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(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1033   Roll No. | | | | | | | | | | | |

B.Tech.

FOURTH SEMESTER EXAMINATION, 2004-2005

FUNDAMENTAL OF COMPUTER COMMUNICATION SYSTEM

Time : 2 Hours   *Total Marks : 50*

Note :   (i)   *Attempt **ALL** questions.*

(ii)   *In case of numerical problems assume data wherever not provided.*

1.   Attempt *any four* parts of the following :   **(3.5x4=14)**

(a)   What are Data Encoding Schemes. Explain them. Consider a Message containing five different symbols A, B, C, D, E using this information.

(i)   Calculate the minimum number of bits needed to code each symbol uniquely.

(ii)   Obtain the code for all the symbols.

(iii)   Find out the coded version for message EBAA.

(b) Describe Shanon's Fano algorithm and its properties for Encoding. Consider that a message contains the characters A, B, C, D, E, F, G and H. The likely frequencies of these characters in the message are as follows :

A	B	C	D	E	F	G	H
0.25	0.25	0.14	0.14	0.055	0.055	0.055	0.055

Calculate the entropy of a character/symbol using Shanon's Fano algorithm and Huffman algorithms.

(c) A binary source is emitting symbols in independent sequences. Show that the source entropy is maximum when the symbols occur with equal probabilities and plot the entropy of this source versus p $(0 < p < 1)$.

(d) What is the use of dictionary in data compression and discuss with example.

(e) Draw the block diagram of a communication system and explain its each block.

(f) What is Noise ? Explain some sources of Noise. Explain the Frequency Domain representation of Noise and calculate the Power associated with the frequency.

2. Attempt *any four* of the following :   (3x4=12,

(a) What is A.M. ? How from the side band we recover the signal at the receiver and explain with example.

(b) What is a modulator and explain the balanced modulators with suitable diagram.

(c) Show that the signal

$$v(t) = \sum_{i=1}^{N} [\cos w_c t \cos (w_i t + \theta_i) - \sin w_c t \sin (w_i t + \theta_i)]$$

is an SSB-SC signal $w_c \gg w_m$.

(i) Is it the upper or lower sideband ?

(ii) Write an expression for missing sideband.

(iii) Obtain the expression for total DSB – SC signal.

(d) A carrier which attains a peak voltage of 5 volts has a frequency of 100 MHz. This carrier is FM by a sinusoidal wave form of frequency 2 KHz to such extent that frequency deviation from the carrier frequency is 75 KHz. This modulated wave form passes through zero and is increasing at time $t = 0$. Write an expression for the modulated carrier wave form.

(e) What is sampling theorem ? Explain. If a band limited signal O to Fm then plot the amplitude of spectrum of sampled signals.

(f) What is cross talk ? Explain the cross talk due to high frequency cut off of the channel and cross talk due to low frequency cut off of the channel.

3. Attempt *any two* parts of the following : **(6x2=12)**

(a) What is Pulse Code Modulation ? What is quantization of a signal and quantization error. Explain it.

(b) (i) Explain A binary Phase Shift Keying (PSK) system.

(ii) Explain the Frequency Shift Keying (FSK) system.

(c) Why should PCM be preferable to DM for encoding analog signals that represent digital data.

4. Attempt *any two* parts of the following : **(6x2=12)**

(a) The Generator Polynomial of a (7,4) cyclic code is $g(x) = 1 + x + x^3$. Find the 16 code words of this code by forming the code polynomial using.

$V(x) = D(x).9(x)$ where $D(x)$ is Message Polynomial.

(b) (i) Explain what is Computer Network and goal of Computer Network.

(ii) Explain the Computer Network Topologies.

(c) Explain in detail the OSI model.

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