

N.B.:

1. Question no.1 is compulsory.
2. Attempt any three questions from the remaining five questions.
3. Total four questions need to be solved.
4. Assume suitable data whenever necessary, justify the same.

Attempt any four questions from Q.1

- Q.1 a State and explain Shannon-Hartley theorem. [5]
- Q.1 b To transmit a bit sequence 10011011, draw the waveforms using i) Unipolar RZ, ii) Unipolar NRZ, iii) Polar RZ, iv) AMI, v) Manchester. [5]
- Q.1 c Give comparison between ASK, FSK and PSK. [5]
- Q.1 d Differentiate between linear block code and convolution code. [5]
- Q.1 e Distinguish between matched filter and correlator. [5]
- Q.2 a What is ISI? Discuss the causes and remedies to overcome ISI. [10]
- Q.2 b Explain Minimum Shift Keying (MSK). Why is MSK called a shaped QPSK? [10]
- Q.3 a A discrete memory less source has an alphabet of five symbols with probabilities as shown [10]
- | S1 | S2 | S3 | S4 | S5 |
|------|------|------|------|------|
| 0.40 | 0.19 | 0.16 | 0.15 | 0.10 |
- i) Construct a Shannon-Fano code for the source and calculate code efficiency. ii) Repeat the same for Huffman code
- Q.3 b A convolution vectors for a convolution encoder with code rate $\frac{1}{3}$ are [10]
- $g_1=110, g_2=101, g_3=111$
- i) Sketch the encoder diagram and determine the code word for input vector 10111.
ii) Draw the trellis diagram and state diagram.
- Q.4 a The parity check matrix H of a linear block code (7,4) is given below: [10]
- $$H = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 & 0 & 0 & 1 \end{bmatrix}$$
- Generate the code word for the data word i) 0011, ii) 0100, iii) 0110. How is error detected when the 2nd bit is detected erroneously for data word 0011?
- Q.4 b i) Give comparison between FEC and ARQ. [5]
ii) Draw and explain block diagram of digital communication system [5]
- Q.5 a Draw and explain the block diagram of the QPSK transmitter and receiver. [10]
- Q.5 b Generate the CRC code for the data word of 110010101. The divisor is 10101. [10]

- Q.6 Write a short note on the following. [20]
- a Generation and detection of ASK signal
 - b Impulse response of Matched Filter
 - c Systematic and nonsystematic cyclic codes
 - d Huffman code algorithm
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