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MTECH
(SEM I) THEORY EXAMINATION 2023-24
ADVANCED DIGITAL COMMUNICATION

TIME: 3HRS

M.MARKS: 70

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief.

2 x 7 = 14

a.	What is baseband data transmission, and how does it differ from broadband transmission?
b.	What the significance of the design is of transmit and receive filters in baseband data transmission?
c.	What is the role of symbol timing estimation methods in digital communication systems?
d.	What are convolutional codes, and how are they different from block codes?
e.	State the meaning of spread spectrum?
f.	State the meaning correlative coding.
g.	What are convolutional codes, and how are they different from block codes?

SECTION B

2. Attempt any three of the following:

7 x 3 = 21

a.	Discuss the Nyquist criterion for zero ISI in detail. Explain how it is derived and its significance in designing digital communication systems. Provide examples to illustrate its application.
b.	With a neat block diagram explain the function of DPSK & MPSK modulators and demodulators techniques.
c.	Describe trellis coded modulation (TCM) and its implementation using convolutional codes and signal constellation mappings.
d.	Explain generation and coherent detection of BPSK signals.
e.	Discuss in detail about optimum and suboptimum detectors in CDMA systems.

SECTION C

3. Attempt any one part of the following:

7 x 1 = 7

a.	Explore the relationship between correlative level coding and error detection/correction techniques in digital communication systems. Discuss how they complement each other to improve data transmission reliability.
b.	Explain the difference between decision feedback equalizer and zero forcing equalizer. Discuss their advantages and limitations.

4. Attempt any one part of the following:

7 x 1 = 7

a.	Discuss the advantages and disadvantages of coherent and non-coherent digital modulation schemes in passband transmission. Compare their performance in terms of receiver complexity, bandwidth efficiency, and robustness to channel impairments.
b.	Compare and contrast direct sequence and frequency hopping spread spectrum techniques. Discuss their relative advantages, limitations, and suitability for different communication environments.



PAPER ID-311666

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5. Attempt any *one* part of the following: 7 x 1 = 7

a.	Explore cyclic codes and their characteristics, focusing on encoding and decoding methods. Discuss how cyclic redundancy check (CRC) codes are used for error detection in data transmission.
b.	<p>The parity check matrix of a particular (7,4) linear block code is given by:</p> $H = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$ <p>i. Find the generator matrix. ii. List all the codewords. iii. What is the minimum distance between the code vectors? iv. How many errors can be detected? How many errors can be corrected?</p>

6. Attempt any *one* part of the following: 7 x 1 = 7

a.	Investigate the CDMA system architecture and its implementation using spread spectrum techniques. Discuss how CDMA achieves multiple access and improved spectral efficiency compared to other multiple access techniques.
b.	What is spread spectrum techniques? Evaluate performance parameters of direct sequence spread spectrum (DSSS) systems.

7. Attempt any *one* part of the following: 7 x 1 = 7

a.	Discuss the concept of multiple access in multiuser communication systems.
b.	Why decision feedback equalization technique is known as nonlinear Equalization technique? Explain decision feedback equalizer with its block diagram.