Code: AE17 / AT17 **Subject: TELECOMMUNICATION SYS**
Time: 3 Hours **Max. Marks:**

JUNE 2011

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. Telephone systems may be classified as:

(A) Simplex and symmetrical **(B)** Duplex and asymmetrical.
(C) Simplex and asymmetrical **(D)** Duplex and symmetrical

b. The optical fiber trans-Atlantic cable TAT-14 includes a section from Bude, Cornwall to Tuckerton, New Jersey. Determine the propagation delay if the route length is 6,254 km.

(A) 312.7 ms **(B)** 31.27 ms
(C) 3.198 ms **(D)** 31.98 ms

c. A file is downloaded to a home computer using a 56 kbps modem connected to an Internet Service Provider. If the download completes in 2 minutes, estimate the maximum size of data downloaded.

(A) 6.72 Mbit **(B)** 336 Kbit
(C) 26.88 Mbit **(D)** 13.44 Mbit

d. Baseband transmission may be defined as the transmission of a signal over a link

(A) By means of wires
(B) Without any change in frequency
(C) At a different band of frequencies
(D) Which is relatively short

e. The primary purpose of a Remote Concentrator Unit (RCU) is:

(A) To aggregate small loads of traffic per line into a smaller number of correspondingly heavier loaded lines.
(B) To connect subscribers that is beyond the maximum allowable distance from the LE/CO
(C) To reduce the number of subscriber cable pairs at a LE/CO.
(D) To provide economy through pair gain

f. A telephone customarily includes a 4-wire to 2-wire hybrid. The purpose hybrid is

(A) To combine the signals associated with the microphone and speaker
(B) To interconnect the 4 wires of a telephone to a line.
(C) To merge/separate signals associated with the microphone and speaker
(D) None of them

g. ADSL stands for

(A) Advanced Digital Subscriber Loop
(B) Asymmetrical Digital Subscriber Loop.
(C) Advanced Digital Session Layer
(D) Asynchronous Digital Subscriber Loop.

h. TASI stands for

(A) Transmission And System Interface
(B) Terminal Aided System Interaction
(C) Transmission And System Interference
(D) Time Assignment Speech Interpolation

i. PSTN stands for

(A) Public Switched Telephone Network
(B) Private System Transmission Network
(C) Private Subscriber Telephone Network
(D) Public Switched Transmission Network

j. Ideal value of Grade of service is

(A) Zero **(B)** Unity
(C) infinite. **(D)** ten.

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

Q.2 a. How do you define a SPC system? What is the usual sampling time and frame time for a speech carrying system of this type using time division switching? How do you calculate each slot time? **(8)**

b. Calculate the number of trunks that can be supported on a time multiplexed space switch, having an 8 kHz sampling rate, given that:
(i) 40 channels are multiplexed in each stream.
(ii) Control memory access time is 100 ns.
(iii) Bus switching and transfer time is 100 ns per transfer. **(8)**

Q.3 a. Distinguish between 'Grade and Service' and 'Blocking Probability' in loss systems. Over a 30 minute observation interval, 90 subscribers initiate calls. Total duration of the calls is 5400 seconds. Calculate the load offered to the network by the subscribers and the average subscriber traffic. **(8)**

b. 10,000 subscribers are connected to an exchange. If the exchange is designed to achieve a CCR of 0.8 when the busy hour calling rate is 4.8, calculate BHCA of the exchange. What should be the call processing time for the exchange? **(8)**

Q.4 a. Write down the differences between in channel and common channel signalling. **(8)**

b. A circuit switched connection involves 5 switching nodes. Each node takes 2 sec & 0.2 sec for establishing and releasing connections respectively. If the data transfer rate is 2400 bps. Compute the data transfer time for a message that is 300 bytes long. **(8)**

Q.5 a. What is subscriber loop? Describe subscriber loop with proper diagram and explain BORSCHT. **(8)**

b. Write down the main advantages of ISDN. Give a brief description of ISDN protocol architecture. **(8)**

Q.6 a. What is ATM? How ISDN data is transmitted through ATM network? **(8)**

b. Explain Echo Supressor and Echo Canceller in voice circuits. **(8)**

Q.7 a. In a crossbar exchange, if the number of subscribers is 64, then find the no. of switching elements and the switching capacity. **(8)**

b. List the popular topologies if SONET and compare them with neat diagram. **(8)**

Q.8 a. With neat diagram, explain the concept of DWDM. What are the limitations and its remedial of DWDM system. **(8)**

b. Tabulate the PSTN numbering format followed in India. **(8)**

Q.9 a. We consider a cellular system in which total available voice channels to handle the traffic are 960. The area of each cell is 6 km^2 and the total coverage area of the system is 2000 km^2. Calculate
(i) the system capacity if the cluster size, N (reuse factor), is 4 and
(ii) the system capacity if the cluster size is 7.
How many times would a cluster of size 4 have to be replicated to cover the entire cellular area? Does decreasing the reuse factor N increase the system capacity? Explain. **(8)**

b. Compare TDMA and CDMA schemes, identifying the advantages of each scheme over the other. **(8)**