TELECOMMUNICATION SYSTEMS AND ENGINEERING
(ECEN 5231)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

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

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) GOS is called
(a) call congestion (b) loss probability
(c) (a) or (b) (d) time congestion.

(ii) With N inlets and M outlets the switching network is called a symmetric network if
(a) N≥M (b) N≤M
(c) N=M (d) N>M.

(iii) Centum call record (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.

(iv) To calculate the dc loop resistance for subscriber loop the formula which is applicable is
(a) $R_{dc} = 1.1095/d^2$ (b) $R_{dc} = 0.1095/d^2$
(c) $R_{dc} = 0.1095/d$ (d) None of these.

(v) The basic rate access in ISDN is defined as
(a) 2B +D (b) 2B +2D
(c) B + 2D (d) 2B - D.

(vi) The maximum length of subscriber loop is governed by
(a) resistance limit (b) loss limit
(c) telephone subset (d) both (a) & (b).

(vii) Degradation of system error performance by displacement of ideal sampling instant is caused by
(a) Jitter (b) Distortion
(c) Thermal noise (d) Echo.

(viii) SONET provide digital formats extending to
(a) 2000.00 M bits/sec (b) 9953.28 M bits/sec
(c) 5309.28 M bits/sec (d) 2099.99 M bits/sec.

(ix) An STS-1 signal which includes various overhead bytes and envelope capacity is a specific sequence of
(a) 800 bytes (b) 850 bytes
(c) 810 bytes (d) 820 bytes.

(x) Contention in LAN is a process of
(a) random access of resources (b) controlled access of resources
(c) programmed access of resources (d) hybrid access of resources.

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? [(CO2)(Evaluate/HOCQ)]
(b) Prove that the blocking probability tends to zero with Poisson traffic. [(CO2) (Evaluate/HOCQ)]
(c) OLR = SLR + CLR + RLR - justify the equation. [(CO2)(Analyse/IOCQ)]
3 + 6 + 3 = 12

3. (a) In a group of 10 servers, each is occupied for 30 minutes in an observation interval of two hours. Calculate the traffic carried by the group. [(CO4)(Evaluate/HOCQ)]
(b) What are the functions of control subsystem? [(CO1)(Understand/LOCQ)]
(c) Discuss the characteristics of ADSL technology. [(CO1)(Analyze/IOCQ)]
3 + 4 + 5 = 12

Group – C

4. (a) What is sonnet? Describe the characteristics of sonnet. [(CO2)(Remember/LOCQ)]
(b) What is meant by bit synchronization of digital network? How it is achieved in European E1 system? [(CO2)(Understand/LOCQ)]
(2 + 6) + 4 = 12

5. (a) Why bit synchronization is necessary in case of PCM transmission. [(CO2)(Analyze/IOCQ)]
(b) Explain the term "Slip" with respect to PCM system. [(CO2)(Understand/LOCQ)]
(c) 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. [(CO2)(Evaluate/HOCQ)]
3 + 3 + 6 = 12

Group - D

6. (a) How many sublayers are there in OSI data link layer of LAN? Discuss the functions carried out by them. [(CO2)(Remember/LOCQ)]
   (b) Distinguish between unacknowledged connectionless service and connection mode service. [(CO2)(Analyze/IOCQ)]

(2 + 4) + 6 = 12

7. (a) CSMA/CP is sometime called "listen while transmitting" – Justify. [(CO2)(Analyze/IOCQ)]
   (b) Design the LAN architecture related to OSI as per 802.11 standard with necessary block diagram. [(CO5)(Create/HOCQ)]
   (c) Why LAN process utilize only OSI layers according to 802.11 standard. [(CO5)(Analyze/IOCQ)]

3 + 4 + 5 = 12

Group - E

8. (a) Draw the basic structure of an ATM cell. [(CO6)(Remember/LOCQ)]
   (b) Briefly describe the functions of ATM adaption layer. [(CO6)(Understand/LOCQ)]
   (c) Write short note on retrieval and conversational services in BISDN. [(CO3)(Understand/LOCQ)]

2 + 4 + 6 = 12

9. (a) Distinguish between basic rate access and primary rate access of ISDN architecture. [(CO3)(Analyse/IOCQ)]
   (b) Explain the videotex services of ISDN. [(CO3)(Understand/LOCQ]

6 + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	44.79	32.29	22.92

Course Outcome (CO):

1. Students will know about the different telephone networks, ADSL etc.
2. They will have knowledge about digital telephone systems and local area networks-features and parameters.
3. The students will be aware of ISDN and its operation.
4. They will be able to calculate the efficiency of a tel network.
5. They will know about the various 802.11 standards and their applications.
6. They will know about ATM operation and ATM networks.

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