

12. (a) Construct and explain DPCM transmitter and receiver with neat block diagram.

Or

- (b) (i) A binary channel with bit rate of 36000 bits/sec is available for PCM voice transmission. Find the number of bits per sample, number of quantization levels and sampling frequency assuming highest frequency component of voice signal is 3.2 kHz. (7)
- (ii) Explain about linear prediction with necessary equations. (6)
13. (a) Illustrate the basic idea of correlative coding with a specific example.

Or

- (b) (i) Discuss about the important observations of eye pattern. (6)
- (ii) Explain the operation of zero forcing equalizer. (7)
14. (a) Derive the expression for bit error probability of Binary phase shift keying scheme with appropriate signal space diagram.

Or

- (b) Describe the coherent detection of FSK signal and derive the expression for the probability of error.
15. (a) (i) Consider the generator polynomial of the cyclic encoder as $g(x) = 1 + x + x^3$. Determine the encoded code word for the message sequence 1011. (7)
- (ii) Explain in detail about the syndrome decoding procedure of linear block codes. (6)

Or

- (b) (i) Consider the generator polynomial of the Convolutional encoder $g_1(x) = 1 + x + x^2$ and $g_2(x) = 1 + x^2$.
- (ii) Draw the structure of the convolutional encoder.
- (iii) Determine the convolution code for the data sequence 101011.

PART C — (1 × 15 = 15 marks)

16. (a) Consider a (7,4) linear block code with generator matrix

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

- (i) Find all the code vectors.
- (ii) Find parity check matrix.
- (iii) Comment on the error detection and correction ability with an example code word. (15)

Or

- (b) A discrete memory less source has an alphabet of seven symbols with probabilities [0.4, 0.14, 0.16, 0.15, 0.05, 0.1]. Compute the Huffman code for this source symbols. Also determine average codeword length and efficiency. (15)

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