DECEMBER 2006

Code: A-17 / T-17 **Subject: TELECOMMUNICATION SYSTEMS**
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. Number of links required in a fully connected network of 10 subscribers is

(A) 45 **(B)** 50
(C) 90 **(D)** 100

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

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

c. BORSCHT is

(A) list of interface requirements **(B)** a protocol
(C) an interface circuit **(D)** a telephone company

d. Grade of Service (GoS) is defined as

(A) $\text{GoS} = \frac{\text{Carried traffic}}{\text{Offered traffic}}$

(B) $\text{GoS} = \frac{\text{Lost traffic}}{\text{Offered traffic}}$

(C) $\text{GoS} = \frac{\text{Offered traffic} + \text{Carried traffic}}{\text{Offered traffic}}$

(D) $\text{GoS} = \frac{\text{Offered traffic}}{\text{Offered traffic} + \text{Carried traffic}}$

e. Cellular communication service is expensive because of the complex design of

(A) mobile units **(B)** base station

(C) master station **(D)** all the three

f. CDMA channel bandwidth is

(A) 25 MHz **(B)** 25 kHz
(C) 1.25 MHz **(D)** 200 kHz

g. Bandwidth limits of fibre optic transmission systems are mostly determined by

(A) electro optic drivers **(B)** receivers
(C) interfaces **(D)** all the three

h. The number of overhead bytes in the ATM transmission format is

(A) 2 **(B)** 5
(C) 48 **(D)** 53

i. Potential bandwidths of fibre optic cables are in the order of

(A) 10^6 Hz **(B)** 10^8 Hz
(C) 10^{11} Hz **(D)** 10^{13} Hz

j. A multimode fibre system has attenuation of 3 dB / km. The acceptable loss on the total fibre is 45 dB. The loss limit for the system is about

(A) 11.25 km **(B)** 15 km
(C) 31.5 km **(D)** 135 km

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

Q.2 a. Explain the working of an $N \times N$ three stage switching network with the help of a neat diagram. **(8)**

b. Derive the expression for the minimum number of switching elements required for an $N \times N$ three stage non-blocking configuration. **(8)**

Q.3 a. Discuss the working of an input controlled time division space switch. **(8)**

b. Explain random input/ random output time division time switching. **(8)**

Q.4 a. What are the different methods of providing telephone services to rural subscribers? **(8)**

b. Discuss transmission impairments. **(8)**

Q.5 a. What are the advantages of cellular mobile systems over land line systems? What type of topology is required for cellular mobile systems? **(8)**

b. Explain GSM system. **(8)**

Q.6 a. Illustrate the wavelength division multiplexing (WDM) technique used in fibre optic cable systems. **(8)**

b. Write notes on SONET system. **(8)**

Q.7 a. Differentiate between circuit switching, message switching and packet switching. **(8)**

b. Describe how the store and forward network is configured using packet switching. **(8)**

Q.8 Write short notes on:

(i) Advantages of ISDN
(ii) Various services provided by ISDN.
(iii) ISDN architecture.
(iv) Layers of OSI. **(4x4)**

Q.9 a. Consider a fibre optic token ring with a physical length of 100 km, an operating speed of 100 Mbps, and having 100 stations, each introducing 1-bit delay. Compute the maximum ring utilisation if the free token were to be reintroduced after the first bit arrives at the source. Assume a frame length of 1000 bits and equal spacing of the stations. **(8)**

b. Write notes on combination switching. **(8)**