Systems  
(C) Wait-call Systems (D) Lost-call Systems
- c. Status signal used to send back to inform the caller of the progress of the call is
- (A) Radio frequency signal (B) IF signal  
(C) Clear signal (D) Audio frequency tone
- d. The number of trunks required (N) to carry A erlangs with a Grade of Service (GOS) of B and availability of k is given by
- (A)  $N = (AB)^k$  (B)  $N = AB \frac{1}{k}$   
(C)  $N = AB^k$  (D)  $N = A^k B$
- e. In FDM systems, the carriers are spaced at intervals of
- (A) 4 KHz (B) 8 KHz  
(C) 6 KHz (D) 2 KHz
- f. If two networks use the same protocols, they may be linked by an apparatus called
- (A) Gateway (B) Header  
(C) Bridge (D) Packet

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- g. Which of the following recommendations define how connections should be made to an ISDN?
- (A) X.21 (B) X.25  
(C) X.28 (D) X.31
- h. Basic Rate Access requires a total bit rate of (including 'overheads')
- (A) 160 K bits/s (B) 384 K bits/s  
(C) 1536 K bits/s (D) 1920 K bits/s
- i. In a sample PAM time division switching, the switching capacity (SC) which can be supported is ( $t_s$  is the time in microseconds to set up a connection and transfer the sample value)
- (A)  $SC = \frac{125}{2t_s}$  (B)  $SC = \frac{125}{3t_s}$   
(C)  $SC = \frac{125}{t_s}$  (D)  $SC = \frac{125}{4t_s}$
- j. Routing of traffic over the PSTN instead of using a private network is known as
- (A) Public Telecommunication Operator (PTO)  
(B) Private Branch Exchange (PBX)  
(C) Subscriber Trunk Dialling (STD)  
(D) Virtual Private Network (VPN)

**Answer any FIVE Questions out of EIGHT Questions.**

**Each question carries 16 marks.**

- Q.2** a. Explain the classification of switching systems. (8)
- b. Draw a general trunking diagram for a switching system and explain. (8)
- Q.3** a. Explain a mathematical model of the traffic offered to telecommunication systems. (8)
- b. On average one call arrives every 5 seconds. During a period of 10 seconds, what is the probability that
- (i) No call arrives?  
(ii) One call arrives?  
(iii) Two calls arrive?  
(iv) More than two calls arrive? (8)
- Q.4** a. Explain a fully connected 3-stage switching network with a neat diagram, hence obtain the expression of minimum number of cross points required. (10)
- b. Design a 3-stage network for connecting 100 incoming trunks to 400 outgoing trunks. (6)
- Q.5** a. Explain a simple N x N Time Division Space Switching with a neat diagram. (10)

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- 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. (6)
- Q.6** a. Explain the signal exchange diagram for a local call. (8)
- b. Explain the process architecture in a Stored Program Control (SPC). (8)
- Q.7** a. Explain the Pulse Code Modulation (PCM) signalling. (9)
- b. What are the advantages of Common Channel Signalling (CCS)? (7)
- Q.8** a. Explain the working of Ring networks with a neat diagram. (8)
- b. A token ring operates at 10 M bit/s. It is 1 Km in length and the propagation velocity is  $2 \times 10^8$  m/s. 50 terminals are spaced around the ring and the node latency is one bit. Packets are 512 bits long including 64 overhead bits. The token consists of 8 bits. Calculate the effective data rate when the ring is fully loaded. (8)
- Q.9** a. Explain the Integrated Services Digital network (ISDN). (8)
- b. Explain Cellular Radio Networks. (8)