Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.TECH(ECE)/SEM-1/MC-103/2010-11

2010-11

ADVANCED DIGITAL COMMUNICATION AND CODING

Time Allotted : 3 Hours Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer Question No. *1* and any *four* from the rest.

1. Explain the following terms briefly : $4 \times 2\frac{1}{2}$

   a) Nyquist criteria for zero ISI.

   b) Convolution Encoder.

   c) Error Correction and Detection Capabilities of Hamming Code.

   d) Properties of linear block codes.

2. a) Explain the operation of integrate and dump filter. Derive the expression of its Signal to noise ratio.

   b) What do you mean by match filter ? Find the expression for impulse response for match filter.

(2 + 6) + (2 + 5)

3. a) Explain the scheme of generation of QPSK signal.

   b) Write down the time domain expression for BFSK signal. Find the bandwidth requirement for BFSK signal.

   c) What do you mean by M-ray FSK ? 6 + (4 + 2) + 3

4. a) Explain the concept of spread spectrum.

   b) Draw the block diagram of DS-SS transmitter with binary phase modulation and explain its operation.

   c) What are the advantages of FH-SS over DS-SS ?

   5 + 6 + 4

5. a) State Shannon's channel coding theorems.

   b) Explain the scheme of syndrome decoding of linear block code.

   c) The parity check matrix of a (7, 4) linear block code is as given below :

$$\begin{bmatrix} 1 & 1 & 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

   Calculate the syndrome vector for single bit error and also find the syndrome decoding table. 3 + 5 + (4 + 3)

6. a) Show that for systematic cyclic code the check bit polynomials is C (P) = remainder [p^q M (P) / G (p)].

b) The generator polynomial of a (7, 4) cyclic code is (G (P) = P^3 + P^2 + 1. Find the systematic cyclic code for the message (0101).

c) What are the differences between line coding and error detection coding ? 6 + 6 + 3

7. Write short notes on any *three* of the following : 3 × 5

a) WCDMA

b) BCH coding

c) Structure properties of convolution coding

d) GSM

e) Frequency hopping spread spectrum.