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)   Grade of Service refers to
         (a) carried traffic and ordered traffic   (b) waiting traffic
         (c) Erlang traffic   (d) none of these.

   (ii) Local Network is defined as network in which for its subscribers
         (a) there are no trunk lines
         (b) maximum 1000 connections
         (c) no STD code required
         (d) no maximum call duration.

   (iii) In a Voice Frequency 2 w repeater, an LBO is used at each port for
         (a) impedance matching   (b) echo cancellation
         (c) signal amplification   (d) billing purpose.

   (iv) Quality of service is a measure of
         (a) percentage of lost calls
         (b) new connection of installation delay
         (c) clarity of voice
         (d) all of these.

   (v)   For standard ADSL, downstream frequency is between
         (a) 138kHz – 1104kHz   (b) 138MHz – 1100 MHz
         (c) 26kHz – 137kHz   (d) 26MHz-137MHz.

   (vi) In AMI mode of transmission employing PCM line coding, alternation takes place at
         (a) every occurrence of 1   (b) alternate occurrence of 1
         (c) every occurrence of 0   (d) alternate occurrence of 0.

   (vii) Link budget is
         (a) a calculation of gain and loss
         (b) an estimation of link availability
         (c) a measure of attenuation
         (d) none of these.

   (viii) In a Local Area Network, HSP represents
         (a) Hierarchical Signalling Point   (b) Heavy Speed Ports
         (c) High Speed Printer   (d) none of these.

   (ix) ISDN is designed to serve
         (a) digital voice   (b) slow scan video
         (c) facsimile   (d) all of these and more.

   (x)   In a local area network, BIU stands for
         (d) Billing In Unit   (b) Baseband Interface Unit
         (c) Backup Installation Unit (d) none of these.

Group – B

2. (a) Explain 3 ways of handling lost calls in a telecom network.

   (b) Distinguish between Traffic flow, Traffic density and Traffic Intensity.

   (c) What is meant by Blockage in a telecom network? How do we measure grade of service from blockage parameter?
                                                    5 + 3 + 4 = 12

3. (a) What are the essential considerations in determining shape and size of a serving area? Why is hexagonal shape preferred over other shapes?

   (b) Highlight the concepts of in band and out of band signalling.
                                                    (5 + 1) + 6 = 12

Group – C

4. (a) Explain with a suitable diagram that how a VSAT network operates. What are its specific advantages?

   (b) Highlight the concept of ADSL technology and its operation in terms of digital data transmission in a telephone network.
                                                    (4 + 2) + 6 = 12

5. (a) Explain with a schematic diagram, the operation of a Time-Space-Time Switch.

   (b) Calculate the number of trunks that can be supported on a time multiplexed space switch, given that (i) 32 chls are multiplexed in each

stream (ii) control memory access time is 100 ns (iii) bus switching and transfer time is 100 ns per transfer.

7 + 5 = 12

Group – D

6. (a) What do you understand by synchronous optical networking? Explain how a SONET network is organized to transmit voice, data and video service.

   (b) What is cross talk in a telecom network? What are the types and significant reasons of crosstalk being present in a telecom network?

   (2 + 4) + (3 + 3) = 12

7. (a) With a layout, explain the concepts of North American and European standards for PCM carrier channels.

   (b) What is a Local Area Network? What is the wireless scheme on which this is based? What are the data rates?

   6 + (2 + 2 + 2) = 12

Group – E

8. (a) What are the various channels and standard bit rates in an ISDN network? Draw and explain the ISDN reference model.

   (b) Mention 5 conceptual principles on which ISDN is based.

   (3 + 4) + 5 = 12

9. (a) Explain the concept of ATM (Asynchronous Transfer Mode) related to BISDN in brief.

   (b) Write short notes on:
   (i) ISDN user network interface   (ii) Advantages of BISDN.

   4 + (4 + 4) = 12