

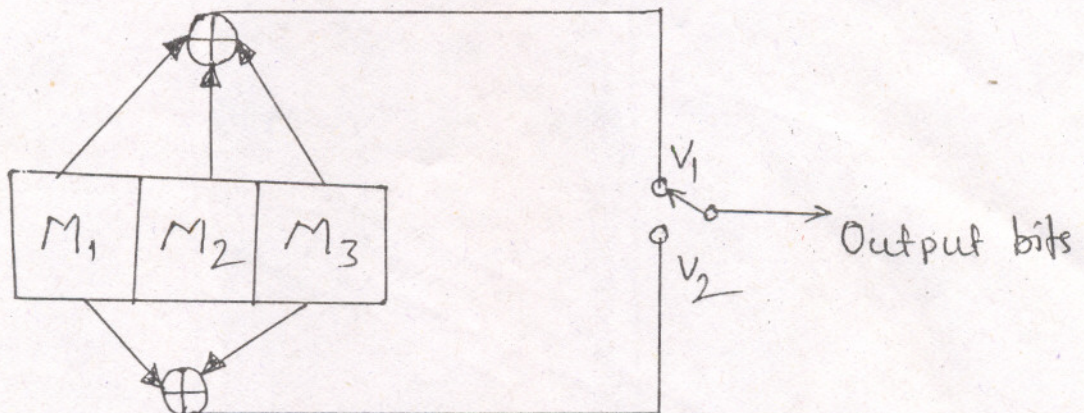
(3 Hours)

[Total Marks : 100

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

(2) Attempt any four questions from remaining six.

1. (a) Enlist at least five major sources of signal loss and noise in communication link. 5
- (b) Derive the condition of maximum entropy of a source. How entropy varies with probability? 5
- (c) Define the terms with their significance- 6
 - (i) Noise bandwidth (ii) Noise figure (iii) Noise temperature.
- (d) Compare channel encoding and encryption on four major points. 4
2. (a) Explain in detail offset and non-offset QPSK. Support your answer with appropriate Block diagram and waveform. 10
- (b) What is line coding? Draw the waveforms for different line coding. Assume the binary sequence 10110101. 10
3. (a) For a convolution encoder of rate $\frac{1}{2}$, $k=3$ as shown in figure, obtain- 12
 - (i) State diagram.
 - (ii) Trellis diagram.
 - (iii) Tree diagram.
 - (iv) If the received signal at the decoder for eight message bits is –
 $V=(00\ 01\ 10\ 00\ 00\ 00\ 10\ 01)$
Trace the decision on code tree diagram and find out message bit sequence.



- (b) Define signature authentication process using public key cryptosystem. 8
4. (a) Draw the block diagram of differentially encoded PSK receiver system and explain. Also write advantages and disadvantages of DEPSK. Show that in DEPSK error occur in pair. 12
- (b) Explain the modified Duo-binary encoding with precoder. 8

5. (a) Explain the Shannon's Information Capacity theorem. Show that channel capacity for channels of infinite bandwidth is $C_{\infty} = 1.44 S/\eta$ bits per sec. 8
- (b) What is Huffman Code? Explain the algorithm of the code. For the code shown in Table. 12

| Symbol | M1 | M2 | M3 | M4 | M5 | M6 |
|-------------|-----|------|------|------|------|------|
| Probability | 0.3 | 0.25 | 0.15 | 0.12 | 0.10 | 0.08 |

Find

- (i) Average length of this Huffman Code.
- (ii) The entropy of the source.
- (iii) The code efficiently.
- (iv) The redundancy of a code.
6. (a) Explain in detail DPCM. 10
- (b) Explain the following terms- 10
- (i) CDF (ii) PDF
7. Write short notes (any four): 20
- (i) Companding in PCM.
- (ii) Run length coding.
- (iii) BCH codes.
- (iv) Eye pattern
- (v) JPEG