Code: AE-17 / AT-17 **Subject: TELECOMMUNICATION SYSTEMS**

JUNE 2007

Time: 3 Hours **Max. Marks: 100**

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.**
- **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 best alternative in the following: (2x10)

a. The number of links required for a fully connected network servicing n subscribers is

(A) n^2 **(B)** $n^2 - 1$
(C) $n(n-1)/2$ **(D)** $n^2/2$

b. The number of switching elements required for a three stage N×N non blocking configuration is

(A) 2N $\sqrt{2N}$ **(B)** 2N
(C) 3N **(D)** $4N\sqrt{2N}$

c. The effect of impedance mismatch in hybrid will give rise to

(A) interruption **(B)** echo
(C) noise **(D)** distortion

d. The most common form of modulation used in analog cellular communication is

(A) AM **(B)** FM
(C) FSK **(D)** Narrow band FM

e. The bandwidth of RF channels in GSM is

(A) 25 kHz **(B)** 30 kHz
(C) 200 kHz **(D)** 25 MHz

f. CDMA uses

(A) time division multiplexing **(B)** spread spectrum technique
(C) frequency division multiplexing **(D)** quadrature multiplexing

g. A basic rate ISDN digital subscriber loop provides bidirectional data rate of

(A) 64 kbps **(B)** 144 kbps
(C) 200 kbps **(D)** 256 kbps

h. A 3 kHz telephone channel can support 60 kbps data rate when S/N ratio is above

(A) 0 dB **(B)** 10 dB
(C) 20 dB **(D)** 30 dB

i. The size of an ATM transmission cell is

(A) 48 bytes **(B)** 53 bytes
(C) 64 bytes **(D)** 128 bytes

j. The switching capacity of a non-blocking $N \times N$ two stage switching network is

(A) $\sqrt{N}$ **(B)** $\sqrt{2N}$
(C) N **(D)** 2 N

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

Q.2 a. Compare single stage and multi stage switching networks. Draw the block diagram of a two stage network and work out the number of switches required for a non-blocking $N \times N$ two stage network. **(8)**

b. Write a note on pair-gain systems. **(8)**

Q.3 a. What is two dimensional switching? Describe STS switching. **(8)**

b. Explain the time multiplexed space switching with a block diagram. **(8)**

Q.4 Write short notes on :

(i) two wire to four wire conversion **(6)**
(ii) transmission impairments **(5)**
(iii) BORSCHT **(5)**

Q.5 a. Determine the switch advantage ratio of a three-stage network with N inlets and N outlets for the cases when
(i) N = 128 (ii) N = 32,768 **(8)**

b. Discuss CDMA cellular system and enumerate the advantages of CDMA over GSM

system. **(8)**

Q.6 a. Explain the terms
(i) Grade of service (ii) blocking probability
(iii) Delay probability (iv) Quality of service
How these terms are used to qualify a network? **(8)**

b. Write a note on delay systems. **(8)**

Q.7 a. Describe the various line codes used in fibre optic transmission. **(8)**

b. Describe SONET system. **(8)**

Q.8 a. What are the different services supported by ATM networks? Write notes on ATM service categories. **(8)**

b. Discuss the ISO-OSI model for data networks. **(8)**

Q.9 Explain segregated and integrated architectures for ISDN networks. Modelling these as M/M/c and M/M/1 queueing systems, analyse their performance and draw a comparison. **(16)**