AMIETE – ET/IT (OLD SCHEME)

Code: AE17/AT17 **Subject: TELECOMMUNICATION SYSTEMS**
Time: 3 Hours **Max. Marks: 100**

JUNE 2010

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 the best alternative in the following: **(2×10)**

a. The number of links required in for fully interconnecting 50 subscribers are

(A) 50 **(B)** <50
(C) 1225 **(D)** 2250

b. A two stage non-blocking network requires number of switching elements as single stage non-blocking network

(A) Same **(B)** Halves
(C) Twice **(D)** Square root

c. The value of GOS for a good network service must be

(A) As large as possible. **(B)** As small as possible.
(C) Medium value. **(D)** Any value.

d. ATM can use _____as a transmission medium.

(A) twisted pair cable **(B)** co-axial cable
(C) fibre optic cable **(D)** All of above

e. SONET is standard for _____networks.

(A) twisted pair cable **(B)** co-axial cable
(C) ethernet **(D)** fibre optic cable

f. PSTN is an example of a _____network.

(A) packet-switched **(B)** circuit switched
(C) message switched **(D)** hand switched

g. SONET is acronym for_____ network.

(A) standard optical **(B)** synchronous optical
(C) standard open **(D)** symmetrical open

h. In ISDN, _____ channel has lowest data rate.

(A) B **(B)** C
(C) D **(D)** H

i. The links that run between switching systems are called.

(A) subscriber lines. **(B)** trunks.
(C) channels. **(D)** transmission lines.

j. Which of the following is in a Time division switch?

(A) TSI **(B)** TDM bus
(C) Cross point **(D)** Both (A) and (B)

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

Q.2 a. Draw a N × N three stage switching network and show that the medium number of switching element is $2N\sqrt{2N}$. **(8)**

b. Calculate the number of trunks that can be supported on a time multiplexed space switch, given that
(i) 32 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. Explain how Time multiplexed time switches permits TSI of sample values. **(8)**

b. Write short notes on the following:
(i) Hybrid (ii) BORSCHT
(iii) Gross-Talk distortion (iv) Subscriber loop system **(2×4)**

Q.4 a. Explain Erlang, grade of service and delay probability. A subscriber makes three phone calls of three minutes, four minutes and two minutes duration respectively in one-hour period. Calculate subscriber Traffic in erlangs, CCS and CM. **(8)**

b. Compare the LCC, LCR and LCH model of loss system. **(8)**

Q.5 a. Explain the GSM architecture in brief and explain the steps involved in call establishment. **(6)**

b. Explain the term frequency reuse. Compute the number of channels available per cell if a system uses four cells reuse. Assume that a total of 50 MHz bandwidth is allotted to a particular FDD system cellular telephone system using two 25 MHz simplex channels to provide full influx control of one channel. Also calculate the equitable distribution of control and voice channel in each cell if 1 MHz of allocated spectrum is dedicated to control channel. **(10)**

Q.6 a. Explain the salient characteristics of line codes used in fibre optic communication. Draw the unipolar RZ, bi-polar NRZ and AMI line codes waveform for bit stream 100110101 . **(8)**

b. Explain the architecture of SDH. **(8)**

Q.7 a. What is ISDN? Discuss its basic rate access and primary rate access. Explain how it differs from BISDN. **(8)**

b. Explain the various types of loss occurring in optical fibre communication. **(8)**

Q.8 a. Compare WAN, MAN and LAN data networks. **(8)**

b. A circuit switched connection involves five switching modes. Each mode takes 2 sec and 0.2 sec for establishing and releasing connections respectively. If the data transfer is 2400 bps, compute the data transfer time for a message that is 300 bytes long. **(8)**

Q.9 a. Explain the ATM cell structure and their services in brief. **(6)**

b. During a busy hour, 30 traffic units were offered to a group of selectors, the call occurring in pure chance order. The total period, during which all selectors were simultaneously engaged, was 12 sec and 2 calls were lost. Calculate the number of calls carried by the group and their average duration. Show that average number of calls offered to the group during an interval to duration of call, would be 30. **(10)**