III SEMESTER

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Subject Code</th>
<th>Name of Subject</th>
<th>No. of Hrs./Week</th>
<th>Duration of Exam in Hours</th>
<th>Marks for</th>
<th>Total Marks</th>
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<tbody>
<tr>
<td>10LDS31</td>
<td>10EC039</td>
<td>Error Control Coding</td>
<td>4 - 2 - 3</td>
<td>50</td>
<td>100</td>
<td>150</td>
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<td>10LDS32</td>
<td>10ECxxx</td>
<td>Elective-III (10LDS32x)</td>
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<td>10ECxxx</td>
<td>Elective-IV (10LDS33x)</td>
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<td>10LDS34</td>
<td>10EC931</td>
<td>Evaluation of Project Phase – I</td>
<td>– - –</td>
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Project Phase-II must be carried out for 3 days a week during III semester. It will be evaluated during IV semester.

Total: 12 - 6 - 6 - 09 - 200 - 300 - 500

ERROR CONTROL AND CODING

Subject Code: 10EC039
IA Marks: 50
Exam Hours: 03
Exam Marks: 100

Introduction to Algebra: Groups, Fields, Binary Field Arithmetic, Construction of Galois Field GF (2^m) and its basic properties, Computation using Galois Field GF (2^m) Arithmetic, Vector spaces and Matrices.

Linear Block Codes: Generator and Parity check Matrices, Encoding circuits, Syndrome and Error Detection, Minimum Distance Considerations, Error detecting and Error correcting capabilities, Standard array and Syndrome decoding, Decoding circuits, Hamming Codes, Reed – Muller codes, The (24, 12) Golay code, Product codes and Interleaved codes.

Cyclic Codes: Introduction, Generator and Parity check Polynomials, Encoding using Multiplication circuits, Systematic Cyclic codes – Encoding using Feed back shift register circuits, Generator matrix for Cyclic codes, Syndrome computation and Error detection, Meggitt decoder, Error trapping decoding, Cyclic Hamming codes, The (23, 12) Golay code, Shortened cyclic codes.

BCH Codes: Binary primitive BCH codes, Decoding procedures, Implementation of Galois field Arithmetic, Implementation of Error correction. Non – binary BCH codes: q – ary Linear Block Codes, Primitive BCH codes over GF (q), Reed – Solomon Codes, Decoding of Non – Binary BCH and RS codes: The Berlekamp - Massey Algorithm.

Majority Logic Decodable Codes: One – step Majority logic decoding, one – step Majority logic decodable Codes, Two – step Majority logic decoding, Multiple – step Majority logic decoding.

Convolutional Codes: Encoding of Convolutional codes, Structural properties, Distance properties, Generator matrix for Convolutional codes, Decoding Algorithm for decoding, Soft – output Viterbi Algorithm, Stack and Fano sequential decoding Algorithms, Majority logic decoding

Concatenated Codes & Turbo Codes: Single level Concatenated codes, Multilevel Concatenated codes, Soft decision Multistage decoding, Concatenated coding schemes with Convolutional Inner codes, Introduction to Turbo coding and their distance properties, Design of Turbo codes.

Burst – Error – Correcting Codes: Burst and Random error correcting codes, Concept of Inter – leavening, cyclic codes for Burst Error correction – Fire codes, Convolutional codes for Burst Error correction.
REFERENCE BOOKS:


ELECTIVE – III

Simulation Modeling and Analysis

<table>
<thead>
<tr>
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<td>04</td>
<td>03</td>
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Basic simulation modeling: nature of simulation, system models, discrete event simulation, single server simulation, alternative approaches, other types of simulation.

Building valid, credible and detailed simulation models. Techniques for increasing model validity and credibility, comparing real world observations.

Selecting input probability distributions. Useful probability distributions, assessing sample independence, activity I, II and III. Models of arrival process.

Random numbers generators: linear congruential, other kinds, testing random number generators. Random variate generation: approaches, continuous random variates, discrete random variates, correlated random variates.


References:


MULTIMEDIA COMMUNICATION

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Multimedia Communications: multimedia information representation, multimedia networks, multimedia applications, network QoS and application QoS.

Detailed Study of MPEG 4: coding of audiovisual objects, MPEG 4 systems, MPEG 4 audio and video, profiles and levels. MPEG 7 standardization process of multimedia content description, MPEG 21 multimedia framework, Significant features of JPEG 2000, MPEG 4 transport across the Internet.

Synchronization: Notion of synchronization, presentation requirements, reference model for synchronization. Introduction to SMIL, Multimedia operating systems, Resource management, process management techniques.

Multimedia Communication Across Networks: Layered video coding, error resilient video coding techniques, multimedia transport across IP networks and relevant protocols such as RSVP, RTP, RTCP, DVMRP, multimedia in mobile networks, multimedia in broadcast networks.

Assignments / Practicals can be given on writing the programs to encode and decode the various kinds of data by using the algorithms. Students can collect several papers from journals/conferences/Internet on a specific area of multimedia communications and write a review paper and make a presentation.

REFERENCE BOOKS:

ADVANCES IN VLSI DESIGN

Subject Code : 10EC009 IA Marks : 50
No. of Lecture Hours /week : 04 Exam Hours : 03
Total no. of Lecture Hours : 52 Exam Marks : 100

Review of MOS Circuits: MOS and CMOS static plots, switches, comparison between CMOS and BI - CMOS.

MESFETS: MESFET and MODFET operations, quantitative description of MESFETS.

MIS Structures and MOSFETS: MIS systems in equilibrium, under bias, small signal operation of MESFETS and MOSFETS.

Short Channel Effects and Challenges to CMOS: Short channel effects, scaling theory, processing challenges to further CMOS miniaturization.

Beyond CMOS: Evolutionary advances beyond CMOS, carbon Nano tubes, conventional vs. tactile computing, computing, molecular and biological computing Mole electronics-molecular Diode and diode- diode logic. Defect tolerant computing.

Super Buffers, Bi-CMOS and Steering Logic: Introduction, RC delay lines, super buffers- An NMOS super buffer, tri state super buffer and pad drivers, CMOS super buffers, Dynamic ratio less inverters, large capacitive loads, pass logic, designing of transistor logic, General functional blocks - NMOS and CMOS functional blocks.


System Design: CMOS design methods, structured design methods, Strategies encompassing hierarchy, regularity, modularity & locality, CMOS Chip design Options, programmable logic, Programmable inter connect, programmable structure, Gate arrays standard cell approach, Full custom Design.

REFERENCE BOOKS:
1. Kevin F Brannan “Introduction to Semiconductor Device”, Cambridge publications

ELECTIVE - IV

CRYPTOGRAPHY AND NETWORK SECURITY

<table>
<thead>
<tr>
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Overview: Services, Mechanisms and attacks, OSI security architecture, Model for network security.


Block Ciphers and DES (Data Encryption Standards): Simplified DES, Block cipher principles, DES, Strength of DES, Block cipher design principles, Block cipher modes of operation, Problems.

Public Key Cryptography and RSA: Principles of public key cryptosystems, RSA algorithm, Problems.

Other Public Key Crypto Systems and Key Management: Key management, Diffie-Hellman key exchange, Elliptic curve arithmetic, Elliptic curve cryptography, Problems.


Authentication Applications: Kerberos, X.509 authentication service, Kerberos encryption technique, Problems.

Electronic Mail Security: Pretty good privacy, S/MIME, Data compression using ZIP, Radix-64 conversion, PGP random number generator.


Firewalls: Firewall design principles; Trusted systems, Problems.

REFERENCE BOOKS:


**REAL TIME OPERATING SYSTEMS**

<table>
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<tr>
<th>Subject Code:</th>
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<td>Exam Marks:</td>
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**Processing:** Preemptive Fixed-Priority Policy, Feasibility, Rate Monotonic least upper bound, Necessary and Sufficient feasibility, Deadline – Monotonic Policy, Dynamic priority policies.

**I/O Resources:**

**Memory:**
- Physical hierarchy, Capacity and allocation, Shared Memory, ECC Memory, Flash filesystems.

**Multi-resource Services:**
- Blocking, Deadlock and livestock, Critical sections to protect shared resources, priority inversion.

**Soft Real-Time Services:**
- Missed Deadlines, QoS, Alternatives to rate monotonic policy, Mixed hard and soft real-time services.

**Embedded System Components:**
- Firmware components, RTOS system software mechanisms, Software application components.

**Debugging Components:**

**Performance Tuning:**
- Basic concepts of drill-down tuning, hardware – supported profiling and tracing, Building performance monitoring into software, Path length, Efficiency, and Call frequency, Fundamental optimizations.

**High availability and Reliability Design:**
- Reliability and Availability, Similarities and differences, Reliability, Reliable software, Available software, Design trade offs, Hierarchical applications for Fail-safe design.

**Design of RTOS – PIC microcontroller. (Chap 13 of book Myke Predko)**

**Reference Books:**

RF AND MICROWAVE CIRCUIT DESIGN

Subject Code : 10EC071
IA Marks : 50
No. of Lecture Hours /week : 04
Exam Hours : 03
Total no. of Lecture Hours : 70
Exam Marks : 100

Wave Propagation in Networks: Introduction to RF/Microwave Concepts and applications; RF Electronics Concepts; Fundamental Concepts in Wave Propagation; Circuit Representations of two port RF/MW networks


Basic Considerations in Active Networks: Stability Consideration in Active networks, Gain Considerations in Amplifiers, Noise Considerations in Active Networks.

REFERENCE BOOKS: