Digital communication
SEM VI
26/05/14
EXTC

QP Code :**MV-18179**

(3 Hours) [**Total Marks : 100**

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** question from remaining **six** questions.
(3) Assume suitable data if necessary.

1. (a) Explain the function of a bit synchromizer. **5**
(b) Distinguish between a matched filter and co-rrelator. **5**
(c) Explain line codes and their characterstics. **5**
(d) Explain shanon-Hartley Theorem on channel capacity. **5**

2. (a) Explain M-ary FSK Transmitter and Receiver with neat block diagram. **10**
(b) A Gaussian channel has 2 MHz bandwidth. Calculate the channel capacity if the signal to Noise Spectral density ratio is 10^4. Also calculate the maximum information rate. **5**
(c) Explain systamatic and non-systamatic error correcting codes. **5**

3. (a) Draw and explain the block diagram of non-offect QPSK transmitter and receiver. Also draw output waveform. **10**
(b) The generator polymonial for a (7, 4) cyclic code is **10**
$g(x) = 1 + x^2 + x^3$
(i) Draw the block diagram of Encoder and syndram calculator.
(ii) Find the code polynimal of 0110.

4. (a) A 1/3 rate, k=3 convolutional encoder can be described by the impulse response of the path given by :– **10**
$g_1 = 101$, $g_2 = 110$, $g_3 = 011$
(i) Draw the block diagram of encoder.
(ii) Draw the code tree and state diagram. Hence find out output sequence if the input to the encoder is 11010.
(b) Draw the signal space diagram of 16 QASK and calculate the Euclidean distance and compare it with 16-PSK. **10**

5. (a) Define entropy and Information rate. A source emits symbols with the given probabilities **10**
0.2, 0.25, 0.15, 0.1, 0.15, 0.05, 0.1
Calculate :–
(1) Entropy of source
(2) Huffman code
(3) Code Efficiency.
(b) What is equalization. Explain with block diagram a tapped delay line equilizer. **10**

6. (a) Consider a (7, 4) code whose generator matrix is **10**

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

(i) Find the code word for (i) 1101 (ii) 1001

(ii) Find out the parity check matrix

(iii) What is the error detecting and correcting capability of the code.

(b) Define the expression for **10**

(1) Impulse response

(2) Propability of error of a matched filter.

7. Write short notes an (any **two**) :– **20**

(1) Eye pattern

(2) ISI and ICI

(3) MSK.
