TELECOMMUNICATION SYSTEMS AND ENGINEERING
(ECEN 5132)

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)   Telephone companies normally provide an activation voltage of
       (a) + 24 V DC   (b) 50V AC
       (c) -48V DC   (d) + 48 V DC.

  (ii)   Grade of service signifies services offered by the
       (a) trunk groups   (b) network
       (c) line repeaters   (d) signaling system.

  (iii)   A Master group consists of
       (a) 12 voice channels   (b) 24 voice channels
       (c) 60 voice channels   (d) 300 voice channels.

  (iv)   Subscriber loop is a pair of wires connecting
       (a) subscriber to exchange   (b) talk battery
       (c) remote subscribers   (d) exchanges in tandem.

  (v)   For standard ADSL, downstream frequency lies in between
       (a) 138Khz – 1104Khz   (b) 138Mhz – 1100 Mhz
       (c) 26Khz – 137Khz   (d) 26Mhz-137Mhz.

  (vi)   When go and return wire channels are carried in the same cable sheathe
       (a) NEXT is dominant   (b) FEXT is dominant
       (c) scintillation is dominant   (d) Jitter is dominant.

  (vii)   Coaxial cables that are used in LAN have a typical impedance of
       (a) 50 ohms   (b) 100 ohms   (c) 75 ohms   (d) 150 ohms.

  (viii)   In a Local area Network, HSP represents
       (a) hierarchial 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)   SPC stands for:
       (a) Standard Protocol Control   (b) Stored Program Control
       (c) Signaling and switching Centre   (d) Signaling Process Center.

Group – B

2. (a)   Define Grade of Service. A 10,000 line exchange has traffic load of 0.1E per subscriber and GoS of 0.2. If suddenly the telephone traffic shoots up by 60%, what is the change in GoS?

  (b)   What is side tone in telecom system and what are its positive and negative effects.

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

3. (a)   With the help of a schematic diagram, explain the principle of operation of a 4-wire VF repeater. What is the function of hybrid in this network?

  (b)   What are the parameters that need to be considered while designing a subscriber loop?

  (c)   How is the shape of a serving area determined considering all the parameters including subscriber identity?

           (3 + 2) + 3 + 4 = 12

Group – C

4. (a)   In a telephone network, explain the concept of signalling and why a robust signalling system is essential.

  (b)   What is E&M signalling? Explain with a diagram, how this is organised in a telecom network.

  (c)   What is SF & 2VF? What frequency is used there?
           (2 + 2) + (2 + 4) + 2 = 12

5. (a)   Show how American Standard and European standard of digital hierarchy is organised. What are their essential features?

(b) With a diagram explain how a time space time switch is organised.

(4 + 4) + 4 = 12

Group – D

6. (a) What do you understand by a Local area network and how are these organised?

(b) What are the factors on which Data rate on current LANs are determined?

(c) Draw a typical tree network for LAN connectivity.

(1 + 5) + 3 + 3 = 12

7. (a) What do you understand by the term "Broadband" and what are the key features of Broadband Service? What is meant by "always ON" connection?

(b) What are the key features of a Digital subscriber line? What is HDSL?

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

Group – E

8. (a) What are the motivating factors behind implementation of ISDN? Name some important services that ISDN provides to the users.

(b) Draw the Functional grouping and ISDN reference points diagram labelling each unit.

(2 + 4) + 6 = 12

9. (a) What are the main differences between ISDN & BISDN? In a BISDN protocol reference model, explain the functions of user plane & control plane.

(b) Write short notes on (i) ATM adaptation layer (AAL) (ii) disadvantages of broadband network.

(3 + 3) + (3 + 3) = 12