

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 × 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 μ s
 - b) 8.33 μ s
 - c) 125 μ s
 - d) none of these.
- iii) MTTR means
 - a) Mean Time To Repair
 - b) Maximum Time To Repair
 - c) Most Time To Repair
 - 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. $3 \times 5 = 15$

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 that $GOS = P_B$, 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)

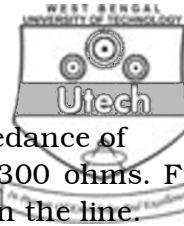
Answer any *three* of the following. $3 \times 15 = 45$

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

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

$$I = I_1 \cos \gamma d + V_1 / Z_0 \sin \gamma d$$

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



- b) A lossless line has a characteristic 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 centralized 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 downstream 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.