**[5560]-545**

# T.E. (Electronics Engineering)
# DATA COMMUNICATION
## (2015 course) (Semester - I) (End Sem.) (304205)

*Time : 2½Hours]*                                                                 *[Max. Marks : 70*

*Instructions to the candidates:*

1) *Neat diagrams must be drawn wherever necessary.*
2) *Figures to the right Indicate full marks.*
3) *Use of logarithmic table, slide rule electronic calculator is allowed.*
4) *Assume suitable data if necessary.*
5) *Answer the Q.1 or Q.2 and Q.3 or Q.4 and Q.5 or Q.6 and Q.7 or Q.8 and Q.9 or Q.10*

**Q1)** a) Draw the layered architecture of OSI model Explain functioning of data link and network layer. **[6]**

b) Compare coaxial cable, twisted pair and optical cable. **[4]**

OR

**Q2)** a) Write a short note on ISDN. **[4]**

b) For a systematic LBC, the three parity check digits $C_4, C_5, C_6$, are given by. **[6]**

$$C_4 = d_1 \oplus d_2 \oplus d_3$$
$$C_5 = d_1 \oplus d_2$$
$$C_6 = d_1 \oplus d_3$$

i) Construct generator matrix

ii) List all the code words generated by this matrix

**Q3)** a) Apply shannon fano coding or the following message ensemble and find coding efficiency. **[6]**

$$[X] = [x_1 \quad\quad x_2 \quad\quad x_3 \quad x_4]$$
$$[P] = [0.4 \quad\quad 0.3 \quad\quad 0.2 \quad 0.1]$$

b) State & explain shannon's source coding theorem **[4]**

OR

*P.T.O.*

*Q4)* a) Apply Huffman encoding to following message ensemble find coding efficiency. **[6]**

$[X]=[x_1 \quad x_2 \quad x_3 \quad x_4 \quad x_5 \quad x_6 \quad x_7]$

$[P]= [0.45 \quad 0.1 \quad 0.1 \quad 0.15 \quad 0.04 \quad 0.08 \quad 0.08]$

b) Explain selective repeat ARQ system with neat diagram in detail. **[4]**

*Q5)* a) A Delta modulation system is operated at 3 times the nyquist rate for a signal with a 3KHz band width the quantising step size is 250mv **[8]**

　　　i) Determine the maximum amplitude of a 1KHz input sinusoid for which the delta modulator does not show slope overload

　　　ii) Determine the post filtered output of SNR

b) Draw & explain waveform for the bit sequence 100110100 using following formats. **[8]**

　　　i) Unipolar NRZ

　　　ii) Polar quarternary

　　　iii) Bipolar NRZ

　　　iv) Split phase manchester.

<center>OR</center>

*Q6)* a) Explain adaptive delta modulation transmitter & receiver in detail with the help of neat block diagram. **[8]**

b) Compare different types of waveform coding techniques. **[4]**

c) Explain Multilevel schemes. **[4]**

　　　i) 2B1Q　　　　　　　　　　　　　ii) MLT3

*Q7)* a) Explain QPSK Transmitter & receiver in with neat block diagram in detail. **[8]**

b) Compare following digital modulation techniques. **[4]**

　　　i) ASk

　　　ii) FSK

　　　iii) PSK

c) Draw the signal space diagram for BPSK system. **[4]**

<center>OR</center>

*Q8)* a) Explain with the help of neat block diagram 16 bit QAM transmitter & receiver. **[8]**

b) Explain M-ary PSK transmitter & receiver with the help of neat block diagram. **[8]**

*Q9)* a) Explain the working of FH-SS transmitter & receiver with neat block diagram. **[8]**

b) Compare FDMA, TDMA & CDMA. **[6]**

c) State & Explain properties of PN sequence. **[4]**

OR

*Q10)*a) Explain the working of DS-SS transmitter & receiver with neat block diagram. **[8]**

b) A PN sequence is generated using a feed back shift register of length m=4, the chip rate is 107 chips/sec find the following parameters. **[6]**
   i) PN sequence length

   ii) Chip duration

   iii) PN sequence period

c) Write a short note on CSMA. **[4]**

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