

**TELECOMMUNICATION SYSTEMS AND ENGINEERING
(ECEN 5231)**

Time Allotted : 2½ hrs

Full Marks : 60

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 4 (four) from Group B to E, taking one from each group.*

Candidates are required to give answer in their own words as far as practicable.

Group – A

1. Answer any twelve:

12 × 1 = 12

Choose the correct alternative for the following

- (i) The links that run between the switching systems are called
 - (a) trunks
 - (b) nodes
 - (c) subscriber lines
 - (d) marker
- (ii) The exchange that does not support local subscribers is called a
 - (a) folded exchange
 - (b) transit exchange
 - (c) Intra exchange
 - (d) magneto exchange
- (iii) If the coded values are transferred during the same time interval from input to output the technique is called
 - (a) space switching
 - (b) time switching
 - (c) space-time switching
 - (d) combination switching
- (iv) Centum call second (CCS) is considered as a measure of traffic intensity which is valid only for
 - (a) data circuits
 - (b) both data & voice circuits
 - (c) telephone circuits
 - (d) satellite communication
- (v) The E1 European PCM system consists of
 - (a) 24 channels
 - (b) 30 channels
 - (c) 12 channels
 - (d) 54 channels
- (vi) The basic SONET module STS-1 has a bit rate of
 - (a) 84.84 Mbit/s
 - (b) 51.84 Mbit/s
 - (c) 79.84 Mbit/s
 - (d) 108 Mbit/s
- (vii) The behaviour of delay systems are studied using
 - (a) Blocking models
 - (b) Queuing models
 - (c) Traffic arrival model
 - (d) Birth death model
- (viii) The basic rate access in ISDN is defined as
 - (a) 2B + D
 - (b) 2B + 2D
 - (c) B + 2D
 - (d) 2B - D

- (ix) The maximum length of subscriber loop is governed by
 (a) resistance limit (b) loss limit
 (c) telephone subset (d) both (a) & (b)
- (x) The famous Erlang B formula is based on
 (a) LCC model (b) LCR model (c) LCH model (d) LCD model.

Fill in the blanks with the correct word

- (xi) The _____ channel is primarily used for carrying signalling information in ISDN services.
- (xii) A telecommunication network can be modelled as a B-D process where the busy servers represents the _____.
- (xiii) BISDN services are broadly classified as interactive and _____ services.
- (xiv) E1 In its primary rate format transmits _____ channels of 8 bit time slots.
- (xv) Loudness rating is the principal parameter for measuring the quality of a _____ connection.

Group - B

2. (a) A rural telephone exchange normally experiences four call originates per minute. What is the probability that exactly eight calls occur in an arbitrary chosen interval of 30 seconds?
[[C01](Evaluate/HOCQ)]
- (b) Compare the performance of ADSL with regular dial-up copper telephone line.
[[C01](Analyse/IOCQ)]
- (c) $OLR = SLR + CLR + RLR$ - justify the equation.
[[C01](Apply/IOCQ)]
 $4 + 4 + 4 = 12$
3. (a) Explain the term GOS. Distinguish between GOS and blocking probability
[[C01](Remember/LOCQ)][[C01](Analyse/IOCQ)]
- (b) What is tandem exchange?
[[C02](Understand/LOCQ)]
- (c) 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
[[C01](Evaluate/HOCQ)]
 $(4 + 2) + 2 + 4 = 12$

Group - C

4. (a) "Noise stops at the repeater" - Justify the statement with respect to PCM transmission system.
[[C02](Analyse/HOCQ)]
- (b) A Television signal having a bandwidth of 10.2 MHz is transmitted using binary PCM system, given that the number of quantization level is 512. Determine
 (i) Code word length
 (ii) Transmission Band Width
 (iii) Final Bit rate.
[[C02](Evaluate/HOCQ)]
 $6 + 6 = 12$

5. (a) What is meant by slip in digital network? [[C02](Understand/LOCQ)]
 (b) Analyze the reasons of occurring of slips. [[C02](Analyse/IOCQ)]
 (c) How they can be prevented? [[C02](Understand/LOCQ)]
6 + 4 + 2 = 12

Group - D

6. (a) How many sublayers are there in OSI datalink layer of LAN? Discuss the functions carried out by them. [[C03](Remember/LOCQ)]
 (b) Distinguish between unacknowledged connectionless service and connection mode service. [[C03](Analyse/IOCQ)]
(2 + 4) + 6 = 12
7. (a) Mention the factors, which determine the basic topologies of LAN. [[C03](Remember/LOCQ)]
 (b) Distinguish between Contention and Polling of LAN access protocols. [[C03](Apply/IOCQ)]
 (c) Explain the bus and ring topologies of LAN. [[C03](Understand/LOCQ)]
4 + 4 + 4 = 12

Group - E

8. (a) Distinguish between the basic rate access and Primary rate access of ISDN architecture. [[C05](Analyse/IOCQ)]
 (b) Name the three fundamental channels used in ISDN. Mention the functions of D channel. [[C05](Remember/LOCQ)]
6 + (3 + 3) = 12
9. (a) Mention the key features of Asynchronous Transmission Mode. [[C06](Remember/LOCQ)]
 (b) ATM is the underlying packet technology of B-ISDN - Justify. [[C06](Apply/IOCQ)]
6 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	37.5	41.67	20.83

Course Outcome (CO):

After the completion of the course students will be able to

1. Define and describe the different telephone networks, ADSL etc.
2. Recognize digital telephone systems, SONET and SDH and Digital Network Synchronization.
3. Compare local area networks- features and parameters.
4. Explain the various 802.11 standards and their applications.
5. Analyze ISDN and its operation.
6. Explain ATM networks and operations and B-ISDN.

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question.

