

Con. 5307-08.

RC-6482

(REVISED COURSE)

(3 Hours)

[Total Marks : 100]

N.B.: (1) Question No. 1 is compulsory.

(2) Attempt any four questions out of remaining six questions.

(3) Figures to the right indicate full marks.

(4) Assume suitable data if necessary.

1. (a) Explain sampling signal for low pass signals. Also explain different sampling methods. 10
- (b) State Shannon-Hartley theorem for channel capacity of a Gaussian channel. How the Shannon's limit is attended by using orthogonal signals? 10
2. (a) For the following binary sequence sketch various waveforms— 10
1011001011
(i) RZ (ii) NRZ (iii) Manchester coding (iv) AMI
- (b) Explain with neat diagram the QPSK transmitter, waveform and phasor diagram. Also explain the concept of Non-offset and offset QPSK. 10
3. (a) What is matched filter in a communication system? Enumerate its properties and derive an expression for probability of error of matched filter. 10
- (b) A source emits seven messages with probabilities $1/3, 1/3, 1/9, 1/9, 1/27, 1/27$ and $1/27$ respectively. Find the entropy of the source and compact binary code, the average length of the codeword. Determine the efficiency and redundancy of this code. 10
4. (a) For a (6, 3) systematic linear block code the three parity check digits C_4, C_5, C_6 are— 12
 $C_4 = d_1 + d_2 + d_3$
 $C_5 = d_1 + d_2$
 $C_6 = d_1 + d_3$
(i) construct the appropriate generator matrix
(ii) construct the code generated by this matrix
(iii) determine the error correcting capability of this code
(iv) prepare a suitable decoding table
(v) Decode the following code words 101100, 000110, 101010.
- (b) Explain systematic cyclic code generator circuit by shift register and decoding process of cyclic code. 8
5. (a) What is a Gaussian probability density function. Derive its cumulative distribution function in terms of its complimentary error function. 10
- (b) Explain how 'Duo binary signaling' introduces controlled Intersymbol Interference [ISI]. 10
Also derive the Duo-binary transfer function and sketch the pulse shape.

[TURN OVER]

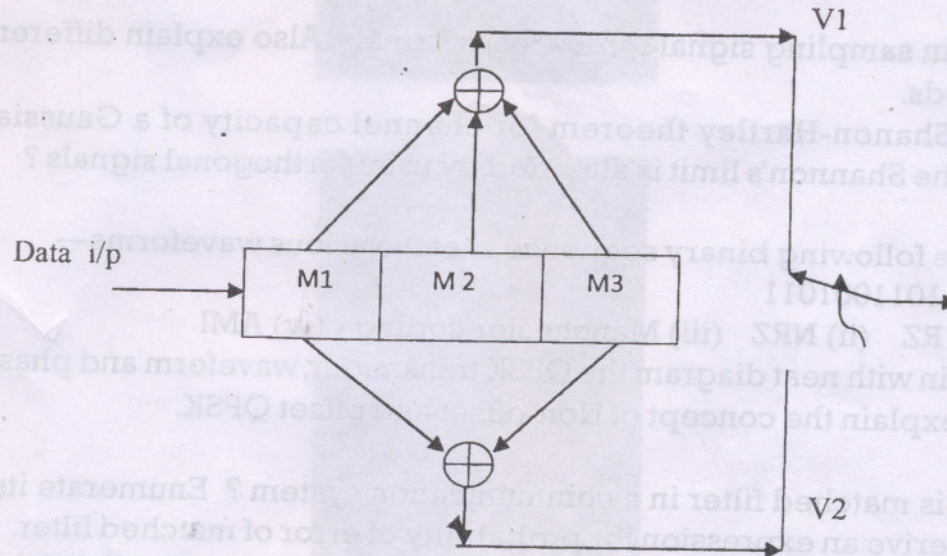
6. (a) For a convolution encoder of rate $1/2$, $k = 3$ as shown in fig obtain—

10

- (i) State diagram
- (ii) Trellis diagram
- (iii) Tree diagram
- (iv) If the received signal at the decoder for eight message bits is—

$$V = (00\ 01\ 10\ 00\ 00\ 10\ 01)$$

trace the decision on code tree diagram and find out message bit sequence—



(b) Explain signature authentication process using public key crypto system.

10

7. Write notes on any **four** :—

- (a) BCH codes
- (b) Autocorrelation and cross correlation of function
- (c) Image and data compression
- (d) Eye pattern
- (e) Viterbi decoding.

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