ADVANCED DIGITAL COMMUNICATIONS

17ECMC1T2   **Credits: 4**
Lecture: 4 periods/week   **Internal assessment: 40 marks**
                                                           Semester end examination: 60 marks

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Prerequisites: Digital communications

Course Objectives:

- To provide the student with an understanding of modulation and multiple access techniques
- To provide the student with an understanding of Spread Spectrum and spreading sequences
- To provide the student with an understanding of Equalization techniques
- To give the student an understanding of Single and Multiuser detection techniques

Course outcomes:

After completion of the course the student is able to

- Design different modulation techniques with lower bandwidth
- Analyze different spread spectrum techniques and their performance
- Analyze different equalization techniques and transmits the data
- Able to design optimum filter which use low probability of error

UNIT I

Digital Modulation and Multiple Access Techniques: Digital Modulation Techniques: ASK, FSK, PSK, QPSK, DPSK and QAM Techniques. Multiple Access Techniques: introduction to FDMA, TDMA, CDMA and SDMA Techniques

UNIT II

Spread Spectrum Techniques and Pseudo-Random Code Sequences: Spread Spectrum Techniques: FDMA, TDMA CDMA, Direct-Sequence Spread-Spectrum Systems, Frequency Hopping Systems, and Commercial Applications.

Pseudo-Random Code Sequences: Generation of binary pseudo-random sequences, Maximal-length sequences (m-sequences), preferred pairs of m-sequences, Gold sequences, Kasami sequences, Walsh sequences.

UNIT III

Equalization and Adaptive Equalization Techniques: Equalization Techniques: Linear equalization, Decision – feedback equalization, iterative equalization and decoding- Turbo equalization

Adaptive equalization: Adaptive linear equalizer, adaptive decision feedback equalizer, self recovering (blind) equalization.

UNIT IV

Single user and Multiuser Detection Techniques: Single –user matched filter receiver, optimum receiver structure, sub-optimum linear receiver structures: Decorrelating and MMSE Detectors, sub-optimal nonlinear receiver structures (interference cancellation): successive interference cancellation, parallel interference cancellation.

Text Books:

1. Simon Haykin "Digital communications" 8th edition Wiley

2. John G.Prokis, "Digital communications" 4th edition, Mc GRAW Hill, 2001

3. Bernard sklar "Digital Communications" Second EditionCommunications Engineering Services, Tarzana, and University of California, Los Angeles

4. S.verdu, "multi-user detection" Cambridge university press-1998.

Reference Books:

1. Andrew J.Viterbi, CDMA: "Principles of spread spectrum communications", Prentice Hall, USA, 1995.

2. Theodore S. Rappaport "wireless communication principles & practice" PHI Pub.