[5058] - 352

T.E. (Electronics Engg.)
DATA COMMUNICATION
(2012 Pattern) (End Sem.) (304202)

Time : 2½ Hours]   *[Max. Marks :70*

Instructions to the candidates:

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*

2) *Neat diagrams must be drawn wherever necessary.*

3) *Figure to the right indicate full marks.*

4) *Assume suitable data if necessary.*

Q1) a)   What are the limitations of DM? Explain with suitable waveforms.   **[6]**

b)   Draw and explain Layered architecture of OSI model.   **[7]**

c)   A 1 kHz signal of voice channel is sampled at 4 kHz using 12 bit PCM. Obtain the followings.   **[6]**

   i)   Nyquist rate

   ii)   BW required

   iii)   SNR at PCM output

OR

Q2) a)   Compare ARQ and FEC.   **[6]**

b)   Consider a sinewave of frequency f_m and amplitude A_m applied to a DM of step size δ. Show that the slope over load distortion will occure if

$$A_m > \frac{\delta}{2\pi f_m T_s}$$

Where T_s is the sampling period.   **[7]**

c)   Compare RZ unipolar, RZ polar and RZ bipolar data formats.   **[6]**

Q3) a) Apply Shannan-Fano coding procedure for the following message ensemble. Also determine its efficiency. **[8]**

x	x_1	x_2	x_3	x_4	x_5	x_6
P	0.4	0.28	0.12	0.08	0.08	0.04

b) Find the rate of information transmission across the channel shown in the figure below for P = 0.8 and P = 0.6. The symbols are generated at the rate of 1000 per second. Also determine channel input information rate.

Given $P(x_0) = P(x_1) = \frac{1}{2}$. **[8]**
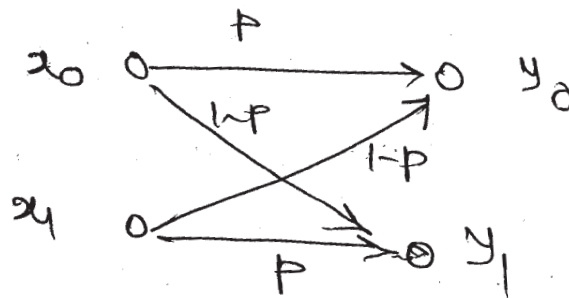
OR

Q4) a) The voice frequency modulating signal of a PCM system is to be quantized in 16 levels with following probabilities. **[8]**

$P_1 = P_2 = P_3 = P_4 = 0.1$

$P_5 = P_6 = P_7 = P_8 = 0.05$

$P_9 = P_{10} = P_{11} = P_{12} = 0.075$

$P_{13} = P_{14} = P_{15} = P_{16} = 0.025$

Calculate the entropy and information rate, Assume $F_m = 3kH_Z$.

b) What steps are involved in Huffman coding procedure? Evaluate the performance of Huffman code over Shannon Fano code for large mesage ensemble with equal probabilities. **[8]**

Q5) a) Explain QPSK modulation and demodulation. **[8]**

b) Derive the expression of error probability of ASK. **[8]**

OR

Q6) a) What is OFDM? Explain its working and give its application. **[8]**

b) For BPSK explain. **[8]**

   i) Generation

   ii) Reception

   iii) Spectrum

   iv) BW

Q7) a) Compare FDMA, TDMA and CDMA. **[6]**

b) Compare FH-SS and DS-SS. **[6]**

c) For DS- SS define. **[6]**

   i) Chip sequence

   ii) Chip period

   iii) Processing gain (spread factor)

OR

Q8) a) Write a short note on CSMA. **[6]**

b) Write a short note on FH - SS **[6]**

c) Compare through puts of pure ALOHA and slotted ALOHA. **[6]**

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