ROLL NO. _____

Code: AE64/AE115 Subject: TELECOMMUNICATION SWITCHING SYSTEMS

AMIETE – ET (Current & New Scheme)

Time: 3 Hours **DECEMBER 2018** **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. The probability of a call arrival in a very short period of time δt is given by $P(a) = A\,\delta t/h$, where h is the
(A) Maximum service time **(B)** Minimum service time
(C) Mean service time **(D)** Total service time

b. In queuing systems, the trunks are often called as
(A) Congestion **(B)** Server
(C) Traffic **(D)** Trunk calls

c. If a four stage network with N incoming and N outgoing trunks is constructed with switch of size n x n, then $N = n^3$ and the total number of switch is $4n^2$ the number of cross points per incoming trunks are
(A) $N^{\frac{1}{3}}$ **(B)** $4\,N^{\frac{1}{3}}$
(C) $N^{\frac{4}{3}}$ **(D)** $4\,N^{\frac{4}{3}}$

d. In basic time division space switching system digital bus is employed in
(A) Pulse Position Modulation (PPM)
(B) Pulse Amplitude Modulation (PAM)
(C) Pulse Code Modulation (PCM)
(D) Pulse Width Modulation (PWM)

e. When each customer replaces the handset, line current ceases and provides a signal to the exchange, which is known as
(A) Blocking Signal **(B)** Clear Signal
(C) Message Signal **(D)** Request Signal

f. A common control performs a specific call processing function. It serves different calls on a time division basis. Since a number of trunks may request the use of common control at the same time, contention can arise. A circuit in a common control used to resolve this contention is called
(A) One-only selector **(B)** Allotter
(C) Arbiter **(D)** All of these

g. Systems that transmit signals within the baseband of FDM systems are known as
(A) Inband signaling systems
(B) Outband signaling systems
(C) Inband-outband signaling systems
(D) Base band signaling systems

h. In the asynchronous transfer mode, fixed length packets are known as
(A) Coder **(B)** Cell
(C) Allotter **(D)** All of these

i. A telecommunication operator can lease a private data circuit to a customer by setting up a
(A) Permanent virtual call (PVC)
(B) Packet-switched Service (PSS)
(C) Packet switched public data network
(D) All of these

j. In ISDN, at any local exchange, the access networks are connected to the core network via .
(A) Line termination (LT) **(B)** Exchange Termination (ET)
(C) Network termination **(D)** All of these

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

Q.2 a. With help of a diagram explain working principle of nonfolded switching network and folded switching network. **(5+5)**

b. With help of a simple sketch explain working principle of diode crosspoint in the speech path. **(6)**

Q.3 a. Why traffic measurements are essentially required for any operating company and how it is measured? **(5)**

b. During the busy hour, on an average, a customer with a single telephone line makes three calls and receives three calls. The average call duration is 2 minutes. What is the probability that a caller will find the line engaged? **(3)**

c. A group of five trunk offered 2E traffic. If sequential selection is used for the group of trunks, how much traffic carried by (i) the first-choice trunk and (ii) the last choice trunk? **(3+5)**

Q.4 a. (i) What are three basic control methodology for a time division time switch?
(ii) List the key advantages and disadvantages of circuit switching technique. **(3+5)**

b. Design a three stage network for connecting 100 incoming trunks to 100 outgoing trunks using primary switches with 5 inlets and tertiary switches with 5 outlets. Also calculate the Grade of Service (GoS) that operates in mode 1 and is offered 30E of traffic. **(4+4)**

Q.5 a. (i) Explain the triangular crosspoint matrix for connecting both-way trunks.
(ii) How many triangular crosspoints are required for 5 number similar circuits? **(5+3)**

b. Calculate the number of trunks that can be supported on a time multiplexed space switch, given that, 32 channels are multiplexed in each stream, Control memory access time is 100 ns and Bus switching & transfer time is 100 ns per transfer. If Control memory access time and bus switching & transfer time is reduced 50%, calculate the number of trunks that can be supported by the same network. **(4+4)**

Q.6 a. What are the major functions of the Control field of high level data link control protocol (HDLC)? Explain field formats used for it. **(2+6)**

b. In any telephone exchange during the busy hour, the total traffic offered to the exchange is 1000 E and the average holding time of calls is 3 minutes. The processing times for calls can be assumed to have an exponential distribution, with a mean time of 162 ms.
(i) Find the percentage of tasks which must queue for processing during the busy hour when both processors are operating.
(ii) Find the percentage of tasks which must queue for processing during the busy hour when one processor is out of service.
(iii) What will happen if the number of calls offered to the exchange during the busy hour increases by 25% when one processor is out of service? **(4+2+2)**

Q.7 a. What are the possible ways of controlling release of any telephone switching connection? Explain the four major operations of the common control arbiter. **(4+4)**

b. Based on high–level data-linked protocol, briefly describe, (i) different types of signal units, (ii) stuffing and unstuffing and (iii) error check field. **(3+3+2)**

Q.8 a. What are the components used to form cellular radio network? Explain briefly handoff process. **(8)**

b. A pure ALOHA system uses a 56 kbits/s channel. On an average each terminal originates a 512-bit packet every 10 seconds. How many terminals can the system accommodate? **(8)**

Q.9 a. Compare roll call polling and hub polling (or token passing) in bus network. Write a short note on Frame relay. **(4+4)**

b. Briefly describe different level of service switching point(SPC) software organization. **(4)**

c. What are the basic criteria to be satisfied for long-distance call charging plan? **(4)**