Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech(ECE)/SEM-5/EC-501/2009-10

2009

TELECOMMUNICATION SYSTEMS

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

   i) In modem uploading data rates always less than downloading data rates because
      a) SNR (20 dB) is very low in communication channel
      b) quantisation noise limits the channel data rates
      c) during uploading extra control bits are added with the data.
      d) none of these.

   ii) The voice signal BW is 4 kHz and the Nyquist sampling rate is 8 kHz and time multiplexed space switching 30 channel is to be multiplexed. The TS is
      a) 4·16 μs b) 8·33 μs
      c) 125 μs d) none of these.

   iii) MTTR means
      a) Mean Time To Repair
      b) Maximum Time To Repair
      c) Most Time To Reapir
      d) Mean Time To Represent.

iv) Blocking probability is
   a) call congestion b) time congestion
   c) both (a) and (b) d) none of these.

v) GOS in India is
   a) 0·002 b) 0·02
   c) 0·2 d) 2.

vi) ISDN B-channel carries data and services at
   a) 16 kbps b) 32 kbps
   c) 64 kbps d) 1·544 Mbps.

vii) Loudspeaker is an end instrument of
   a) transmitter side b) receiver side
   c) both (a) and (b) d) none of these.

viii) CHILL is a
   a) CCITT language b) IEEE language
   c) IEE language d) ANSI language.

ix) Attenuation can be reduced in subscriber loop by using
   a) higher diameter in copper wire
   b) series of inductance in line
   c) lower diameter in copper wire
   d) series of capacitance in line.

x) SDL stands for
   a) Software Description Language
   b) Specification Derived Language
   c) Specification Description Language
   d) Software Derived Language.

xi) A subscriber makes 3 phone calls of 3 minutes, 4 minutes and 2 minutes duration in one hour period. Calculate the subscriber traffic in Erlangs.
   a) 0·15 E b) 0·2 E
   c) 0·5 E d) 0·7 E.

xii) In a Strowger system the high value of CCI indicates
   a) good design b) poor design
   c) no impact on design d) none of these.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. a) What do you mean by point-to-point communication ?
   b) Explain the disadvantages of this scheme.
   c) If the number of nodes in point-to-point communication is 770, find out the total number of links required for total connectivity. $1\frac{1}{2} + 2 + 1\frac{1}{2}$
3. a) Show tha GOS = P_B , explaining the meaning of the symbol.
   b) Over a 20 minute observation interval, 40 subscribers initiate calls. Total duration of the calls is 4800 seconds. Calculate the load offered to the network by the subscribers and the average subscriber traffic. 3 + 2
4. What is call completion rate (CCR) ? 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. 2 + 3
5. What is BORSCHT function ? Why is this important in electronic exchanges ? 2 + 3
6. How many types of transmission media are used in telecommunication ? What are the advantages of twisted pair cable over parallel wire cable ? What is step index fiber and graded index fiber ? 2 + 1 + 2

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Assuming simultaneously forward and backward wave propagation in a transmission line. Derive the following general equation for the line,

$$V = V_1 \cos h\gamma d + I_1 Z_0 \sin h\gamma d$$

$$I = I_1 \cos h\gamma d + I_1 / Z_0 \sin h\gamma d$$

where V and I are the voltage and current respectively at a distance from a load end of the transmission line having characteristic independence Z_0 and propagation constant γ. The load end voltage and current V_1 and I_1 respectively.

b) A loseless line has a characteristics impedance of 75 ohm and is terminated in a load of 300 ohms. Find out the reflection coefficient and VSWR in the line.

c) Explain the principle of DTMF dialing. 7 + 4 + 4

8. a) What is ISDN ? Explain the transmission channels in ISDN ?

b) What are the drawbacks of ISDN ? How does B-ISDN overcome from this ?

c) Write functional grouping and reference point in ISDN. 5 + 5 + 5

9. a) Explain centralized SPC and the different modes of it.

b) Explain distributed SPC and explain the different types of level processing in it.

c) In the load sharing configuration of centralised SPC MTBF = 2000 hours and MTTR = 4 hours, calculate the unavailability for single and dual processor systems.

d) Explain time division space switching. 5 + 5 + 2 + 3

10. What is DTE and DCE ? Explain how data communication takes place between DTE and DCE using RS 232C serial interface. Why is conventional telephone modem down stream data rate 56 kbps ? A telephone line has a bandwidth of 3000 Hz and SNR is 34 dB calculate the data rate of this line. 2 + 7 + 2 + 4

11. Write short notes on any *three* of the following : 3 × 5

a) Packet switching

b) ISDN systems interface

c) Difference between circuit switch, packet switch and message switch

d) Modems and standards

e) Facsimile transmission.