

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

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

(3) Assumptions made should be **clearly** stated.

(4) Illustrate answers with **sketches** wherever **required**.

1. Attempt any **four** :-

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- (a) Explain Coherent and non-coherent reception.
- (b) Explain the importance of central limit theorem
- (c) Explain Aliasing error in sampling.
- (d) What are the advantages and disadvantages of digital communication system ?
- (e) What is the significance of Euclidian distance ?

2. (a) Define sampling theorem. What is the standard sampling frequency for speech signals ? Justify the same. 10

(b) What is Binary Symmetric Channel (BSC) ? Explain optimum receiver algorithm for binary symmetric channel. 10

3. (a) What are the different approaches to realize a receiver for detection of signal in presence of noise ? Explain in brief. Also explain the properties of matched filter. 10

(b) What is line coding ? What are the important properties of line code ? Represent the data 11010011 using split phase Manchester, RZ AMI and unipolar NRZ. 10

4. (a) What are the disadvantages of DPSK ? Explain in details transmitter and receiver of Differentially Encoded PSK. 10

(b) Explain offset QPSK transmitter and receiver. (With appropriate waveform). 10

5. (a) Explain the : (i) Shannon–Hartley capacity theorem (ii) Shannon limit. 10

(b) Source coding reduces redundancy and discards irrelevant content. What is the difference between redundancy and irrelevancy ? Also explain Huffman code. 10

(a) Define the following terms :- 8

- (i) Systematic and Non–systematic
- (ii) Hamming weight
- (iii) Hamming distance
- (iv) Rate of code and efficiency.

(b) The parity check matrix of a (7, 4) linear block code is :

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$$H = \begin{bmatrix} 1110100 \\ 1101010 \\ 1011001 \end{bmatrix}$$

- (i) A certain codeword is transmitted which is received as 1110110. Check if any error has occurred at the receiving end.
- (ii) How would you obtain the correct transmitted codeword if a single error has occurred ?
- (iii) Draw the syndrome decoder for above linear block code.

7. Write short notes :-

(a) Effect of noises on communication system 6

(b) Image compression 8

(c) Signature authentication using public key crypto system. 8