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B. TECH.

FOURTH SEMESTER EXAMINATION, 2002-2003

FUNDAMENTAL OF COMPUTER COMMUNICATION SYSTEM

Time : 2 Hours *Total Marks : 50*

Note : (1) Attempt **ALL** the questions.

(2) Attempt any **TWO** parts from each question.

(3) All questions carry equal marks.

1. *(a)* *(i)* What is Amplitude Modulation ? Explain the methods to recover the message signal from their sidebands.

(ii) Compare FM and PM. How are they similar and how are different ? Explain.

(b) Show that the signal,

$$V(t) = \sum_{i=1}^{N} [\cos\omega_c t.\cos(\omega_i t + \theta_i) - \sin\omega_c t.\sin(\omega_i t + \theta_i)]$$

is a SSB-SC Signal $(\omega_c >> \omega_m)$.

(i) Is it the upper or lower sideband ?

(ii) Write the expression for the missing sidebands.

(iii) Obtain an expression for the total DSB-SC Signal.

(c) Explain the Shannon Hartley theorem and channel capacity of a Gaussian Channel.

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2. (*a*) Why is PCM preferable for encoding analog signals that represent digital data ?

(*b*) Write short notes on the following :—

(*i*) PAM Signalling,

(*ii*) Coherent and non-coherent detection.

(*c*) Explain the differential phase shift keying and show how it avoids the necessity of providing the synchronous carrier requirement at the receiver end for demodulating a phase shift key signal.

3. (*a*) Consider the four messages m_1, m_2, m_3 and m_4 having their respective occurrence probabilities 1/2, 1/4, 1/8, 1/8.

(*i*) Calculate the average information per message.

(*ii*) What is the rate at which binary digits are transmitted if the messages m_1, m_2, m_3 and m_4 are encoded as 000, 001, 010 and 011 respectively.

(*b*) Explain the method for generation of cyclic codes. Determine (7, 4) cyclic code, with generator polynomial $g(x) = x^3 + x + 1$ and verify its operation using the message vector 0101.

(*c*) What is Sampling ? Why is Nyquist rate required for recovering the signal ? Explain with example.

4. (*a*) What is Interfacing ? Explain its characteristics.

(*b*) What is the concept of Circuit Switching and Packet Switching ? Differentiate between them with example.

 Write short notes on the following :—

(*i*) Hybrid Switching

(*ii*) MODEM

5. (*a*) Explain the Open System Interconnection Model, in detail.

(*b*) Write short notes on the following :—

(*i*) ISDN

(*ii*) X.25

(*c*) What do you understand by SONET and ATM ? Explain them and give their applications.