Printed Pages : 4   **CS – 405**

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

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

B. Tech.

(SEM. IV) EXAMINATION, 2006 – 07
FUNDAMENTAL OF COMPUTER COMMUNICATION SYSTEM

Time : 2 Hours]   *[Total Marks : 50*

Note :   *(1)*   *Attempt **all** questions.*

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

         (3)   *Be precise in your answer.*

1   Attempt any **four** parts of the following :   **3.5×4=14**

   a)   Briefly describe the functional blocks in a digital communications system.

   b)   An analog signal bandlimited to 10 kHz is quantized in 8 levels of a PCM system with probability of $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{5}$, $\frac{1}{10}$, $\frac{1}{20}$, $\frac{1}{20}$ and $\frac{1}{20}$ respectively. Find the entropy and rate of information.

   c)   A modulating signal consists of a symmetrical triangular wave having zero dc component and

peak to peak voltage of 11 volt. It is used to amplitude modulate a carrier of peak voltage 10 volt. Calculate the modulation index and the ratio of the side lengths $\dfrac{L_1}{L_2}$ of the corresponding trapezoidal pattern.

d) Compare PAM, PDM, and PPM signals in terms of bandwidth requirements, multiplexing and complexity of the receivers.

e) Define thermal noise and noise figure. Discuss their significance in communication systems.

f) Show that in a binary PCM the SNR increases exponentially with the transmission brandwidth.

2   Attempt any **four** parts of the following :   3×4=12

a) What are the different line codes available for binary data transmission? Sketch all of them and give merits and demerits of each of them.

b) Explain differentially phase shift keying and describe a scheme to recover baseband signal in DPSK.

c) Find the minimum required bandwidth for the baseband transmission of a four level PAM pulse sequence having a data rate of R = 2400 bits/sec.

if the system transfer characteristic consists of a raised cosine spectrum with 100% excess bandwidth $(\gamma = 1)$.

d) Many times, providing more $\dfrac{E_b}{N_o}$ will not mitigate the degradation due to inter symbol interference. Explain the reason behind this phenomenon.

e) The term matched filter is often used synonymously with correlator. How is that possible when their mathematical operations are different?

f) Why MSK is considered to be more spectrally efficient then QPSK. How do you explain then that the QPSK spectrum has a narrower mainlobe than the MSK spectrum ?

3 Attempt any **two** parts of the following : 6×2=12

a) (i) Describe four types of trade offs that can be accomplished by using an error correcting code.

(ii) In a real time communication system, added redundancy means faster signaling, less energy per channel symbol and more errors out of the demodulator. In the face of such degradation, explain how coding gain is achieved.

b) A (15,5) cyclic code has a generator polynomial as $g(x) = 1 + x + x^2 + x^5 + x^8 + x^{10}$. Find the code polynomial (in systematic form) for the message $m(x) = 1 + x^2 + x^4$.

c) Consider a (24,12) linear block code capable of double error corrections. Assume that a non-coherently detected binary orthogonal frequency shift keying (BFSK) modulation format is used and that the received $\frac{E_b}{N_o} = 14 \, dB$. Does the code provide any improvement in probability of message error? If it does, how much ? If it does not, why not? Explain.

4 Attempt any **four** parts of the following : 3×4=12

a) What is the principal difference between connectionless and connection oriented communication in Computer networks ?

b) Describe briefly various layers of an OSI model.

c) What do you understand by synchronous and asynchronous transmission ? - Explain.

d) Explain the ATM protocol. Reference model briefly.

e) What are the functions of a Hub and router? Explain briefly.

f) What are the major parts of a ISDN network? Explain briefly.