Sona College of Technology, Salem

(Autonomous)

Subjects of Study for ME I Semester under Regulations 2010R

Branch: M.E. Computer Science and Engineering

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	P10CSE101R	Theoretical Foundations of Computer Science	3	1	0	4
2	P10CSE102R	Advanced Computer Architecture	3	0	0	3
3	P10CSE103R	Advanced Data Structures and Algorithms	3	0	0	3
4	P10CSE104R	Advanced Operating Systems	3	0	0	3
5	P10CSE105R	Software Engineering Methodologies	3	0	0	3
6	P10CSE106R	Network Engineering and Management	3	0	0	3
Practical						
7	P10CSE107R	Data Structures Laboratory	0	0	3	2
					Total Credits	**21**

Approved by

Chairperson, Computer Science and Engineering BOS Dr.B.Sathiyabhama

Member Secretary, Academic Council Dr.B.Sathiyabhama

Chairperson, Academic Council & Principal Dr.P.Govindarajan

Copy to:-
HOD/CSE, First Semester ME CSE Students and Staff, COE

P10CSE101 R THEORETICAL FOUNDATIONS OF COMPUTER SCIENCE

L T P C
3 1 0 4

Aim:

The subject aims at imparting the knowledge of modeling and languages, probability.

Objectives:

At the end of the course students should be able to understand the basic principles of mathematical foundations required for computer science modeling and simulation.

UNIT – I FUNDAMENTAL STRUCTURES (12)

Set theory- Relationships between sets – Operations on sets – Set identities –Principle of inclusion and exclusion – Minsets. Relations:– Binary relations – Partial orderings – Equivalence relations. Functions:– Properties of functions – Composition of functions – Inverse functions – Permutation functions.

UNIT - II LOGIC (12)

Propositional logic – Logical connectives – Truth tables – Normal forms (conjunctive and disjunctive) – Predicate logic – Universal and existential quantifiers – Proof techniques – direct and indirect – Proof by contradiction – Mathematical Induction.

UNIT - III COMBINATORICS (12)

Basics of counting – Counting arguments – Pigeonhole principle – Permutations and Combinations – Recursion and Recurrence relations – Generating functions.

UNIT – IV MODELING COMPUTATION AND LANGUAGES (12)

Finite state machines – Deterministic and Non- deterministic finite state machines – Turing Machines – Formal Languages – Classes of Grammars – Type 0 – Context Sensitive – Context Free – Regular Grammars – Ambiguity

UNIT – V DISCRETE PROBABILITY (12)

Finite probability – Conditional Probability – Independence – Bayes' theorem – Mathematical expectation – Probability Distribution (Binomial, Poisson, Geometric and their Properties).

Lecture: 45 Tutorial:15 Total:60

Reference Books:

1. Judith L.Gersting, "Mathematical Structures for Computer Science", W.H. Freeman and Company, NY, 2006.
2. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Fifth Edition, TMH, 2003.
3. M.K. Venkataraman, N. Sridharan and N.Chandrasekaran," Discrete Maths.", The National Publishing Company, 2003.
4. Kishore S Trivedi, "Probability and statistics with reliability, Queing and computer science applications", PHI, 2006.

P10CSE102 R ADVANCED COMPUTER ARCHITECTURE **L T P C**
3 0 0 3

Aim:
To understand the advanced concepts in instruction set architecture and organization of modern computers.

Course Objectives:
- Understand processor design concepts in modern computer architecture.
- Understand Organization and Instruction Set Architecture
- Understand Main and cache memory organization and design issues
- Understand the ILP, Superscalar architecture and TLP performance
- Understand different IO and Interconnection structures
- Evaluate tradeoff in processor and memory design
- Understand multicore architecture design

UNIT I PIPELINING AND ILP (9)
Fundamentals of Computer Design - Measuring and Reporting Performance - Instruction Level Parallelism and Its Exploitation - Concepts and Challenges - Overcoming Data Hazards with Dynamic Scheduling – Dynamic Branch Prediction - Speculation - Multiple Issue Processors – Case Studies.

UNIT II TLP AND LIMITS OF ILP (9)
Compiler Techniques for Exposing ILP - Limitations on ILP for Realizable Processors - Hardware versus Software Speculation - Multithreading: Using ILP Support to Exploit Thread-level Parallelism - Performance and Efficiency in Advanced Multiple Issue Processors - Case Studies.

UNIT III MULTIPROCESSOR SYSTEMS (9)
Symmetric and distributed shared memory architectures – Cache coherence issues - Performance Issues – Synchronization issues – Models of Memory Consistency - Interconnection networks – Buses, crossbar and multi-stage switches.

UNIT IV MULTI-CORE ARCHITECTURES (9)
Introduction to Multicore Architecture –SMT and CMP architectures – Multicore Vs Multithreading– Case studies – Intel Multi-core architecture – SUN CMP architecture – IBM cell architecture.- hp architecture.

UNIT V MEMORY HIERARCHY DESIGN (9)
Introduction - Optimizations of Cache Performance - Memory Technology and Optimizations - Protection: Virtual Memory and Virtual Machines - Design of Memory Hierarchies - Case Studies.

TOTAL - 45

Reference Books:

1. John L. Hennessey and David A. Patterson, " Computer Architecture – A quantitative approach", Morgan Kaufmann / Elsevier, 4th. edition, 2007.
2. Kai Hwang, "Advanced Computer Architecture: Parallelism, Scalability and Programmability" McGraw-Hill, 1993
3. William Stallings, "Computer Organization and Architecture – Designing for Performance", Pearson Education, Seventh Edition, 2006.

P10CSE103R ADVANCED DATA STRUCTURES AND ALGORITHMS

L	T	P	C
3	0	0	3

Aim:

The aim is to introduce the concepts and implementation of advanced Data Structures.

Objectives:

- To understand the concepts of notations and analysis.
- To understand the concepts of Heaps and search structures.
- To understand the concepts of multimedia structures and algorithms.

UNIT I FUNDAMENTALS (9)

Mathematical Induction - Asymptotic Notations – Properties of Big-oh Notation – Conditional Asymptotic Notation – Algorithm Analysis – Amortized Analysis – NP Completeness – NP-Hard – Recurrence Equations – Solving Recurrence Equations – Memory Representation of Multi-dimensional Arrays – Time-Space Tradeoff.

UNIT II HEAP STRUCTURES (9)

Min/Max heaps – Deaps – Leftist Heaps – Binomial Heaps – Fibonacci Heaps – Skew Heaps – Lazy-Binomial Heaps.

UNIT III SEARCH STRUCTURES (9)

Binary Search Trees – AVL Trees – Red-Black trees – Multi-way Search Trees –B-Trees – Splay Trees – Tries.

UNIT IV MULTIMEDIA STRUCTURES (9)

Segment Trees – k-d Trees – Point Quad Trees – MX-Quad Trees – R-Trees – TVTrees.

UNIT V ALGORITHMS (9)

Huffman Coding – Convex Hull – Topological Sort – Tree Vertex Splitting – Activity Networks – Flow Shop Scheduling – Counting Binary Trees – Introduction to Randomized Algorithms.

Total: 45

Reference Books:

1. E. Horowitz, S.Sahni and Dinesh Mehta, Fundamentals of Data structures in C++, Uiversity Press, 2007.
2. E. Horowitz, S. Sahni and S. Rajasekaran, Computer Algorithms/C++, Second Edition, University Press, 2007.
3. G. Brassard and P. Bratley, Algorithmics: Theory and Practice, Printice –Hall, 1988.
4. V.S. Subramanian, Principles of Multimedia Database systems, Morgan Kaufman, 1998.

P10CSE104 R ADVANCED OPERATING SYSTEMS

L	T	P	C
3	0	0	3

Aim:

The overall aim of this course is to provide a general understanding of modern operating systems that explores design aspects of modern operating systems.

Objectives:

- Explain the concepts of process, address space, and file
- Compare and contrast various CPU scheduling algorithms
- Understand the differences between segmented and paged memories, and be able to describe the advantages and disadvantages of each
- Knowing the concepts of multi processor & distributed operating system

UNIT – I INTRODUCTION (9)

Operating system concept – processes and threads, process model, process creation, process termination, Implementation of processes. CPU scheduling – Scheduling Algorithms- Inter Process Communication- Race conditions, critical regions, Mutual Exclusion with busy waiting, sleep and wakeup, Semaphores, Monitors.

UNIT – II DEADLOCK & MEMORY MANAGEMENT (9)

Deadlocks-Introduction, Deadlock detection and Recovery, Deadlock avoidance, Deadlock prevention, Deadlock handling strategies in distributed system – Memory Management- Swapping – Paging – Segmentation – Virtual Memory - Demand paging – Page Replacement.

UNIT – III FILE SYSTEMS (9)

File Concepts – Access methods – Directory Structure – File Protection – File System Implementation: File System Structure and Implementation – Directory Implementation – Allocation methods Free Space Management – Recovery – Disk Structure – Disk Scheduling.

UNIT – IV MULTIPROCESSOR OPERATING SYSTEMS (9)

Basic multiprocessor system architectures – basic multiprocessor system architecture – inter connection networks for multiprocessor systems – Caching – structures of multiprocessor operating system – operating system design issues – process synchronization.

UNIT – V DISTRIBUTED OPERATING SYSTEM (9)

Design issues in distributed operating system - Distributed file systems – Naming and Transparency-Remote File Access - Stateful versus Stateless service – Distributed Coordination- Event Ordering-Mutual Exclusion-Atomicity- Concurrency Control- Deadlock Handling - Election Algorithms.

Total: 45

Reference Books:

1. Avi Silberschatz, P.B.Galvin, G.Gagne “Operating System Concepts” seventh edition, John Wiley & Sons, 2007.
2. Pradeep K.Sinha, “Distributed Operating System: Concepts and Design”, IEEE computer Society Press, PHI, 2004.
3. Andrew S. Tanenbaum , “Modern Operating Systems”, PHI , 2nd Edition, 2001

P10CSE105R SOFTWARE ENGINEERING METHODOLOGIES

L	T	P	C
3	0	0	3

Aim:

The subject aims to impart sound knowledge to design and implement an efficient software system and manage the resources.

Objectives:

The students would be able to understand the process models and project management, analyze software requirements, design and develop an efficient software system through group cohesiveness, use the testing tools and methods and also to understand the various quality standards.

UNIT – I PROCESS AND PROJECT MANAGEMENT (9)

Software Process models – process iteration – process activities – rational unified process – computer aided software engineering. Management activities – project planning – project scheduling – risk management.

UNIT – II REQUIREMENT ANALYSIS (9)

Functional and Non – functional requirements – user requirements – system requirements – interface specifications – software requirements document. Requirements engineering processes – feasibility studies – elicitation and analysis – validations – management. System Models – Context – Behavioral – Data – Object – Structured.

UNIT – III SOFTWARE DESIGN (9)

Architectural Design – Distributed System Architectures – Application Architectures – Object Oriented Design – Real-time Software Design.

UNIT – IV SOFTWARE TESTING (9)

Software testing fundamentals – Test Case Design – White Box – Basis Path Testing – Control Structure Testing – Black Box – Testing for Specialized environments, Architectures and Applications - Software Testing Strategies – Approach – issues – testing – unit – integration – validation – system – art of debugging.

UNIT – V SOFTWARE QUALITY ASSURANCE (9)

Software Quality Concepts – Quality Assurance – Software Technical Reviews – Formal Approach to Software Quality Assurance – Reliability – Quality Standards – Software Quality Assurance Plan – Software Maintenance – Software Configuration Management – configuration item – process – objects in the software configuration – version control – change control – configuration audit – status reporting – SCM Standards – Case study : Martha Stockton Greengage (MSG) foundations.

Total: 45

Reference Books:

1. Roger S. Pressman, “Software Engineering: A Practitioner’s Approach”, Sixth Edition, McGraw Hill, 2005.
2. I.Sommerville, “Software Engineering”, 5th Edition, Addison Wesley, 1996.

P10CSE106 R NETWORK ENGINEERING AND MANAGEMENT

L T P C
3 0 0 3

Aim:

The aim is to introduce the concepts of high performance and high speed networks, management and Quality of service.

Objectives:

- To understand the basic concepts in networking.
- To understand the Quality of Service issues.
- To understand the concepts of high performance and high speed networks.
- To understand the concepts of network management.

UNIT I FOUNDATIONS OF NETWORKING (9)

Communication Networks – Network Elements – Switched Networks and Shared media Networks –Datagrams and Virtual Circuits – Multiplexing – Switching - Error and Flow Control – Congestion Control – Layered Architecture

UNIT II QUALITY OF SERVICE (9)

Traffic Characteristics and Descriptors – Quality of Service and Metrics – Best Effort model and Guaranteed Service Model – Limitations of IP networks – Scheduling and Dropping policies for BE and GS models – Traffic Shaping algorithms – End to End solutions – Laissez Faire Approach

UNIT III HIGH PERFORMANCE NETWORKS (9)

Integrated Services Architecture – Components and Services – Differentiated Services Networks – Per Hop Behaviour – Admission Control – MPLS Networks – Principles and Mechanisms – Label Stacking – RSVP – RTP/RTCP

UNIT IV HIGH SPEED NETWORKS (9)

Optical links – WDM systems – Optical Cross Connects – Optical paths and Networks –Principles of ATM Networks – B-ISDN/ATM Reference Model – ATM Header Structure – ATM Adaptation Layer – Management and Control – Service Categories and Traffic descriptors in ATM networks

UNIT V NETWORK MANAGEMENT (9)

ICMP – CMIP – SNMP– SNMPv2 and SNMPv3 – Remote monitoring – RMON SMI and MIB

Total: 45

Reference Books:

1. Mahbub Hassan and Raj Jain, 'High Performance TCP/IP Networking', Pearson Education, 2004.
2. Larry L Peterson and Bruce S Davie, 'Computer Networks: A Systems Approach', Fourth Edition, Morgan Kaufman Publishers, 2007.
3. Jean Warland and Pravin Vareya, 'High Performance Networks', Morgan Kauffman Publishers, 2002
4. William Stallings, 'High Speed Networks: Performance and Quality of Service', 2nd Edition, Pearson Education, 2002.
5. Mani Subramaniam, 'Network Management: Principles and Practices', Pearson Education, 2000
6. Kasera and Seth, 'ATM Networks: Concepts and Protocols', Tata McGraw Hill, 2002.

P10CSE107 R DATA STRUCTURES LABORATORY

L	T	P	C
0	0	3	2

1. Implementation of multi-dimensional structures such as matrices, triangular matrices, diagonal matrices, etc into a one dimensional array (atleast any two)
2. Implementation of any two of the following Heap structures

   Deaps (Insertion, Delete Min, Delete Max)

   Leftist Heap (All Meldable Priority Queue operations)

   Skew Heap (All Meldable Priority Queue operations)

   Fibonacci Heap (All Meldable Priority Queue operations)

3. Implementation of any two of the following Search Structures

   AVL Trees (Insertion, Deletion and Search)

   Splay Trees (Insertion, Deletion and Search)

   Tries for any specified alphabet (Insertion, Deletion and Search)

   B-Trees (Insertion, Deletion and Search)

4. Implementation of any two of the following multimedia structures

   2-d Trees (Insertion, Deletion and Range Queries)

   Point Quad-Trees (Insertion, Deletion and Range Queries)

   Segment Trees (Insertion, Deletion – Show list of nodes where in insertion and deletion took place)

5. Finding Convex-hull.

Sona College of Technology, Salem

(Autonomous)

Subjects of Study for ME I Semester under Regulations 2010

Mechanical Engineering

Branch: M.E. Engineering Design

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	P10END101	Advanced Mathematics	3	1	0	4
2	P10END102	Computer Applications in Design	3	1	0	4
3	P10END103	Finite Element Analysis	3	0	0	3
4	P10END104	Concepts of Engineering Design	3	0	0	3
5	P10END105	Micro Electro Mechanical Systems Design	3	0	0	3
6	P10END501	Rapid Prototyping and Tooling	3	0	0	3
Practical						
7	P10END106	CAD Lab	0	0	3	2
					Total Credits	**22**

Approved by

Chairperson, Mechanical Engineering BOS	**Member Secretary, Academic Council**	**Chairperson, Academic Council & Principal**
Dr.R.Venkatesan	Dr.B.Sathiyabhama	Dr.P.Govindarajan

Copy to:-
HOD/MECH, First Semester ME END Students and Staff, COE

P10END101 ADVANCED MATHEMATICS 3 1 0 4

1. SIMULTANEOUS EQUATIONS AND NUMERICAL INTEGRATION 10

Solving of set of equations, Gauss elimination method, Choleski method, Iterative methods, Relaxation method, System of non-linear equations- Newton Raphson method -Newton-Cotes integration formulas, Trapezoidal rule, Simpson's rules, Gaussian quadrature, Adaptive integration, Examples.

2. BOUNDARY VALUE AND CHARACTERISTIC VALUE PROBLEMS 8

Shooting method, solution through a set of equations, derivative boundary conditions, Rayleigh-Ritz method, characteristic value problems, solution using Characteristic polynomial method, Jacobi method, Power method and Inverse power method.

3. CALCULUS OF VARIATIONS 6

Variation and its properties –Euler's equation – Functionals dependent on first and higher order derivatives - Functionals dependent on functions of several independent variables – Rayleigh Ritz method- Galerkin method**.**

4. PARTIAL DIFFERENTIAL EQUATIONS - NUMERICAL SOLUTION 7

Laplace's equations, representations as a difference equation, Iterative methods for Laplace's equations, Poisson equation, derivative boundary conditions, irregular and non-rectangular grids, Matrix patterns, Sparseness, ADI method, Applications to heat flow problems.

5. PARABOLIC PARTIAL DIFFERENTIAL EQUATIONS 7

Explicit method, Crank-Nicholson method, derivative boundary condition, stability and convergence criteria, Parabolic equations in two or more dimensions, applications to heat flow problems.

6.HYPERBOLIC PARTIAL DIFFERENTIAL EQUATIONS 7

Solving wave equation by finite differences, stability of numerical method, method of characteristics, Wave equation in two space dimensions, computer programs.

Note: Assignments/Term papers using MATLAB / C / C++ to solve design problems.

TUTORIALS: 15

TOTAL: 60

REFERENCES

1. Curtis F Gerald and Patrick O Wheatley, "Applied Numerical Analysis", Pearson Education, 2002.
2. Rajasekaran S, “Numerical Methods in Science and Engineering – A Practical Approach”, Wheeler Publishing, 1999, Second Edition.
3. Douglas J Faires and Riched Burden, "Numerical Methods", Brooks/Cole Publishing Company, 1998, Second Edition.
4. Steven C Chapra and Raymond P Canale, “Numerical Methods for Engineers with Software and Programming Applications”, Tata McGraw Hill Edition, 2004.
5. John H Mathews and Kurtis D Fink, “Numerical Methods using MATLAB”, Prentice Hall, 1998.
6. Ward Cheney and David Kincaid, "Numerical Mathematics and Computing", Brooks/Cole Publishing Company, 1999, Fourth Edition.

P10END102 COMPUTER APPLICATIONS IN DESIGN

3 0 0 4

1. INTRODUCTION TO COMPUTER APPLICATIONS IN NEW PRODUCT DESIGN 9

Concept design – parametric sketching – constraints – computer graphics principles- 2D transformation, scaling, rotation – windowing, view ports – clipping – data exchange formats.

2. COMPUTERS IN DESIGN 10

Solid modeling of Mechanical components – associative features – Sheet metal components, nesting and development – plastic parts with draft and shrinkage allowance – Reverse engineering of components – assembly of parts – tolerance analysis – mass property calculations

3. COMPUTERS IN TOOLING DESIGN 9

Mould design – jigs and fixtures design – check for interferences – mechanism design and analysis – Rapid tooling

4. COMPUTERS IN DESIGN PRODUCTIVITY 8

Customizing various software by using visual basic, pro/program, script, LISP etc to write applications like design of shafts, gears etc.,

5. MANAGING PRODUCT DESIGN DATA 9

Version control – library creation – catalog making – standardization for design – collaborative design among peer groups – Design optimization for geometry - Design check, approval and validation.

Total: 45

REFERENCES

1. William M. Neumann and Robert Sproul " Principles of Computer Graphics" McGraw Hill Book Co. Singapore 1989.
2. Ibrahim Zeid "CAD/CAM – Theory and Practice" – McGraw Hill, International Edition 1998.
3. P N Rao "CAD/CAM :Principles and Applications" Tata McGraw Hill , Second Edition. 2004.
4. Schlechtendahl, E. G, CAD – Data transfer for Solid Models, Springer Verlag, Berlin, 1989.
5. Donald Hearn and M Pauline Baker "Computer Graphics" Prentice Hall Inc 1992.

P10END103 FINITE ELEMENT ANALYSIS

3 0 0 3

1. INTRODUCTION & ONE-DIMENSIONAL PROBLEMS 10

Relevance of finite element analysis in design - Variational principles and methods – Weighted-Integral statements – Weak formulations – Ritz method – Method of weighted residuals – Applications of FEA - Finite element modeling – Co-ordinates and shape functions - Potential energy approach – Galerkin's approach – One dimensional finite element models in Solid mechanics and Heat transfer – Finite element model for beams

2. TWO-DIMENSIONAL PROBLEMS 10

Poisson equation – Laplace equation – Weak form – Element matrices for triangular and rectangular elements – Evaluation of integrals – Assembly – Axi-symmetric problems – Applications – Conduction and convection heat transfer - Torsional cylindrical member – Transient analysis - Theory of elasticity – Plane strain – Plane stress – Axi-symmetric problems – Principle of virtual displacement

3. ISOPARAMETRIC ELEMENTS 8

Introduction – Bilinear quadrilateral elements – Quadratic quadrilaterals – Hexahedral elements - Numerical integration – Gauss quadrature – Static condensation – Load considerations – Stress calculations – Examples of 2D and 3D applications

4. STRUCTURAL DYNAMICS APPLICATIONS 9

Dynamic equations – Mass and damping matrices – Natural frequencies and modes – Reduction of number of DOF-response history – Model methods – Ritz vectors – Component mode synthesis – Harmonic response – Direct integration techniques – Explicit and implicit methods – Analysis by response spectra – Example problems

5. NON-LINEAR PROBLEMS & ERROR ESTIMATES 8

Introduction – Material non-linearity – Elasto Plasticity – Plasticity – Visco plasticity – Geometric non-linearity – Large displacement – Error norms and convergence rates – H-refinement with adaptivity – adaptive refinement

Total : 45

REFERENCES

1. Reddy J.N., "An Introduction to the Finite Element Method", McGraw Hill, International Edition, 1993.
2. Logan D.L, "A First Course in the Finite Element Method", Third Edition, Thomson Learning, 2002.

3. Cook, Robert Davis et al “Concepts and Applications of Finite Element Analysis”, Wiley, John & Sons, 1999.
4. Segerlind L.J., “Applied Finite Element Analysis”, John Wiley, 1984.
5. S.S.Rao, “Finite Element Analysis”, 2002 Edition.
6. Zienkiewicz, O.C. and Taylor, R.L., “The Finite Element Method”, Fourth Edition, Volumes 1 & 2, McGraw Hill International Edition, Physics Services, 1991.
7. Bathe K.J., “Finite Element Procedures in Engineering Analysis”, Prentice Hall, 1990.

P10END104 CONCEPTS OF ENGINEERING DESIGN

3 0 0 3

1. THE DESIGN PROCESS 8

The Design Process - need identification – Design requirements – Product Life Cycle – Morphology of Design steps of Product Design – Conceptual Design, Embodiment Design, detailed Design – Concurrent Engineering – CAD & CAM, Human factors in Design.

2. TOOLS IN ENGINEERING DESIGN 9

Creativity and problem solving, Decision Theory, Modeling – Role of models in Engineering Design, Mathematical modeling, Geometric modeling, finite element modeling, Rapid Prototyping – Simulation Finite Difference method, Monte Carlo method – Optimization – Search methods, Geometric programming, Structural and shape optimization.

3 MATERIAL SELECTION AND MATERIALS IN DESIGN 9

The Classification and properties of Engineering materials, material standards and specifications – Methods of material selection – Ashby Chart and method of weight factors, Derivation of material indices, Use of material selection Chart, Pugh selection method, selection with computed aided databases – Design for brittle fracture, Design for fatigue failure, Design for corrosion resistance, Designing with plastics.

4. MATERIAL PROCESSING AND DESIGN 9

Classification of manufacturing processes and their role in design, Factors determining the process selection, use of process selection chart and computerized database – Design for manufacturing, Design for forging and sheet metal forming, Design for casting, Design for machining, welding and assembly, design for residual stresses and heat – treatment.

5. Legal, ethical environmental and safety issues in design and Quality Engineering 10

The origin of laws, Contracts, - Liability – Tort Law- Product Liability – Design aspects of product liability, Codes of ethics, solving ethical conflicts. Design for environment – Life Cycle assessment – Material recycling and remanufacture, Design for safety – Potential Dangers and Guidelines for design for safety, Design for reliability failure mode effect analysis, robust Design.

Total: 45

REFERENCES

1. Dieter, George E, Engineering Design –“A materials and processing Approach,”. Mc Graw Hill, International Edition, Singapore 2000.
2. Karl T. Vlrich and Steven D. Eppinger “Product design and Development”, Mc Graw Hill, International Edition, 2000.
3. Pahlgand Beitz W “Engineering Design” Springr – Verlag NY- 1984.
4. Ray M.S. “Elements of Engineering Design”, Printice Hall Inc. 1985
5. Suh. N. P. “The principles of design”,. Oxford University, Press NY 1990.

P10END105 MICRO ELECTRO MECHANICAL SYSTEMS DESIGN

3 0 0 3

1. INTRODUCTION 9

Overview-Microsystems and microelectronics - Working principle of Microsystems -micro actuation techniques-micro sensors-types-microactuators-types-micropump-micromotors-micro-valves-microgrippers-scaling laws-scaling in geomentry-scaling in rigid body dynamics- scaling in electrostatic forces- scaling in electricity- scaling in fluid mechanics- scaling in heat transfer.

2. MATERIALS AND FABRICATION PROCESS 9

Substrates and wafer-single crystal silicon wafer formation-ideal substrates-mechanical properties-silicon compounds - Sio_2, SiC, Si_3N_4 and polycrystalline silicon - Silicon piezoresistors - Gallium aresenside, Quartz-piezoelectric crystals-polymers for MEMS -conductive polymers – Photolithography - Ion implantation - Diffusion – Oxidation –CVD - Physical vapor deposition - Deposition by epitaxy - etching process

3. MICROMECHANICS 9

Introduction-static bending of thin plates-circular plates with edge fixed - rectangular plate with all edges fixed and square plate with all edges fixed – Mechanical vibration-resonant vibration- micro accelerometers-design theory and damping coefficients- thermo mechanics-thermal stresses-fracture mechanics-stress intensity factors, fracture toughness and interfacial fracture mechanics.

4. MICRO SYSTEM MANUFACTURING 9

Clean room technology-Bulk Micro manufacturing- surface micro machining –LIGA-SLIGA-Micro system packaging-materials-die level-device level-system level-packaging techniques-die preparation-surface bonding-wire bonding-sealing

5. MICRO SYSTEM DESIGN 9

Design considerations-process design-mask layout design- mechanical design-applications of micro system in -automotive industry-bio medical –aero space-telecommunications.

Total: 45

REFERENCES

1. Mohamed Gad-el-Hak, The MEMS Hand book, CRC press 2002.
2. Julian W.Gardner,Vijay K.Varadan,Osama O.Awadel Karim,Microsensors MEMS and Smart Devices, John Wiby & sons Ltd.,2001.
3. S.Fatikow,U.Rembold,Microsystem Technology and Microrobotics,Springer-Verlag Berlin Heidelberg ,1997.

4. Tai-Ran Hsu,MEMS & Microsystems Design and Manufacture,Tata McGraw-Hill,2006.
5. Francis E.H Tay and W.O Choong, Microfludics and BioMEMS Applications, Springer, 2002.

P10END501 RAPID PROTOTYPING AND TOOLING 3 0 0 3

1. INTRODUCTION 4

Need for the compression in product development, History of RP systems, Survey of applications, Growth of RP industry, classification of RP systems.

2. STEREOLITHOGRAPHY SYSTEMS 8

Principle, Process parameters, Process details, Data preparation, Data files and Machine details, Applications.

SELECTIVE LASER SINTERING - Types of machines, Principle of operation, Process parameters, Data preparation for SLS, Applications.

3. FUSION DEPOSITION MODELING 6

Principle, Process parameters, Path generation, Applications. SOLID GROUND CURING**:** Principle of operation, Machine details, Applications.

4.LAMINATED OBJECT MANUFACTURING 8

Principle of operation, LOM materials, Process details, Applications. CONCEPT MODELERS - Principle, Thermo jet printer, Sander's model market, 3-D printer, Genisys Xs printer, JP system 5, Object Quadra System. LASER ENGINEERED NET SHAPING (LENS) – principle –applications.

5. RAPID TOOLING 7

Indirect Rapid Tooling - Silicone rubber tooling, Aluminum filled epoxy tooling, Spray metal tooling, etc. Direct Rapid Tooling - Direct AIM, Quick cast process, Copper polyamide, Rapid Tool, DMILS, ProMetal, Sand casting tooling, Laminate tooling, soft tooling vs hard tooling.

6. SOFTWARE FOR RAPID PROTOTYPING 12

STL files, Overview of Solid view, Magics, mimics, magics communicator, etc. Internet based softwares, Collaboration tools.RAPID MANUFACTURING PROCESS OPTIMIZATION **-** Factors influencing accuracy, Data preparation errors, Part building errors, Errors in finishing, Influence of part build orientation. ALLIED PROCESSES **-** Vacuum Casting, Surface Digitizing, Surface Generation from point cloud, Surface modification, data transfer to solid models.

Total: 45

REFERENCES

1. Paul. F. Jacobs, "Stereo lithography and other RP & M Technologies", SME, NY, 1996.
2. Pham. D. T. & Dimov. S. S., "Rapid Manufacturing", Verlag, London, 2001.
3. Terry Wohlers, "Wohlers Report 2006", Wohlers Associates, 2006

P10END106CAD Laboratory

0 0 3 2

Exercises in Sketching, Solid Modeling, Surface modeling, Sheet metal and mechanism design of Mechanical Components and assembly using Parametric and Feature Based Packages like **PRO-E / SOLID WORKS /SOLID EDGE/CATIA / NX / ANSYS / NASTRAN** etc.

Total: 45

Sona College of Technology, Salem

(Autonomous)

Subjects of Study for ME I Semester under Regulations 2010

Electronics and Communication Engineering

Branch: M.E. Communication Systems

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	P10COS101	Applied Mathematics	3	1	0	4
2	P10COS102	Advanced Digital Signal Processing	3	0	0	3
3	P10COS103	Modern Digital Communication Techniques	3	0	0	3
4	P10COS104	Optical Communication Networks	3	1	0	4
5	P10COS105	Advanced Radiation Systems	3	0	0	3
6	P10COS106	Satellite Communication	3	0	0	3
Practical						
7	P10COS107	Communication System Lab I	0	0	4	2
					Total Credits	**22**

Approved by

Chairperson, Electronics and Communication Engineering BOS
Dr.K.R.Kashwan

Member Secretary, Academic Council
Dr.B.Sathiyabhama

Chairperson, Academic Council & Principal
Dr.P.Govindarajan

Copy to:-
HOD/ECE (PG), First Semester ME COS Students and Staff, COE

P10COS101 - APPLIED MATHEMATICS 3 1 0 4

AIM

To introduce the students about the linear algebraic & wave equations, Random variables and Queuing theory in the engineering field.

OBJECTIVES

- To develop efficient algorithms for solving numerical methods, to acquire skills in handling situation involving random variable.
- To learn the basics and gained the skill for specialized studies and research.

UNIT I

LINEAR ALGEBRAIC EQUATION AND EIGEN VALUE PROBLEMS 9+3

System of equations- Solution by Gauss Elimination, Gauss-Jordan and LU decomposition method- Jacobi, Gauss-Seidal iteration method- Eigen values of a matrix by Jacobi and Power method.

UNIT II

WAVE EQUATION 9+3

Solution of initial and boundary value problems- Characteristics- D'Alembert's Solution - Significance of characteristic curves - Laplace transform solutions for displacement in a long string - a long string under its weight - a bar with prescribed force on one end- free vibrations of a string.

UNIT III

SPECIAL FUNCTIONS 9+3

Bessel's equation - Bessel Functions- Legendre's equation - Legendre polynomials -Rodrigue's formula - Recurrence relations- generating functions and orthogonal property for Bessel functions – Legendre polynomials.

UNIT IV

RANDOM VARIABLES 9+3

One dimensional Random Variable - Moments and MGF – Binomial, Poisson, Geometrical, Normal Distributions- Two dimensional Random Variables – Marginal and Conditional Distributions – Covariance and Correlation Coefficient - Functions of Two dimensional random variable

UNIT V

QUEUEING THEORY 9+3

Single and Multiple server Markovian queueing models - Steady state system size probabilities – Little's formula - Priority queues - M/G/1 queueing system – P.K. formula.

L + T = 45 + 15 = 60

TEXT BOOKS:

1. Sankara Rao.K. "Introduction to Partial Differential Equation ", PHI, 1995.
2. Taha. H.A., "Operations Research- An Introduction " 6th Edition, PHI, 1997.
3. Jain M.K. Iyengar, S.R.K. & Jain R.K., "International Methods for Scientific and Engineering Computation", New Age International (P) Ltd, Publlishers 2003..

REFERENCES:

1. Kanpur J.N. & Saxena. H.C. "Mathematical Statistics", S.Chand & Co.,New Delhi, 2003.
2. Greweal B.S. "Higher Engineering Mathematics", Khanna Publishers, 2005.

P10COS102 - ADVANCED DIGITAL SIGNAL PROCESSING 3 0 0 3

AIM

To introduce the student to advanced digital signal processing techniques.

OBJECTIVES

On completion of the course, the student will be able to:

- Understand the basic concepts and to apply in discrete random signal processing.
- Estimate the spectrum using parametric methods and non parametric methods.
- Estimation and prediction using wiener FIR & IIR filters
- Study adaptive filtering techniques using LMS algorithm and to study the applications of adaptive filtering.
- Apply multirate signal processing fundamentals.

UNIT I 9

DISCRETE RANDOM SIGNAL PROCESSING

Discrete Random Processes- Ensemble averages, stationary processes, Autocorrelation and Auto covariance matrices. Parseval's Theorem, Wiener-Khintchine Relation- Power Spectral DensityPeriodogram, Spectral Factorization, Filtering random processes. Low Pass Filtering of White Noise. Parameter estimation: Bias and consistency.

UNIT II 9

SPECTRUM ESTIMATION

Estimation of spectra from finite duration signals, Non-Parametric Methods-Correlation Method ,Periodogram Estimator, Performance Analysis of Estimators -Unbiased, Consistent Estimators- Modified periodogram, Bartlett and Welch methods, Blackman –Tukey method. Parametric Methods - AR, MA, ARMA model based spectral estimation. Parameter Estimation -Yule-Walker equations, solutions using Durbin's algorithm

UNIT III 9

LINEAR ESTIMATION AND PREDICTION

Linear prediction- Forward and backward predictions, Solutions of the Normal equations- Levinson- Durbin algorithms. Least mean squared error criterion -Wiener filter for filtering and prediction , FIR Wiener filter and Wiener IIR filters ,Discrete Kalman filter

UNIT IV 9

ADAPTIVE FILTERS

FIR adaptive filters -adaptive filter based on steepest descent method-Widrow-Hoff LMS adaptive algorithm, Normalized LMS. Adaptive channel equalization-Adaptive echo cancellation-Adaptive noise cancellation- Adaptive recursive filters (IIR). RLS adaptive filters-Exponentially weighted RLS-sliding window RLS.

UNIT V 9

MULTIRATE DIGITAL SIGNAL PROCESSING

Mathematical description of change of sampling rate - Interpolation and Decimation , Decimation by an integer factor - Interpolation by an integer factor, Sampling rate conversion by a rational factor, Filter implementation for sampling rate conversion- Direct form FIR structures, Polyphase filter structures, time-variant structures. Multistage implementation of multirate system. Application to sub band coding -Wavelet transform and filter bank implementation of wavelet expansion of signals.

Total-45

TEXT BOOKS:

1. Monson H.Hayes, Statistical Digital Signal Processing and Modeling, John Wiley and Sons,Inc.,Singapore, 2002.
2. John G.Proakis, Dimitris G.Manolakis, Digital Signal Processing Pearson Education, 2002.

REFERENCES:

1. John G.Proakis et.al.,'Algorithms for Statistical Signal Processing', Pearson Education, 2002.
2. Dimitris G.Manolakis et.al.,'Statistical and adaptive signal Processing', McGraw Hill,Newyork,2000.
3. Rafael C. Gonzalez, Richard E.Woods, 'Digital Image Processing', Pearson Education, Inc.,Second Edition, 2004.(For Wavelet Transform Topic)

P10COS103 - MODERN DIGITAL COMMUNICATION TECHNIQUES 3 0 0 3

AIM

To introduce the basic concepts of Modern Digital Communication Techniques and to give an exposure to receiver performance and Error control coding schemes.

OBJECTIVES

- To study the coherent and Non-coherent communication receivers and to discuss their performance analysis
- To learn error control coding which encompasses techniques for the encoding and decoding of digital data streams for their reliable transmission over noisy channels.

UNIT I 9

COHERENT AND NON-COHERENT COMMUNICATION:

Coherent receivers – Optimum receivers in WGN – IQ modulation & demodulation – Noncoherent receivers in random phase channels; M-FSK receivers – Rayleigh and Rician channels – Partially coherent receives – DPSK; M-PSK; M-DPSK,-BER Performance Analysis.

UNIT II 9

BANDLIMITED CHANNELS AND DIGITAL MODULATIONS:

Eye pattern; demodulation in the presence of ISI and AWGN; Equalization techniques – IQ modulations; QPSK; QAM; QBOM; -BER Performance Analysis. – Continuous phase modulation; CPFM; CPFSK; MSK,OFDM.

UNIT III 9

BLOCK CODED DIGITAL COMMUNICATION:

Architecture and performance – Binary block codes; Orthogonal; Biorthogonal; Transorthogonal – Shannon's channel coding theorem; Channel capacity; Matched filter; Concepts of Spread spectrum communication – Coded BPSK and DPSK demodulators – Linear block codes; Hammning; Golay; Cyclic; BCH ; Reed – Solomon codes..

UNIT IV 9

CONVOLUTIONAL CODED DIGITAL COMMUNICATION:

Representation of codes using Polynomial, State diagram, Tree diagram, and Trellis diagram – Decoding techniques using Maximum likelihood, Viterbi algorithm, Sequential and Threshold methods – Error probability performance for BPSK and Viterbi algorithm, Turbo Coding.

UNIT V 9

SPREAD SPECTRUM SIGNALS FOR DIGITAL COMMUNICATION

Model of spread Spectrum Digital Communication System-Direct Sequence Spread Spectrum Signals,Error rate performance of the coder, Generation of PN Sequences- Frequency-Hopped Spread SpectrumSignals, Performance of FH Spread Spectrum Signals in an AWGN Channel- Synchronization of Spread Spectrum Systems.

Total: 45

TEXT BOOKS:

1. M.K.Simon, S.M.Hinedi and W.C.Lindsey, Digital communication techniques; Signalling and detection, Prentice Hall India, New Delhi. 1995.
2. Simon Haykin, Digital communications, John Wiley and sons, 1998
3. Wayne Tomasi, Advanced electronic communication systems, 4th Edition Pearson Education Asia, 1998

REFERENCES:

1. B.P.Lathi Modern digital and analog communication systems, 3rd Edition, Oxford University press 1998.
2. John G. Proakis, Digital Communications, 4th Edition, McGraw-Hill, New york , 2001

P10COS104 - OPTICAL COMMUNICATION NETWORKS 3 1 0 4

AIM

To understand the new networking revolution within a revolution called Optical Communication. Networks.

OBJECTIVES

- To study the Optical network components for Optical Network communication.
- To study various Network architecture and topologies for optical networks.
- To study the issues in the network design and operation for wavelength routing in optical networks.

UNIT I 9

OPTICAL NETWORKING COMPONENTS:

First- and second-generation optical networks, Components: couplers, isolators, circulators, multiplexers,filters, amplifiers, switches, and wavelength converters.

UNIT II 9

SONET AND SDH NETWORKS:

Integration of TDM signals, Layers, Framing, Transport overhead, Alarms, Multiplexing, Network elements, Topologies, Protection architectures, Ring architectures, Network Management.

UNIT III 9

BROADCAST – AND- SELECT NETWORKS:

Topologies, Single-hop, Multihop, and Shufflenet multihop networks, Media-Access control protocols,Test beds.

UNIT IV 9

WAVELENGTH-ROUTING NETWORKS:

Node designs, Issues in Network design and operation, Optical layer cost Tradeoffs, Routing and Wavelength assignment, Wavelength routing test beds.

UNIT V 9

HIGH CAPACITY NETWORKS:

SDM, TDM, and WDM approaches, Application areas, Optical TDM Networks: Multiplexing and demultiplexing, Synchronization, Broadcast networks, Switch-based networks, OTDM test beds.

L + T = 45 + 15 = 60

TEXT BOOKS:

1. Rajiv Ramaswami and Kumar Sivarajan, Optical Networks: A practical perspective, Morgan Kaufmann, 2nd edition, 2001.
2. Vivek Alwayn, Optical Network Design and Implementation, Pearson Education, 2004.

REFERENCES:

1. Hussein T.Mouftab and Pin-Han Ho, Optical Networks: Architecture and Survivability, Kluwer Academic Publishers, 2002.
2. Biswanath Mukherjee, Optical Communication Networks, McGraw Hill, 1997

P10COS105 - ADVANCED RADIATION SYSTEMS 3 0 0 3

AIM

To enable the student to understand the concepts of Radiation and to study the various types of antennas and its characteristics

OBJECTIVES

- To study the concepts of radiation from a current element.
- To study Antenna arrays.
- To study various antenna synthesis methods.
- To study horn , microstrip , reflector antennas and various types of antennas.

UNIT I 9

CONCEPTS OF RADIATION

Retarded vector potentials – Heuristic approach and Maxwell's equation approach. Electric vector potential F for a magnetic current source M. Duality theorem. The Lorentz gauge condition. Vector potential in Phasor form. Fields radiated by an alternating current element and half wave dipole. Total power radiated and radiation resistance of alternating current element and half wave dipole. Power radiated in the far field. Linear, Elliptical and circular polarization. Development of the Poincare sphere.

UNIT II 9

ANTENNA ARRAYS

N element linear arrays – uniform amplitude and spacing- Phased arrays- Directivity of Broadside and End fire arrays. Three dimensional characteristics - Pattern multiplication- Binomial arrays and Dolph- Tchebycheff arrays. Circular array. Mutual coupling in arrays, multidimensional arrays- phased arrays and array feeding techniques.

UNIT III

ANTENNA SYNTHESIS 9

Synthesis problem-Line source based beam synthesis methods (Fourier transform and Woodward- Lawson sampling method – Linear array shaped beam synthesis method – Low side lobe, narrow main beam synthesis methods - discretization of continuous sources. Schelkunoff polynomial method

UNIT IV 9

APERTURE ANTENNAS

Radiation from apertures - Huygens Principle. Rectangular apertures- techniques for evaluating gain,Circular apertures and their design considerations- Babinets principle Fraunhoffer and Fresnel diffraction. Complimentary screens and slot antennas. Slot and dipoles as dual antennas. Fourier transform in aperture antenna theory.

UNIT V 9

HORN, MICROSTRIP, REFLECTOR ANTENNAS.

E and H plane sectoral Horns. Pyramidal horns. Conical and corrugated Horns. Multimode horns. Phase center.Microstrip antennas – feeding methods. Rectangular patch- Transmission line model – Circular patch Parabolic Reflector antennas – Prime focus and cassegrain reflectors. Equivalent focal length of Cassegrain antennas. Spillover and taper efficiencies. Optimum illumination.

Total:45

TEXT BOOKS:

1. Balanis, C.A., “Antenna Theory” Wiley,2003
2. Jordan, E.C., “ Electromagnetic waves and Radiating systems”. PHI 2003
3. Krauss, J.D.,, Fleisch,D.A., “Electromagnetics” McGraw-Hill,1999

REFERENCES:

1. Warren L. Stutzman and Gary A. Thiele,“ Antenna theory and design”John Wiley and sons 1998
2. Krauss, J.D., “ Radio Astronomy” McGraw-Hill 1966, for the last unit (reprints available)

P10COS106 - SATELLITE COMMUNICATION 3 0 0 3

AIM

To introduce the student with the basics of orbital mechanics and the space perturbations.

Various Multiple Access techniques and network aspects are also introduced.

OBJECTIVES

- To study the orbital mechanics and space craft sub systems and earth station.
- To study space links for the satellite link design.
- To study the various multiple access techniques and network aspects for Space Services and applications.

UNIT I 9

ORBITAL MECHANICS

Kepler's laws of motion, Orbits, Orbit Equations, Orbit Description, Locating the Satellite in the Orbit and with Respect to Earth, Orbital Elements-Look Angle Determination and Visibility - Orbital Perturbations, Orbit Determination, Launch Vehicles, Orbital Effects in Communication System - Performance Attitude control; Satellite launch vehicles. spectrum allocations for satellite systems.

UNIT II 9

SPACECRAFT SUB SYSTEMS AND EARTH STATION

Spacecraft Subsystems, Altitude and Orbit Control, Telemetry and Tracking, Power Systems, Communication Subsystems, Transponders, Antennas, Equipment Reliability, Earth Stations, Example of payloads of operating and planned systems.

UNIT III 9

SPACE LINKS

The Space Link, Satellite Link Design - Satellite uplink -down link power Budget, Basic Transmission Theory, System Noise Temp, G/T Ratio, Noise Figure, Downlink Design, Design of Satellite Links for Specified C/N - Microwave Propagation on Satellite-Earth Paths. Interference between satellite circuits, Energy Dispersal, propagation characteristics of fixed and mobile satellite links.

UNIT IV 9

MULTIPLE ACCESS TECHNIQUES AND NETWORK ASPECTS

Single access vs. multiple access (MA). Classical MA techniques: FDMA, TDMA. Single channel per carrier (SCPC) access - Code division multiple access (CDMA). Demand assignment techniques. Examples of MA techniques for existing and planned systems (e.g. the satellite component of UMTS).Mobile satellite network design, ATM via satellite. TCP/IP via satellite - Call control, handover and call set up procedures. Hybrid satellite-terrestrial networks

UNIT V 9

SERVICES AND APPLICATIONS

Fixed and mobile services - Multimedia satellite services - Advanced applications based on satellite platforms - INTELSAT series - INSAT, VSAT, Remote Sensing - Mobile satellite service: GSM. GPS, INMARSAT, Navigation System, Direct to Home service (DTH), Special services, E-mail, Video conferencing and Internet connectivity
TOTAL : 45

TEXT BOOK:

1. Dennis Roddy, “Satellite Communications”, 3rd Edition, Mc Graw Hill International Editions, 2001

REFERENCES:

1. Bruce R.Elbert, “Introduction to Satellite Communication” , Artech House Inc.,1999.
2. Timothy Pratt, Charles W. Bostian, Jeremy Allnutt, “Satellite Communications”, 2nd Edition, Wiley, John & Sons, 2002
3. Wilbur L.Pritchard, Hendri G.Suyderhood, Robert A.Nelson, “Satellite Communication Systems Engineering”, 2nd Edition, Prentice Hall, New Jersey, 1993

4. Tri T.Ha, "Digital satellite communication", 2nd Edition, McGraw Hill, New york.1990

P10COS107 - COMMUNICATION SYSTEM LAB I 0 0 4 2

1. Antenna Radiation Pattern measurement.
2. Simulation of Modulation and Coding in a AWGN Communication Channel using Simulation Packages.
3. Implementation of Adaptive Filters, periodogram and multistage multirate system in DSP Processor
4. Performance evaluation of Digital Data Transmission through Fiber Optic Link.
5. Study of Spread Spectrum Techniques.
6. Simulation of QMF using Simulation Packages.
7. Implementation of Video Link using Optical Fiber.
8. Implementation of Linear and Cyclic Codes.

Sona College of Technology, Salem

(Autonomous)

Subjects of Study for ME I Semester under Regulations 2010

Electrical and Electronics Engineering

Branch: M.E. Power Electronics and Drives

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	P10PED101	Applied Mathematics	3	1	0	4
2	P10PED102	Modeling and Analysis of Electrical Machines	3	1	0	4
3	P10PED103	Advanced Digital System Design	3	0	0	3
4	P10PED104	Advanced Power Semiconductor Devices	3	0	0	3
5	P10PED105	Analysis of Power Converters	3	0	0	3
6	P10PED501	Elective-I High Voltage Direct Current Transmission	3	0	0	3
Practical						
7	P10PED106	Modeling & Simulation Laboratory	0	0	3	2
					Total Credits	**22**

Approved by

Chairperson, Electrical Engineering BOS Prof. C. Easwarlal

Member Secretary, Academic Council Dr.B.Sathiyabhama

Chairperson, Academic Council & Principal Dr.P.Govindarajan

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P10PED101 APPLIED MATHEMATICS 3 1 0 100

UNIT - I CALCULUS OF VARIATION 12

Functional – Euler's equation – Variational problems involving one unknown function – Several unknown functions – Functionals dependent on higher order derivatives – Several independent variables – Isoperimetric problems.

UNIT - II Z – TRANSFORM 12

Transform of standard functions – Convolution – Initial and Final value problems – Shifting Theorem – Inverse transform (Using Partial Fraction – Residues) – Solution of difference Equations using Z – Transform.

UNIT - III RANDOM PROCESSES 12

Classification – Auto correlation – Cross correlation – Ergodicity – Power spectral density function – Poisson processes.

UNIT - IV LINEAR PROGRAMMING 12

Simplex algorithm – Two-phase and Big–M method – Duality theory – Dual simplex method -Transportation and Assignment problems.

UNIT - V NON - LINEAR PROGRAMMING 12

Formulation of non–linear programming problem – Constrained optimization with equality constraints – Constrained optimization with inequality constraints – Saddle point problem – Graphical method of non–linear programming problem involving only two variables – Kuhn-tucker conditions with non-negative constraints – Wolfe's modified simplex method.

Lecture : 45, Tutorial :15, Total : 60

REFERENCE BOOKS

1. M.K.Venkataraman , "Higher Mathematics for Engineering & Science", National Publishing Company,2000
2. Kandasamy, "Engineering Mathematics Volume – II", S.Chand & Co., 2001.
3. P.K.Gupta , D.S.Hira, "Operations Research", S.Chand &Co ., 1999
4. T.Veerarajan,"Probability, Statistics & Random Processes", Tata McGraw Hill., 2002.

P10PED102 MODELING AND ANALYSIS OF ELECTRICAL MACHINES 3 1 0 100

UNIT - I MODELING OF DC MACHINES 12

Equivalent circuit and Electro magnetic torque-Electromechanical modeling-Field excitation: separate, shunt, series and compound excitation-commutator action. Effect of armature mmf-Analytical fundamentals: Electric circuit aspects-magnetic circuit aspects-inter poles.

UNIT - II DYNAMIC MODELING OF INDUCTION MACHINES 12

Equivalent circuits- steady state performance equations-Dynamic modeling of induction machines: Real time model of a two phase induction machines, Three phase to two phase transformation-Electromagnetic torque-generalized model in arbitrary reference frames-stator reference frames model-rotor reference frames model-synchronously rotating reference frame model.

UNIT - III PHASE CONTROLLED AND FREQUENCY CONTROLLED INDUCTION MACHINES 12

Stator voltage control: Steady state analysis-approximate analysis-slip power recovery scheme: principle of operation-steady state analysis range of slip equivalent circuit-performance-static scherbius drive. Constant Volts/Hz controls implementation-steady state performance-dynamic simulation. PWM Voltages: Generation-machine model-steady state performance.

UNIT - IV VECTOR CONTROLLED INDUCTION MACHINES 12

Principle of vector control-direct vector control: flux and torque processor-DVC in stator reference frames with space vector modulation. Indirect vector control scheme: Derivation and implementation. Flux weakening operation: principle-flux weakening in stator flux linkage and rotor flux linkage.

UNIT - V SPECIAL MACHINES 12

Permanent magnet and characteristics-synchronous machines with PMs: Machine configuration-flux density distribution-types of PMSM-Variable Reluctance Machines: Basics-analysis-practical configuration-circuit wave forms for torque production- stepping motors.

Lecture : 45, Tutorial :15, Total : 60

REFERENCE BOOKS

1. R.Krishnan."Electric motor & Drives: Modeling, Analysis and Control", Prentice Hall of India, 2001.
2. Charles kingsley, Jr., A.E.Fityzgerald, Stephen D.Umans "Electric Machinery", Tata McGraw Hill, Sixth Edition, 2002.
3. Miller, T.J.E."Brushless permanent magnet and reluctance motor drives", Oxford, 2005.
4. C.V.Jones, "The Unified Theory of ElectricalMachines:,Butterworth,London,1967.
5. P.S.Bhimbra, "Generalised theory of electrical machines", Khanna Publishers.
6. P.S.Bhimbra,"Generalised theory of electrical machines", Khanna Publishers, 4th Edition, 1993.

P10PED103 **ADVANCED DIGITAL SYSTEM DESIGN** **3 0 0 100**

(Common to Applied Electronics, Power Electronics & Drives)

UNIT - I SEQUENTIAL LOGIC OPTIMIZATION 9

Sequential Circuit Optimization Using State Based Models, Sequential Circuit Optimization Using Network Models, Implicit Finite State machine Traversal Methods, Testability Considerations for Synchronous Circuits.

UNIT - II ASYNCHRONOUS FINITE STATE MACHINES 9

Scope, Asynchronous Analysis, Design of Asynchronous Machines, Cycle and Races, Plotting and Reading the Excitation Map, Hazards, Essential Hazards Map Entered Variable, MEV Approaches to Asynchronous Design, Hazards in Circuit Developed by MEV Method.

UNIT - III DIGITAL SYSTEM TESTING 9

Fault Models, Fault Equivalence, Fault Location, Fault Dominance, Single and Multiple Stack Faults, Testing for Single Stack Faults, Algorithms, Random test Generation, Adhoc Design for Testability Techniques, Classical Scan Designs, Boundary Scan Standards, Built-In-Self-Test, Test Pattern Generation, BIST Architecture examples.

UNIT - IV HIGH SPEED DIGITAL DESIGN 9

Frequency, Time and Distance, Capacitance and Inductance Effects, High Speed Properties of Logical Gates, Speed And Power, Measurement Techniques, Rise Time and Bandwidth of Oscilloscope probes, Self Inductance , Signal pickup and loading effects of probes, clock distribution, clock skew and methods to reduce skew, Controlling crosstalk on clock lines, Delay adjustments, Clock oscillators and clock jitter.

UNIT - V SYSTEM DESIGN USING VHDL 9

Specification of combinational systems using VHDL, Basic language element of VHDL, Types of Modeling, Design of serial adder with accumulator, State graph for Control network, Design of Binary Multiplier and Binary Divider, Flip-Flops, Registers, Counters, Sequential Machines, Combinational Logic Circuits.

Total 45

REFERENCE BOOKS

1. Fletcher .An Engineering Approach to Digital Design, PHI 2004.
2. Parag K Lala ,Digital Circuit Testing And Testability, Academic 1997.
3. Miron Abramovici et.al , Digital System Testing And Testable Design, Jaico Publishing House 2001.
4. Howard Johnson and Martin Graham, High Speed Digital Design : Handbook of Black Magic, PHI PTR.
5. Masakazu Shoji, High Speed Digital Circuits, Addison Wesley Publishing Co.
6. J.Bhaskar, A VHDL Primer, Addison Wesley 1999.
7. C.H.Roth, Digital System using VHDL, PWS Publishing.
8. Z.Navabi, VHDL-Analysis And Modeling of Digital Systems, MGH.

P10PED104 ADVANCED POWER SEMICONDUCTOR DEVICES 3 0 0 100

UNIT - I INTRODUCTION 9

Power switching devices overview – Attributes of an ideal switch, application requirements, circuit symbols – Power handling capability – (SOA); Device selection strategy – On-state and switching losses – EMI due to switching – Power diodes – Types, forward and reverse characteristics, switching characteristics – rating.

UNIT – II CURRENT CONTROLLED DEVICES 9

BJTs – Construction, static characteristics, switching characteristics- Negative temperature coefficient and secondary breakdown – Power Darlington – Thyristors – Physical and electrical principle underlying operating mode – Two transistor analogy – Effect of a and i_{co} on i_a – concept of latching – Gate and switching characteristics – Converter grade and inverter grade and other types; series and parallel operation – Comparison of BJT and Thyristor – Steady state and dynamic models of BJT and Thyristor.

UNIT - III VOLTAGE CONTROLLED DEVICES 9

Power MOSFETs and IGBTs – Principle of voltage controlled devices, construction, types, static and switching characteristics – Steady state and dynamic models of MOSFET and IGBTs; Basics of GTO, MCT, FCT, RCT and IGCT.

UNIT – IV FIRING AND PROTECTING CIRCUITS 9

Necessity of isolation – pulse transformer – opto-coupler; Gate drive circuit for SCR, MOSFET, IGBTs and base driving for power BJT – overvoltage, over current and gate protections, Design of snubbers.

UNIT - V THERMAL PROTECTION 9

Heat transfer – conduction, convection and radiation – Cooling – liquid cooling, vapour – phase cooling; Guidance for heat sink selection – Thermal resistance and impedance – Electrical analogy of thermal components, heat sink types and design – Mounting types.

Lecture : 45, Tutorial :00 , Total : 60

REFERENCE BOOKS

1. B.W. Williams, "Power Electronics – Devices, Drivers, Applications and passive components", Macmillan, (2/e), 1992.
2. Rashid M.H., "Power Electronics circuits, Devices and Applications", Prentice Hall India, Third Edition, Newdelhi, 2004.
3. M.D. Singh and K.B.Khanchandani, "Power Electronics", Tata McGraw Hill, 2001.
4. Mohan, Undeland and Robins, "Power Electronics – Concepts, applications and design", John Wiley and sons, Singapore, 2000.

P10PED105 ANALYSIS OF POWER CONVERTERS 3 0 0 100

UNIT – I ANALYSIS OF SWITCHED CIRCUITS 9

Ideal models of power switches – analysis of the thyristor controlled half wave rectifier – R, L, RL, RC load circuits – load circuit with electromotive force – thyristor specifications – heat sink calculations – Surge currents – limitation on di/dt, dv/dt, classification and analysis of commutation.

UNIT - II CONTROLLED RECTIFIERS 9

Continuous and discontinuous modes of single phase half wave and full wave rectifiers – half controlled configurations – RL circuit with electromotive force for continuous and discontinuous operation. Effect of transformer leakage reactance – operating domains of three phase full converters and semi converters.

UNIT - III DC-DC SWITCH MODE CONVERTERS 9

DC-DC converter systems – control of DC-DC converters, Buck converters – Continuous and discontinuous modes – Boost converters – continuous and discontinuous modes – Buck boost converters – continuous and discontinuous and discontinuous modes. Cuck converters – continuous and discontinuous models – DC-DC converter comparison; ZVS and ZCS resonant converters.

UNIT - IV CHOPPERS 9

Classification of DC chopper circuits – analysis of type A chopper and type B chopper – voltage, current and load commutation of choppers – step up chopper – pulse width modulated AC choppers – Current topologies and Harmonic elimination methods.

UNIT - V INVERTERS 9

Characteristics – output voltage and waveform control – bridge inverters – single phase and three phase versions – MOSFET, IGBT inverters analysis and design; Current source inverters – Concepts of multilevel inverters.

Lecture : 45, Tutorial :00 , Total : 60

REFERENCE BOOKS

1. Dewan, S.B. and Straugher A., “Power Semiconductor Circuits”, John Wiley and sons, 1975.
2. Dubey G.K., Doralda S.R., Joshi A., and sinha R.M.K., “Thyristorised power controllers”, Wiley Eastern Limited, 1986.
3. Rashid M.H., “Power Electronics Circuits, Devices and Applications”, PHI, (3/e), 2004.
4. Sen P.C., “Thyristor DC Drives”, John Wiley and sons. 1981. Ned Mohan, Undeland and Robbins, “Power Electronics: concepts, applications and design”, John wiley and sons, Singapore,2000.
5. Bimal K. Bose, “Modern Power Electronics and AC Drives”, Pearson (2/e), 2003

P10PED501 HIGH VOLTAGE DIRECT CURRENT TRANSMISSION L T P M

3 0 0 100

(Common to Power Electronics & Drives and Power System Engineering)

UNIT - I GENERAL ASPECTS 9

Historical development of HVAC and DC links – kinds of DC links-HVDC projects in India and abroad – advantages and disadvantages of HVDC transmission - Applications of DC transmission – economic factors – development of power devices for HVDC transmission – thyristors – light activated thyristors – MOS controlled thyristors (MCTs) –Switching and steady state characteristics– Cooling of Thyristors Problem.

UNIT - II THYRISTOR CONVERTERS 9

Three phase fully controlled thyristor bridge converters – operation as rectifiers and line commutated inverters – converter equivalent circuits – parameters and characteristics of rectifiers and inverters – series and parallel arrangement of thyristors – multibridge converters.

UNIT - III CONTROL OF CONVERTERS AND REACTIVE POWER CONTROL 9

Gate control – basic means of control and modes of operation – power reversal – desired features of control – control characteristics – constant current control – constant extinction angle control – stability of control – tap changer control – power control and current limits. Reactive Power Requirements – Reactive Power Control during Steady State and Transients

UNIT - IV PROTECTION OF HVDC SYSTEMS, HARMONICS, FILTERS AND GROUND RETURN 9

Basics of protection of HVDC systems – DC reactors – voltage and current oscillations – DC line oscillations – clearing line faults and re-energizing the line – circuit breakers – over voltage protection -Characteristics and uncharacteristic harmonics – troubles caused by harmonics – means of reducing harmonics — harmonic filters – Corona and Radio interference- ground return and ground Electrodes

UNIT - V SIMULATION OF HVDC SYSTEMS 9

Introduction – System Simulation: Philosophy and Tools – HVDC System Simulation – Modeling of HVDC Systems for Digital Dynamic Simulation – Digital Dynamic Simulation of Converters and DC Systems.

Lecture : 45, Tutorial : 00 , Total : 45

REFERENCE BOOKS

1. Kimbark E.X., “Direct Current Transmission”, Vol. I, Wiley Interscience, New York 1971
2. Allan Greenwood, ‘Electrical Transients in Power Systems’, John Wiley and Sons New York, 1992
3. Kory(ed) B. J., “ High Voltage Direct Current Converters and Systems”. Macdonald & Co, London 1995
4. Adamson and Hingorani N.G., “High Voltage Direct Current Power Transmission”, Garraway ltd., England, 1960.

P10PED106 **MODELING & SIMULATION LABORATORY** **0 0 3 100**

(Any 10 Experiments)

LIST OF EXPERIMENTS

1. Modeling of simple PN Junction diode
2. Modeling of Silicon Controlled Rectifier.
3. Modeling of MOSFET / IGBT / BJT
4. Simulation of Single phase Semi converter
   (i) R Load (ii) RL Load (iii) RLE (motor) Load
5. Simulation of Single phase Fully controlled converter
   (i) R Load (ii) RL Load (iii) RLE (motor) Load
6. Simulation of Single phase Dual converter
7. Simulation of Three phase semi converter.
8. Simulation of Three phase fully controlled converter
9. Simulation of Single phase full bridge Inverter
10. Simulation of Three phase full bridge inverter.
    a) 180 degree mode operation
    b) 120 degree mode operation
11. Simulation of PWM inverters
12. Sinusoidal PWM
13. Square PWM
14. Simulation of Three phase AC Voltage Controller.
    a) Lamp load

Motor load

Sona College of Technology, Salem

(Autonomous)

Subjects of Study for ME I Semester under Regulations 2010

Electrical and Electronics Engineering

Branch: M.E. Power Systems Engineering

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	P10PSE101	Applied Mathematics	3	1	0	4
2	P10PSE102	Linear and Non Linear Systems Theory	3	1	0	4
3	P10PSE103	Power Electronics application to Power Systems	3	0	0	3
4	P10PSE104	Optimization and Soft Computing Techniques	3	0	0	3
5	P10PSE105	Power System Operation and Control	3	0	0	3
6	P10PSE501	Elective-I High Voltage Direct Current Transmission	3	0	0	3
Practical						
7	P10PSE106	Power Electronics Laboratory	0	0	3	2
					Total Credits	**22**

Approved by

Chairperson, Electrical Engineering BOS	**Member Secretary, Academic Council**	**Chairperson, Academic Council & Principal**
Prof.C.Easwarlal	Dr.B.Sathiyabhama	Dr.P.Govindarajan

Copy to:-
Copy: All HODS, First Semester ME PSE Students and Staff, COE

P10PSE101 APPLIED MATHEMATICS 3 1 0 100

(Common to Applied Electronics, Power Electronics & Drives and Power System Engineering)

UNIT - I CALCULUS OF VARIATION 12

Functional – Euler's equation – Variational problems involving one unknown function – Several unknown functions – Functionals dependent on higher order derivatives – Several independent variables – Isoperimetric problems.

UNIT - II Z – TRANSFORM 12

Transform of standard functions – Convolution – Initial and Final value problems – Shifting Theorem – Inverse transform (Using Partial Fraction – Residues) – Solution of difference Equations using Z – Transform.

UNIT - III RANDOM PROCESSES 12

Classification – Auto correlation – Cross correlation – Ergodicity – Power spectral density function – Poisson processes.

UNIT - IV LINEAR PROGRAMMING 12

Simplex algorithm – Two-phase and Big–M method – Duality theory – Dual simplex method -Transportation and Assignment problems.

UNIT - V NON - LINEAR PROGRAMMING 12

Formulation of non–linear programming problem – Constrained optimization with equality constraints – Constrained optimization with inequality constraints – Saddle point problem – Graphical method of non–linear programming problem involving only two variables – Kuhn-tucker conditions with non-negative constraints – Wolfe's modified simplex method.

Lecture :45, Tutorial :15, Total : 60

REFERENCE BOOKS

1. M.K.Venkataraman , "Higher Mathematics for Engineering & Science", National Publishing Company,2000
2. Kandasamy, "Engineering Mathematics Volume – II", S.Chand & Co., 2001.
3. P.K.Gupta , D.S.Hira, "Operations Research", S.Chand &Co ., 1999
4. T.Veerarajan,"Probability, Statistics & Random Processes", Tata McGraw Hill., 2002.

P10PSE102 LINEAR AND NON LINEAR SYSTEMS THEORY 3 1 0 100

UNIT - I LINEAR SYSTEMS 12

Concepts of state, state variables and state model - State model for linear time invariant continuous systems. Diagonalization – Solution of state equations – Concepts of Controllability and Observability- Pole placement by state feedback – Observer systems.

UNIT - II NON-LINEAR SYSTEMS 12

Types of non-linearity – Typical examples – Phase plane analysis – Singular points – Limit cycles – Construction of phase trajectories – Describing function method – Derivation of describing functions.

UNIT – III LIAPUNOV STABILITY 12

Liapunov stability analysis – Stability in the sense of Liapunov – Definiteness of scalar Functions – Quadratic forms – Second method of Liapunov – Liapunov stability analysis of linear time invariant systems and non-linear systems.

UNIT - IV OPTIMAL CONTROL SYSTEMS 12

Parameter Optimization: Servomechanisms – Optimal Control Problems: Transfer function Approach – State variable approach – the state regulator problem – The Infinite-time regulator problem – Output regulator and the tracking Problems – Parameter Optimization: Regulators.(Continuous system only).

UNIT - V ADVANCED CONTROL SYSTEMS 12

Adaptive Control: Model-Reference Adaptive Control fundamental concepts – Self tuning control - Robust Control: Parameter perturbations - Design of robust control system – PID controllers – Fuzzy Logic Control – Neural Network Controller.

Lecture : 45, Tutorial :15, Total : 60

REFERENCE BOOKS

1. Katsuhiko Ogata, “Modern Control Engineering”, Pearson Education, New Delhi, Fourth Edition , 2004.
2. Nagrath.I.J. and Gopal. M. “Control Systems Engineering”, New Age International (P)Limited, New Delhi, Fourth Edition,2005.
3. Benjamin C.Kuo. “Automatic Control Systems”, Prentice Hall of India Private Ltd., New Delhi, Sixth Edition, 1994.
4. Aggarwal K.K. “Control System Analysis and Design”, Khanna Publishers, New Delhi, 1999.

P10PSE103 POWER ELECTRONICS APPLICATIONS TO POWER SYSTEMS 3 0 0 100

UNIT - I HIGH POWER DEVICES AND THREE PHASE CONVERTERS 9

High power devices for power system controllers – characteristics – Converters configuration for large power control. Properties of three phase converters – Current and voltage harmonics – Effects of source and load impedance – Choice of best circuit for power systems.

UNIT - II CONVERTER CONTROL 9

Gate control – Basic means of control – Control characteristics – Stability of control – Reactive power control

UNIT - III HVDC SYSTEM 9

Application of converters in HVDC system – Static VAR control – Sources of reactive power – Harmonics and filters.

UNIT - IV WIND ENERGY AND PV ENERGY CONVERSION SYSTEM 9

Basic components – Generator control – Harmonics – Power factor improvement. Different schemes for PV energy conversion – DC and AC power conditioners – Synchronized operation with grid supply – Harmonic problems.

UNIT - V POWER FLOW ANALYSIS 9

Component models – Converter control – Analysis of converter – Transient and Dynamic stability analysis – Protection.

Lecture: 45, Tutorial: 0, Total: 45

Reference Books

1. Padiyar KR, “HVDC Power Transmission System”, Willey Eastern Limited, Newdelhi, 1992.
2. Rai GD, “Solar Energy Utilization”, Khanna Publishers, Newdelhi, 1991.
3. Mukund R Patel, “Wind and Solar Power Systems”, CRC Press, London, 1999.
4. Daniel, Haunt V, “Wind Power – A handbook of WECS”, Van Nostrand Co., New York, 1981.
5. Rakesh Das Bagamudre, “Extra High Voltage AC Transmission Engineering”, Willey Eastern Limited, Newdelhi, Second Edition, 1990.
6. Arrillaga and Watson, “Computer Modelling of Electrical Power Systems”, John Wiley, London, 2001.
7. Acha E and Agilidis VG, “Power Electronic Control in Electrical Systems”, Elsevier India Pvt. Ltd., First Edition, 2006.

P10PSE104 OPTIMIZATION AND SOFT COMPUTING TECHNIQUES 3 0 0 100

UNIT - I SINGLE OBJECTIVE OPTIMIZATION ALGORITHM 9

Optimal problem formulation: Constraints, objective functions, variable bounds. Single variable optimization algorithm: optimality criteria – bracketing method; exhaustive search method & bounding phase method. Region elimination methods – interval halving method, Fibonnaci search method – Root finding using optimization technique.

UNIT - II MULTI OBJECTIVE OPTIMIZATION PROBLEMS 9

Basic concepts – non-dominated solutions – preference structures, basic solution approach – Weighted sum approach; Random weight approach, Adaptive weight approach. Distance method, concepts – calculation of distance measure – applications. Compromise approach and goal programming approach.

UNIT - III CONSTRAINED OPTIMIZATION ALGORITHM 9

Khun – Tucker conditions – transformation methods; penalty function method and multiplier method – sensitivity analysis – direct search for constrained minimization; variable elimination method, complex search method, random search method – Generalized reduced gradient method – gradient projection method.

UNIT - IV INTEGER PROGRAMMING 9

Integer linear programming – graphical representation – Gomory's cutting plane method – integer polynomial programming – integer nonlinear programming – Stochastic linear and non-linear programming.

UNIT - V NETWORK DESIGN AND ROUTING 9

Adaptive network routing – genetic based adaptive routing, representation and evaluation of chromosomes – genetic operations – Computer network expansion – problem description and kummar and Gupta's approach. Multistage process planning – problem description and Genetic Algorithm approach. Simulated annealing – global optimization using steepest descent method and simulated annealing method.

Lecture: 45, Tutorial: 00, Total: 45

REFERENCE BOOKS

1. Kalyanmoy Deb, "Optimization for Engineering Design – Algorithms and Examples", Prentice Hall India, Fifth printing, 2002.
2. Mitsuo Gen, Runwei Cheng, " Genetic Algorithms and Engineering Optimization", John Wiley & Sons Inc., 2002.
3. S. S. Rao, "Optimization – Theory and Applications", Wiley Eastern Limited, Second Edition, 1984.

P10PSE105 POWER SYSTEM OPERATION AND CONTROL 3 0 0 100

UNIT - I HYDRO THERMAL SCHEDULING 9

Problem definition and mathematical model of long and short term problems – Discretization – Dynamic and incremental dynamic programming – Hydro thermal system with pumped hydro units – Solution of hydro thermal scheduling using Linear programming.

UNIT - II PRODUCTION COST MODELS 9

Uses and types of production cost programs, probabilistic production cost programs – Sample computation – No forced outages – Forced outages included – interchange of power and energy and its types.

UNIT - III SECURITY CONTROL CONCEPT 9

System operating states by security control functions – Monitoring, evaluation of system state by contingency analysis – Corrective controls (preventive, emergency, and restorative) – Islanding scheme – Derivation related to network islanding.

UNIT - IV STATE ESTIMATION 9

Least square estimation – Basic solution – Sequential form of solution – Static State estimation of power system by different algorithms – Tracking state estimation of power system – Computer consideration – External equivalancing – Treatment of load data and on line load flow analysis.

UNIT - V COMPUTER CONTROL OF POWER SYSTEM 9

Energy control center – Various levels – National – Regional and state level SCADA system – Computer configuration – Functions – Monitoring, data acquisition and controls – EMS systems – Software in EMS system – Expert system application for power system operation.

Lecture: 45, Tutorial: 00, Total: 45

REFERENCE BOOKS

1. Allen J Wood, Bruce F Wollenberg, “Power Generation and Control”, John Wiley & Sons, Newyork, II Edition, 1984.
2. Krichmayer L, “Economic operatin of power system”, John Wiley & Sons, Newyork, II Edition, 1959.
3. Elgerd OI, “Electrical Energy System Theory – An Introduction”, Tata McGraw Hill Pub. Co. Ltd., Newdelhi, II Edition, 1971.
4. Mahamabalis AK, Kothari DP and Ahson SI, “Computer Aided Power System Analysis and Control”, McGraw Hill Publishing Ltd., 1984.
5. Kundur P, “Power System Stability and Control”, McGraw Hill, 2006.

P10PSE501 HIGH VOLTAGE DIRECT CURRENT TRANSMISSION L T P C

3 0 0 3

UNIT - I GENERAL ASPECTS 9

Historical development of HVAC and DC links – kinds of DC links-HVDC projects in India and abroad – advantages and disadvantages of HVDC transmission -Applications of DC transmission – economic factors – development of power devices for HVDC transmission – thyristors – light activated thyristors – MOS controlled thyristors (MCTs) –Switching and steady state characteristics–Cooling of Thyristors Problem.

UNIT - II THYRISTOR CONVERTERS 9

Three phase fully controlled thyristor bridge converters – operation as rectifiers and Line commutated inverters – converter equivalent circuits – parameters and Characteristics of rectifiers and inverters – series and parallel arrangement of thyristors – multibridge converters.

UNIT - III CONTROL OF CONVERTERS AND REACTIVE POWER CONTROL 9

Gate control – basic means of control and modes of operation – power reversal – desired features of control – control characteristics – constant current control – constant extinction angle control – stability of control – tap changer control – power control and current limits. Reactive Power Requirements – Reactive Power Control during Steady State and Transients

UNIT - IV PROTECTION OF HVDC SYSTEMS, HARMONICS, FILTERS AND GROUND RETURN 9

Basics of protection of HVDC systems – DC reactors – voltage and current Oscillations – DC line oscillations – clearing line faults and re-energizing the line – Circuit breakers – over voltage protection - Characteristics and uncharacteristic Harmonics – troubles caused by harmonics – means of reducing harmonics -Harmonic filters – Corona and Radio interference- ground return and ground Electrodes.

UNIT - V SIMULATION OF HVDC SYSTEMS 9

Introduction – System Simulation: Philosophy and Tools – HVDC System Simulation – Modeling of HVDC Systems for Digital Dynamic Simulation – Digital Dynamic Simulation of Converters and DC Systems

Lecture: 45, Tutorial: 0, Total: 45

REFERENCE BOOKS

1. Kim barks E.X., “Direct Current Transmission”, Vol. I, Wiley Interscience, New York 1971
2. Allan Greenwood, ‘Electrical Transients in Power Systems’, John Wiley and Sons New York, 1992
3. Kory(ed) B. J., “ High Voltage Direct Current Converters and Systems”. Macdonald & Co, London 1995
4. Adamson and Hingorani N.G.,“High Voltage Direct Current Power Transmission”, Garraway ltd., England, 1960.

P10PSE106 POWER ELECTRONICS LABORATORY 3 0 0 100

LIST OF EXPERIMENTS

1. Single Phase Semi-converter with R-L and R-L-E loads for continuous and discontinuous conduction modes using Matlab & PSpice
2. Single phase full- converter with R-L and R-L-E loads for continuous and discontinuous conduction modes using Matlab & PSpice
3. Three phase full-converter with R-L-E load using Matlab & PSpice
4. MOSFET, IGBT based Choppers using Matlab & PSpice
5. IGBT based Single phase inverters using Matlab & PSpice
6. Single phase AC voltage controller using Matlab & PSpice

Sona College of Technology, Salem

(Autonomous)

Subjects of Study for ME I Semester under Regulations 2010

Mechanical Engineering

Branch: M.E. Product Design and Development

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	P10PDD101	Geometric Modeling	3	1	0	4
2	P10PDD102	Product Development Strategies	3	1	0	4
3	P10PDD103	Finite Element Mechanism Analysis	3	0	0	3
4	P10PDD104	Product Data Management	3	0	0	3
5	P10PDD105	Rapid Prototyping and Tooling	3	0	0	3
6	P10PDD503	Production and Operations Management	3	0	0	3
Practical						
7	P10PDD106	CAD Lab	0	0	3	2
					Total Credits	**22**

Approved by

Chairperson, Mechanical Engineering BOS	**Member Secretary, Academic Council**	**Chairperson, Academic Council & Principal**
Dr.R.Venkatesan	Dr.B.Sathiyabhama	Dr.P.Govindarajan

Copy to:-
HOD/MECH, First Semester ME PDD Students and Staff, COE

P10PDD101 GEOMETRIC MODELING 3 1 0 4

TYPES AND MATHEMATICAL REPRESENTATION OF CURVES: Introduction, Wire frame models, parametric representation of curves (analytic & synthetic), curve manipulation, design examples. (6)

MATHEMATICAL REPRESENTATION OF SURFACES: Surface models, parametric representation, surface manipulation, design applications. (6)

MATHEMATICAL REPRESENTATION OF SOLIDS: Fundamentals of solid modeling, Boundary representation, constructive solid geometry, sweep representation, analytic solid modelers, design applications. (8)

VISUAL REALISATION: Model cleanup, hidden line removal, hidden surface removal, shading, colouring. (5)

COMPUTER ANIMATION: Computer animation, animation systems, types and technique, design applications, Computer Graphics Standard. (5)

LABORATORY PRACTICE: **(**15)

Total: 45

REFERENCES:

1. David Solomon, " Computer Graphics and Geometric Modeling", Springer Verlag, 1999
2. Ibrahim Zeid, "CAD/CAM Theory and Practice", McGraw Hill Inc., New York, 1991.
3. Radhakrishnan P & Kothandaraman C P, "Computer Graphics and Design", Dhanpat Rai and Sons, 1997.
4. Radhakrishnan P & Subramanyan S, “CAD/CAM/CIM”, New Age International (P) Ltd., 1997.
5. Michael E Mortenson, "Geometric Modeling", John Wiley & Sons Inc., Second Edition, 1997

P10PDD102 PRODUCT DEVELOPMENT STRATEGIES 3 1 0 4

Phases in the life cycle of a product, configuration management. (6)

Concurrent Engineering, Cost of design changes, schemes for concurrent engineering, axiomatic design, design for manufacturing and assembly, robust design, failure mode and effect analysis, Value engineering. (8)

CAD/CAM hardware - windows NT and unix based systems. (5)

Geometric modeling, current concepts, part design, sketching, use of datums construction features, free form manipulation, patterning, copying, modifying features. (7)

Assembly modeling, tolerancing, mass property calculations, rapid prototyping and tooling. Finite element modeling and analysis, general procedure, analysis techniques, finite element modeling, static, dynamic and thermal analysis. (9)

Mechanism analysis (5)

Design Project. (5)

Total: 45

REFERENCES:

1. Ibrahim Zeid, “CAD/CAM Theory and Practice”, McGraw Hill Inc., 1991.
2. David Bedworth, Mark Henderson & Philip Wolfe, “Computer Integrated Design and Manufacturing”, McGraw Hill Inc., 1991.
3. “Pro/Engineer, Part Modeling Users Guide”, 1998.

P10PDD103 FINITE ELEMENT AND MECHANISM ANALYSIS 3 1 0 4

INTRODUCTION TO FEM: Engineering design analysis - meaning and purpose-steady state, propagation and transient problems-basic concepts of FEM - applicability of FEM to structural analysis heat transfer and fluid flow problems-advantages and limitations of FEM - commercial finite element packages-organisation-advantages & limitations. (6)

STATIC ANALYSIS: General procedure of FEM - skeletal and continuum structures - Discretization of domain-basic types of elements-shape function - Reyleigh - Ritz methodformulation of element stiffness matrices - truss, beam, triangular, quadrilateral and brick elements - Isoparametric elements. (10)

DYNAMIC ANALYSIS : Equations of motion for dynamic problems - consistent and lumped mass matrices - formulation of element mass matrices - free vibration and forced vibration problem formulation. (7)

SOLUTION METHODS FOR FINITE ELEMENT EQUATIONS : Handling of simultaneous equations - Gaussian elimination method - Choleski method-solving of eigen value problems - Jacobi & subspace iteration methods - direct integration and mode superposition methods - Interpolation techniques. (6)

HEAT TRANSFER AND FLUID FLOW ANALYSIS : Basic equations of heat transfer & fluid flow problems - Galerkin method- finite element formulation - one dimensional heat and fluid flow problems. (6)

MECHANISM ANALYSIS : Introduction to Analysis of mechanisms - Creation of kinematic models - imposement of constraints and forces - inertial data - static and dynamic analysis of kinematic systems - analysis of output data - animation - displacement, velocity and acceleration functions. (10)

Total: 45

REFERENCES:

1. Segerlind L J, "Applied Finite Element Analysis", John Wiley & Sons, 2 nd Edition, 1984.
2. Bathe K J, "Finite Element Procedures in Ind., Engineering Analysis", Prentice Hall, New Jersey, 1982
3. Shames I H & Dym C L , “Energy and Finite Element Methods in Structural Mechanics,” Wiley Eastern Ltd., 1995.
4. Shigley .J. E. & Vicker .J. J., "Theory of Machines and Mechanisms", McGraw Hill, 1998.
5. MDI, "ADAMS Reference Manual".
6. Rao SS, "The Finite Element Method in Engineering", Pergomon Press, Oxford, 2nd Edition., 1989
7. Cook R.D., Malkus D.S.,. & Plesha M.E., "Concepts and Applications of Finite Element Analysis", John Wiley & Sons, 1989.

P10PDD104 PRODUCT DATA MANAGEMENT 3 0 0 3

INTRODUCTION: Introduction to PDM-present market constraints-need for collaborationinternet and developments in server-client computing. (3)

COMPONENTS OF PDM: Components of a typical PDM setup-hardware and softwaredocument management-creation and viewing of documents-creating parts-versions and version control of parts and documents- case studies. (9)

CONFIGURATION MANAGEMENT: Base lines- product structure-configuration management- case studies. (5)

PROJECTS AND ROLES: Creation of projects and roles- life cycle of a product- life cycle management- automating information flow- work flows- creation of work flow templates-life cycle-work flow integration- case studies. (12)

CHANGE MANAGEMENT: Change issue-change request-change investigation-change proposal-change activity-case studies. (6)

GENERIC PRODUCTS AND VARIANTS: Product configurator-comparison between sales configuration and product configurator-generic product modeling in configuration modeleruse of order generator for variant creation- registering of variants in product register-case studies. (10)

Total: 45

REFERENCES:

1. David Bedworth, Mark Henderson & Phillip Wolfe, “Computer Integrated Design and Manufacturing”, McGraw Hill Inc.,1991.
2. Terry Quatrain, “Visual Modeling with Rational Rose and UML”, Addison Wesley, 1998.
3. Wind-chill R5.0 Reference manuals, 2000.

P10PDD105 RAPID PROTOTYPING AND TOOLING 3 0 0 3

INTRODUCTION: Need for the compression in product development, History of RP systems, Survey of applications, Growth of RP industry, classification of RP systems. (4)

STEREOLITHOGRAPHY SYSTEMS: Principle, Process parameters, Process details, Data preparation, Data files and Machine details, Applications. (4)

SELECTIVE LASER SINTERING: Types of machines, Principle of operation, Process parameters, Data preparation for SLS, Applications. (4)

FUSION DEPOSITION MODELING: Principle, Process parameters, Path generation, Applications. (3)

SOLID GROUND CURING: Principle of operation, Machine details, Applications. (3)

LAMINATED OBJECT MANUFACTURING: Principle of operation, LOM materials, Process details, Applications. (3)

CONCEPT MODELERS: Principle, Thermo jet printer, Sander's model market, 3-D printer, Genisys Xs printer, JP system 5, Object Quadra System. (4)

LASER ENGINEERED NET SHAPING (LENS)

RAPID TOOLING: Indirect Rapid Tooling - Silicone rubber tooling, Aluminum filled epoxy tooling, Spray metal tooling, Cast Kirksite, 3D Keltool, etc. Direct Rapid Tooling - Direct AIM, Quick cast process, Copper polyamide, Rapid Tool, DMILS, ProMetal, Sand casting tooling, Laminate tooling, soft tooling vs hard tooling. (7)

SOFTWARE FOR RP: STL files, Overview of Solid view, Magics, mimics, magics communicator, etc. Internet based softwares, Collaboration tools. (4)

RAPID MANUFACTURING PROCESS OPTIMIZATION: Factors influencing accuracy, Data preparation errors, Part building errors, Errors in finishing, Influence of part build orientation. (5)

ALLIED PROCESSES: Vacuum Casting, Surface Digitizing, Surface Generation from point cloud, Surface modification, data transfer to solid models. (4)

Total : 45

REFERENCE:

1. Terry Wohlers, "Wohlers Report 2000", Wohlers Associates, 2000.
1. Paul. F. Jacobs, "Stereo lithography and other RP & M Technologies", SME, NY, 1996.
2. Pham. D. T. & Dimov. S. S., "Rapid Manufacturing", Verlag, London, 2001.

P10PDD503 PRODUCTION AND OPERATIONS MANAGEMENT 3 0 0 3

FORECASTING: Introduction, measures of forecast. Accuracy, forecasting methods - time Series Smoothing - Regression models - exponential smoothing - Seasonal forecasting - Cyclic forecasting. (5)

FACILITY LOCATION AND LAYOUT: Location factors, location evaluation methods. Different types of layouts for operations and production. Arrangement of facilities within departments. (5)

AGGREGATE PLANNING AND MASTER PRODUCTION SCHEDULING: Approaches to aggregate planning - graphical, empirical, and optimisation. Development of a master production schedule, materials requirement planning (MRP- I) and manufacturing resource planning (MRP -II). (6)

INVENTORY ANALYSIS AND CONTROL: Definitions - ABC inventory System - EOQ models for Purchased Parts - Inventory order policies - EMQ Models for Manufactured Parts - Lot sizing Techniques. Inventory models under uncertainty. (5)

SCHEDULING AND CONTROLLING: Objectives in Scheduling - Major steps involved - information system linkages in Production Planning and Control - Production control in repetitive, batch and jobshop manufacturing environment. (6)

JUST IN TIME MANUFACTURING: INTRODUCTION: Elements of JIT - uniform production rate - Pull versus Push method- Kanban system - small lot size - Quick, inexpensive set-up - Continuous improvement. Optimised Production Technology. (6)

PROJECT PLANNING: Evolution of Network Planning Techniques - Critical Path Method (CPM) - Project Evaluation and Review Technique (PERT). Network stochastic consideration. Project monitoring. Line of Balance. (6)

SCHEDULING WITH RESOURCE CONSTRAINTS: Allocation of units for a single resource - allocation of multiple resources - Resource Balancing. Line Balancing - Helgeson Brine approach - Region approach. Stochastic mixed - Product Line Balancing. Flexible manufacturing system - concepts - advantages and limitation - Computer Integration and AI in manufacturing and operations. Electronic data interchange. (6)

Total: 45

REFERENCES:

1. Bedworth. D.D. " Integrated Production Control systems Management, Analysis, Design", John Wiley & Sons, New York, 1982.
2. Vollman. T.E., "Manufacturing Planning and Control Systems", Galgotia Publication (P) Ltd., New Delhi, 1998.
3. Dilworth B. James, "Operations Management, Design, Planning and Control for Manufacturing and Services", Mc-Graw Hill, Inc, New Delhi, 1992.

P10PDD106 **CAD LABORATORY** **0 0 3 2**

Developing a Specified Product Using Modeling, Analysis and Simulation Software and Making a Model Using RP.

Sona College of Technology, Salem

(Autonomous)

Subjects of Study for ME I Semester under Regulations 2010R

Computer Science and Engineering

Branch: M.E. Software Engineering

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	P10SWE101R	Applied Probability and Operations Research	3	1	0	4
2	P10SWE102R	Formal Methods and Requirements Engineering	3	1	0	4
3	P10SWE103R	Object Oriented Systems	3	0	0	3
4	P10SWE104R	Software Engineering	3	0	0	3
5	P10SWE105R	User Interface Design	3	0	0	3
6	P10SWE106R	Network Engineering and Management	3	0	0	3
Practical						
7	P10SWE107R	Case Tools Laboratory	0	0	3	2
					Total Credits	**22**

Approved by

Chairperson, Computer Science and Engineering BOS Dr.B.Sathiyabhama

Member Secretary, Academic Council Dr.B.Sathiyabhama

Chairperson, Academic Council & Principal Dr.P.Govindarajan

Copy to:-
HOD/CSE, First Semester ME SWE Students and Staff, COE

P10CSE101R THEORETICAL FOUNDATIONS OF COMPUTER SCIENCE L T P C
3 1 0 4

Aim:

The subject aims at imparting the knowledge of modeling and languages, probability.

Objectives:

At the end of the course students should be able to understand the basic principles of mathematical foundations required for computer science modeling and simulation.

UNIT – I FUNDAMENTAL STRUCTURES (12)

Set theory- Relationships between sets – Operations on sets – Set identities –Principle of inclusion and exclusion – Minsets. Relations:– Binary relations – Partial orderings – Equivalence relations. Functions:– Properties of functions – Composition of functions – Inverse functions – Permutation functions.

UNIT - II LOGIC (12)

Propositional logic – Logical connectives – Truth tables – Normal forms (conjunctive and disjunctive) – Predicate logic – Universal and existential quantifiers – Proof techniques – direct and indirect – Proof by contradiction – Mathematical Induction.

UNIT - III COMBINATORICS (12)

Basics of counting – Counting arguments – Pigeonhole principle – Permutations and Combinations – Recursion and Recurrence relations – Generating functions.

UNIT – IV MODELING COMPUTATION AND LANGUAGES (12)

Finite state machines – Deterministic and Non- deterministic finite state machines – Turing Machines – Formal Languages – Classes of Grammars – Type 0 – Context Sensitive – Context Free – Regular Grammars – Ambiguity

UNIT – V DISCRETE PROBABILITY (12)

Finite probability – Conditional Probability – Independence – Bayes' theorem – Mathematical expectation – Probability Distribution (Binomial, Poisson, Geometric and their Properties).

Lecture: 45 Tutorial:15 Total:60

Reference Books:

1. Judith L.Gersting, "Mathematical Structures for Computer Science", W.H. Freeman and Company, NY, 2006.
2. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Fifth Edition, TMH, 2003.
3. M.K. Venkataraman, N. Sridharan and N.Chandrasekaran," Discrete Maths.", The National Publishing Company, 2003.
4. Kishore S Trivedi, "Probability and statistics with reliability, Queing and computer science applications", PHI, 2006.

P10CSE102 R ADVANCED COMPUTER ARCHITECTURE L T P C
3 0 0 3

Aim:
To understand the advanced concepts in instruction set architecture and organization of modern computers.

Course Objectives:
- Understand processor design concepts in modern computer architecture.
- Understand Organization and Instruction Set Architecture
- Understand Main and cache memory organization and design issues
- Understand the ILP, Superscalar architecture and TLP performance
- Understand different IO and Interconnection structures
- Evaluate tradeoff in processor and memory design
- Understand multicore architecture design

UNIT I PIPELINING AND ILP (9)
Fundamentals of Computer Design - Measuring and Reporting Performance - Instruction Level Parallelism and Its Exploitation - Concepts and Challenges - Overcoming Data Hazards with Dynamic Scheduling – Dynamic Branch Prediction - Speculation - Multiple Issue Processors – Case Studies.

UNIT II TLP AND LIMITS OF ILP (9)
Compiler Techniques for Exposing ILP - Limitations on ILP for Realizable Processors - Hardware versus Software Speculation - Multithreading: Using ILP Support to Exploit Thread-level Parallelism - Performance and Efficiency in Advanced Multiple Issue Processors - Case Studies.

UNIT III MULTIPROCESSOR SYSTEMS (9)
Symmetric and distributed shared memory architectures – Cache coherence issues - Performance Issues – Synchronization issues – Models of Memory Consistency - Interconnection networks – Buses, crossbar and multi-stage switches.

UNIT IV MULTI-CORE ARCHITECTURES (9) Introduction to Multicore Architecture –SMT and CMP architectures – Multicore Vs Multithreading– Case studies – Intel Multi-core architecture – SUN CMP architecture – IBM cell architecture.- hp architecture.

UNIT V MEMORY HIERARCHY DESIGN (9) Introduction - Optimizations of Cache Performance - Memory Technology and Optimizations - Protection: Virtual Memory and Virtual Machines - Design of Memory Hierarchies - Case Studies.

TOTAL - 45

Reference Books:

1. John L. Hennessey and David A. Patterson, " Computer Architecture – A quantitative approach", Morgan Kaufmann / Elsevier, 4th. edition, 2007.
2. Kai Hwang, "Advanced Computer Architecture: Parallelism, Scalability and Programmability" McGraw-Hill, 1993
3. William Stallings, "Computer Organization and Architecture – Designing for Performance", Pearson Education, Seventh Edition, 2006.

P10CSE103R ADVANCED DATA STRUCTURES AND ALGORITHMS **L T P C**
3 0 0 3

Aim:

The aim is to introduce the concepts and implementation of advanced Data Structures.

Objectives:

- To understand the concepts of notations and analysis.
- To understand the concepts of Heaps and search structures.
- To understand the concepts of multimedia structures and algorithms.

UNIT I FUNDAMENTALS (9)

Mathematical Induction - Asymptotic Notations – Properties of Big-oh Notation – Conditional Asymptotic Notation – Algorithm Analysis – Amortized Analysis – NP Completeness – NP-Hard – Recurrence Equations – Solving Recurrence Equations – Memory Representation of Multi-dimensional Arrays – Time-Space Tradeoff.

UNIT II HEAP STRUCTURES (9)

Min/Max heaps – Deaps – Leftist Heaps – Binomial Heaps – Fibonacci Heaps – Skew Heaps – Lazy-Binomial Heaps.

UNIT III SEARCH STRUCTURES (9)

Binary Search Trees – AVL Trees – Red-Black trees – Multi-way Search Trees –B-Trees – Splay Trees – Tries.

UNIT IV MULTIMEDIA STRUCTURES (9)

Segment Trees – k-d Trees – Point Quad Trees – MX-Quad Trees – R-Trees – TVTrees.

UNIT V ALGORITHMS (9)

Huffman Coding – Convex Hull – Topological Sort – Tree Vertex Splitting – Activity Networks – Flow Shop Scheduling – Counting Binary Trees – Introduction to Randomized Algorithms.

Total: 45

Reference Books:

1. E. Horowitz, S.Sahni and Dinesh Mehta, Fundamentals of Data structures in C++, Uiversity Press, 2007.
2. E. Horowitz, S. Sahni and S. Rajasekaran, Computer Algorithms/C++, Second Edition, University Press, 2007.
3. G. Brassard and P. Bratley, Algorithmics: Theory and Practice, Printice –Hall, 1988.
4. V.S. Subramanian, Principles of Multimedia Database systems, Morgan Kaufman, 1998.

P10CSE104 R ADVANCED OPERATING SYSTEMS

L	T	P	C
3	0	0	3

Aim:

The overall aim of this course is to provide a general understanding of modern operating systems that explores design aspects of modern operating systems.

Objectives:

- Explain the concepts of process, address space, and file
- Compare and contrast various CPU scheduling algorithms
- Understand the differences between segmented and paged memories, and be able to describe the advantages and disadvantages of each
- Knowing the concepts of multi processor & distributed operating system

UNIT – I INTRODUCTION (9)

Operating system concept – processes and threads, process model, process creation, process termination, Implementation of processes. CPU scheduling – Scheduling Algorithms- Inter Process Communication- Race conditions, critical regions, Mutual Exclusion with busy waiting, sleep and wakeup, Semaphores, Monitors.

UNIT – II DEADLOCK & MEMORY MANAGEMENT (9)

Deadlocks-Introduction, Deadlock detection and Recovery, Deadlock avoidance, Deadlock prevention, Deadlock handling strategies in distributed system – Memory Management- Swapping – Paging – Segmentation – Virtual Memory - Demand paging – Page Replacement.

UNIT – III FILE SYSTEMS (9)

File Concepts – Access methods – Directory Structure – File Protection – File System Implementation: File System Structure and Implementation – Directory Implementation – Allocation methods Free Space Management – Recovery – Disk Structure – Disk Scheduling.

UNIT – IV MULTIPROCESSOR OPERATING SYSTEMS (9)

Basic multiprocessor system architectures – basic multiprocessor system architecture – inter connection networks for multiprocessor systems – Caching – structures of multiprocessor operating system – operating system design issues – process synchronization.

UNIT – V DISTRIBUTED OPERATING SYSTEM (9)

Design issues in distributed operating system - Distributed file systems – Naming and Transparency-Remote File Access - Stateful versus Stateless service – Distributed Coordination- Event Ordering-Mutual Exclusion-Atomicity- Concurrency Control- Deadlock Handling - Election Algorithms.

Total: 45

Reference Books:

1. Avi Silberschatz, P.B.Galvin, G.Gagne “Operating System Concepts” seventh edition, John Wiley & Sons, 2007.
2. Pradeep K.Sinha, “Distributed Operating System: Concepts and Design”, IEEE computer Society Press, PHI, 2004.
3. Andrew S. Tanenbaum , “Modern Operating Systems”, PHI , 2nd Edition, 2001

P10CSE105R SOFTWARE ENGINEERING METHODOLOGIES

L	T	P	C
3	0	0	3

Aim:

The subject aims to impart sound knowledge to design and implement an efficient software system and manage the resources.

Objectives:

The students would be able to understand the process models and project management, analyze software requirements, design and develop an efficient software system through group cohesiveness, use the testing tools and methods and also to understand the various quality standards.

UNIT – I PROCESS AND PROJECT MANAGEMENT (9)

Software Process models – process iteration – process activities – rational unified process – computer aided software engineering. Management activities – project planning – project scheduling – risk management.

UNIT – II REQUIREMENT ANALYSIS (9)

Functional and Non – functional requirements – user requirements – system requirements – interface specifications – software requirements document. Requirements engineering processes – feasibility studies – elicitation and analysis – validations – management. System Models – Context – Behavioral – Data – Object – Structured.

UNIT – III SOFTWARE DESIGN (9)

Architectural Design – Distributed System Architectures – Application Architectures – Object Oriented Design – Real-time Software Design.

UNIT – IV SOFTWARE TESTING (9)

Software testing fundamentals – Test Case Design – White Box – Basis Path Testing – Control Structure Testing – Black Box – Testing for Specialized environments, Architectures and Applications - Software Testing Strategies – Approach – issues – testing – unit – integration – validation – system – art of debugging.

UNIT – V SOFTWARE QUALITY ASSURANCE (9)

Software Quality Concepts – Quality Assurance – Software Technical Reviews – Formal Approach to Software Quality Assurance – Reliability – Quality Standards – Software Quality Assurance Plan – Software Maintenance – Software Configuration Management – configuration item – process – objects in the software configuration – version control – change control – configuration audit – status reporting – SCM Standards – Case study : Martha Stockton Greengage (MSG) foundations.

Total: 45

Reference Books:

1. Roger S. Pressman, “Software Engineering: A Practitioner’s Approach”, Sixth Edition, McGraw Hill, 2005.
2. I.Sommerville, “Software Engineering”, 5th Edition, Addison Wesley, 1996.

P10CSE106R NETWORK ENGINEERING AND MANAGEMENT **L T P C**
3 0 0 3

Aim:

The aim is to introduce the concepts of high performance and high speed networks, management and Quality of service.

Objectives:

- To understand the basic concepts in networking.
- To understand the Quality of Service issues.
- To understand the concepts of high performance and high speed networks.
- To understand the concepts of network management.

UNIT I FOUNDATIONS OF NETWORKING (9)

Communication Networks – Network Elements – Switched Networks and Shared media Networks –Datagrams and Virtual Circuits – Multiplexing – Switching - Error and Flow Control – Congestion Control – Layered Architecture

UNIT II QUALITY OF SERVICE (9)

Traffic Characteristics and Descriptors – Quality of Service and Metrics – Best Effort model and Guaranteed Service Model – Limitations of IP networks – Scheduling and Dropping policies for BE and GS models – Traffic Shaping algorithms – End to End solutions – Laissez Faire Approach

UNIT III HIGH PERFORMANCE NETWORKS (9)

Integrated Services Architecture – Components and Services – Differentiated Services Networks – Per Hop Behaviour – Admission Control – MPLS Networks – Principles and Mechanisms – Label Stacking – RSVP – RTP/RTCP

UNIT IV HIGH SPEED NETWORKS (9)

Optical links – WDM systems – Optical Cross Connects – Optical paths and Networks –Principles of ATM Networks – B-ISDN/ATM Reference Model – ATM Header Structure – ATM Adaptation Layer – Management and Control – Service Categories and Traffic descriptors in ATM networks

UNIT V NETWORK MANAGEMENT (9)

ICMP – CMIP – SNMP– SNMPv2 and SNMPv3 – Remote monitoring – RMON SMI and MIB

Total: 45

Reference Books:

1. Mahbub Hassan and Raj Jain, 'High Performance TCP/IP Networking', Pearson Education, 2004.
2. Larry L Peterson and Bruce S Davie, 'Computer Networks: A Systems Approach', Fourth Edition, Morgan Kaufman Publishers, 2007.
3. Jean Warland and Pravin Vareya, 'High Performance Networks', Morgan Kauffman Publishers, 2002
4. William Stallings, 'High Speed Networks: Performance and Quality of Service', 2nd Edition, Pearson Education, 2002.
5. Mani Subramaniam, 'Network Management: Principles and Practices', Pearson Education, 2000
6. Kasera and Seth, 'ATM Networks: Concepts and Protocols', Tata McGraw Hill, 2002.

P10CSE107 R **DATA STRUCTURES LABORATORY** **L T P C**
0 0 3 2

1. Implementation of multi-dimensional structures such as matrices, triangular matrices, diagonal matrices, etc into a one dimensional array (atleast any two)
2. Implementation of any two of the following Heap structures

   Deaps (Insertion, Delete Min, Delete Max)

   Leftist Heap (All Meldable Priority Queue operations)

   Skew Heap (All Meldable Priority Queue operations)

   Fibonacci Heap (All Meldable Priority Queue operations)

3. Implementation of any two of the following Search Structures

   AVL Trees (Insertion, Deletion and Search)

   Splay Trees (Insertion, Deletion and Search)

   Tries for any specified alphabet (Insertion, Deletion and Search)

   B-Trees (Insertion, Deletion and Search)

4. Implementation of any two of the following multimedia structures

   2-d Trees (Insertion, Deletion and Range Queries)

   Point Quad-Trees (Insertion, Deletion and Range Queries)

   Segment Trees (Insertion, Deletion – Show list of nodes where in insertion and deletion took place)

5. Finding Convex-hull.

Sona College of Technology, Salem

(Autonomous)

Subjects of Study for ME I Semester under Regulations 2010

Civil Engineering

Branch: Structural Engineering

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	P10STR101	Matrix and Finite Element Methods of Structural analysis	3	1	0	4
2	P10STR102	Design of Concrete Structures	3	1	0	4
3	P10STR501	Advanced Concrete Technology	3	0	0	3
4	P10STR502	Stability of Structures	3	0	0	3
5	P10STR503	Advanced Foundation Engineering	3	0	0	3
Practical						
6	P10STR103	Computer Aided Structural Analysis Lab	0	0	4	2
7	P10STR104	Structural Engineering Laboratory	0	0	4	2
					Total Credits	**21**

Approved by

Chairperson, Civil Engineering BOS
Dr.R.Kumutha

Member Secretary, Academic Council
Dr.B.Sathiyabhama

Chairperson, Academic Council & Principal
Dr.P.Govindarajan

Copy to:-
Dean/Civil, First Semester ME STR Students and Staff, COE

P11STR101 Matrix and Finite Element Methods of Structural analysis 3 1 0 4

Objectives

- To educate the students to analyse the structures by Matrix methods
- At the end of this course students will have sound knowledge of Finite element method and will be able to analyse linear elastic structures

Unit – I Matrix Methods 9+3

Flexibility Method-Equilibrium and compatibility – Determinate Vs Indeterminate structures – Indeterminacy - Primary structure – Compatibility conditions – Analysis of indeterminate pin-jointed plane frames, continuous beams, rigid jointed plane frames. Stiffness Method – Degree of freedom or Kinematic indeterminacy –Analysis procedure- Stiffness co-efficient- – Analysis of continuous beams – Analysis of pin-jointed plane frames and rigid frames.

Unit – II Introduction to FEM 9+3

Introduction – General description of the method - Analysis procedure- Stress and strain vectors-strain displacement equations-linear Constitutive equations-Plane stress, plane strain and axisymmetric cases of elasticity-Energy principles- Variational methods- Rayleigh Ritz Method-Galerkins method –Concept of piecewise approximation.

Unit – III Element Types and Properties 9+3

Concept of an element - Various element shapes- Approximating displacements by polynomials-Convergence and Compatibility Requirements-Pascal's Triangle- Node numbering procedure – Natural coordinate system – Generalized coordinates – shape function – Lagrange, Serendipity and Hermitian elements – stiffness matrix – Nodal load vector –Condensation of internal degrees of freedom- Degrading Technique.

Unit – IV Stress Analysis 9+3

Displacement formulation for axial element, beam bending element, Constant linear strain triangular elements- Linear Isoparametric quadrilateral and hexahedral elements, plate bending element and axisymmetric elements

Unit – V Applications of FEM 9+3

Discretisation of a body or structure- Minimization of bandwidth- Selection of proper displacement or interpolation model- Derivation of element stiffness matrices and load vectors-Assemblage of element equation to obtain the overall equilibrium equation- Theory of direct stiffness method- solution for unknown nodal displacements computation of element strains and stresses-Application of displacement finite elements to the analysis of simple problems like beams, pin jointed plane frames and plate problems

Lecture : 45, Tutorial : 15 , Total :60

References

1. Weaver, J.R and Gere,J.M., Matrix analysis of framed structures, CBS Publishers,newDelhi,1986.

2. Rao, S.S., The Finite Element Method in Engineering, Pergamon Press, 1999.

3. Bathe, K.J., Finite Element Procedures in Engineering Analysis, Prentice Hall, 1995.

4. Chandrakant S Desai and John F Abel., introduction to Finite Element Method, Affiliated East-West Press private Limited,1987

5. Krishnamoorthy C.S, Finite Element Analysis – Theory and programming, Second edition, Tata McGraw Hill Publishing Co.. 1994

6. Tirupathi R. Chandrupatla and Ashok D. Belegundu, Introduction to Finite Elements in Engineering, Prentice Hall of India Pvt.Ltd., New Delhi, 2002

7. Structural Analysis – A Matrix Approach – G.S. Pandit & S.P. Gupta, Tata McGraw Hill 2004.

P11STR102 Design of Concrete Structures 3 1 0 4

(Use of IS 456-2000, SP 16, SP 34, IS 5525, IS 13920 and other relevant codes are permitted)

Objectives

- To make the students familiar with the limit state design of R.C.C. Beams and columns
- At the end of this course students will be able to design special R.C. elements such as deep beams, Corbels, shear walls, flat slab and grid floors
- To expose them to the concepts of ductile detailing of R.C. members as per IS Codes

Unit – I Review of limit State Design 9+3

Design for limit state of collapse-Design of beams for combined effect of shear, bending moment and torsion-Design of slabs- Design of short and slender columns including biaxial bending - Design for limit state of serviceability-Calculation of deflection and crackwidth according to IS and ACI codes

Unit – II Design of special R.C. Elements 9+3

Design of R.C. walls - Shear walls- Classification and design principles-Rectangular and Flanged shear walls-Design of corbels- Design of deep beams

Unit – III Design of Flat slabs and Grid floors 9+3

Yield line analysis of slabs-Hillerberg's strip method of design of slab-Design of flat slab-Equivalent frame method of design-Approximate analysis and Design of grid floors

Unit – IV Inelastic behaviour of R.C. beams 9+3

Inelastic behaviour of concrete beams – Moment Rotation curves – Moment redistribution – Baker's method of analysis and design – Design of cast in situ joints in frame.

Unit – V Detailing Requirements 9+3

Design and detailing of structural members using seismic design - Reinforcement detailing of structural members as per SP:34 & IS:5525 – Earth quake Resistant Design – Detailing requirements for Ductility as per IS:13920 - Fire resistance of buildings.

Lecture : 45, Tutorial : 15 , Total : 60

References

1. Varghese, P.C. " Advanced Reinforced Concrete Design" Prentice Hall of India,2002.
2. KrishnaRaju .N. "Advanced Reinforced Concrete Design", CBS Publishers and Distributors ,1986.
3. Purushothaman .P. " Reinforced Concrete Structural Elements": Behaviour Analysis and Design, Tata Mcgraw Hill ,1986.
4. Park..R and Pauly.T. "Reinforced Concrete Structures", John wiley & Sons,1975.

P11STR501 Advanced Concrete Technology 3 0 0 3

Objectives

- To enable the students to design concrete mixes as per ACI and IS methods.
- To make the students understand the properties of fresh and hardened concrete and to know the tests for determining these properties

Unit – I Introduction 9

Concrete: Past, Present and Future- Constituent Materials --Strength of Concrete- Dimensional Stability of Concrete- Chemical and Mineral Admixtures-Properties of Fresh and hardened Concrete

Unit – II Mix Design 9

Principles of Concrete Mix Design- Factors in the choice of mix proportions-Mix design methods- A.C.I .Methods -I.S. Methods-Mix proportion- Correction for moisture content-Bulking-Yield of concrete-Design of High strength concrete and Self compacting concrete-EFNARC Specifications- Design of concrete mix with Fly ash and silica fume.

Unit – IIII Concrete Testing 9

Workability-Compression-Tension-Flexure-Bond strength-Factors affecting the results-Accelerated strength results-Stress strain characteristics- Modulus of Elasticity-In situ strength determination-Variation in results- Distribution of strength-Standard deviation-Non destructive tests-I.S. code provision

Unit – IV Special Concretes 9

Lightweight and Heavy Weight Concrete - High Strength Concrete - High Performance Concrete - Polymers in Concrete - Steel fiber Reinforced Concrete- Ferrocement Concrete - Vaccum Concrete – Shotcrete - Ready Mixed Concrete – Self compacting concrete-Geopolymer concrete.

Unit – V Durability of Concrete 9

Permeability-chemical attack-sulphate attack-Quality of water-marine conditions- Thermal properties of concrete-fire resistance-Methods of making durable concrete - Mass Concrete-Formwork-Structural Concrete Block Masonry -Quality Control of Concrete Construction

Total: 45

References

1 Neville, A.M., Properties of Concrete, Pitman Publishing Limited, London, 1995
2 Shetty M.S.,Concrete Technology,S.Chand and Company Ltd,.New Delhi,2003.
3 Gambir,M.L. “Concrete Technology”, Tata McGraw Hill, Publishing Co,Ltd, New Delhi,2004.
4 Krishnaraju.N, “Design of Concrete mixes”, Sehgal Educational Consultants Pvt.Ltd.,Faridabad.
5 IS:456-2000,Indian Standards Code of Practice for Plain and Reinforced Concrete
6 IS: 10262, “Recommended Guidelines for Concrete Mix Design”, 2000.
7 Santhakumar,A.R., Concrete Technology, Oxford University Press, New Delhi, 2007

P11STR502 Stability of Structures 3 0 0 3

Objectives

- At the end of this course students will be in a position to understand the phenomenon of buckling and its effects on structural components.
- They will be in a position to design these components taking into account the effect of buckling

Unit – I Stability of Columns 9

Concepts of Elastic Structural stability- Analytical approaches to stability - characteristics of stability analysis- Elastic Buckling of columns- Equilibrium; Energy and Imperfection approaches – Non-prismatic columns- Built up columns- Buckling modes Effect of shear on buckling load - Large deflection theory.

Unit – II Methods of Analysis and In Elastic Buckling 9

Approximate methods – Rayleigh and Galerkin methods – numerical methods – Finite difference and finite Element - analysis of columns – Experimental study of column behaviour – South well plot - Column curves - Derivation of Column design formula - Effective length of Columns - Inelastic behaviour- Tangent modulus and Double modulus theory

Unit – III Beam Columns and Frames 9

Beam column behaviour- standard cases- Continuous columns and beam columns – Columns on elastic foundation – Buckling of frames – Single storey portal frames with and without side sway – Classical and stiffness methods – Use of Wood's charts.

Unit – IV Buckling of Beams 9

Lateral buckling of beams – Energy method- Application to Symmetric and single symmetric I beams – simply supported and Cantilever beams - Narrow rectangular cross sections- – Numerical solutions – Torsional buckling – Uniform and non uniform Torsion on open cross section - Flexural torsional buckling – Equilibrium and energy approach.

Unit – V Buckling of Thin Plates 9

Isotropic rectangular plates - Governing Differential equations - Simply Supported on all edges – Use of Energy methods –Numerical Techniques.

Total: 45

References

1. Timoshenko, S., and Gere., "Theory of Elastic Stability", McGraw Hill Book Company, 2009.
2. Chajes, A. "Principles of Structures Stability Theory", Prentice Hall, 1974.
3. Ashwini Kumar, Stability of Structures, Allied Publishers LTD, New Delhi, 2003
4. Iyenger.N.G.R.,, "Structural stability of columns and plates", Affiliated East West Press,1986.
5. Gambhir, "Stability Analysis and Design of Structures", springer, New York , 2004.

P11STR503 Advanced Foundation Engineering 3 0 0 3

Objectives

- At the end of this course students will be able to determine the bearing capacity of soil.
- They will be able to select the type of foundation to be adopted and to design shallow foundation, deep foundation and machine foundation

Unit – I Shallow Foundations 9

Types of foundations and their specific applications – depth of foundation – bearing capacity and settlement estimates –structural design of isolated footings, strip, rectangular and trapezoidal combined footings – strap– raft foundation – Approximate flexible method of raft design.

Unit – II Sheet Pile Walls and Cofferdams 9

Sheet pile structures - Cantilever sheet pile walls in granular soils and cohesive soils - Anchored Bulk head - Free earth support method - Fixed earth support method – lateral earth pressure on Braced sheet pile walls - Cofferdams - Types - Cellular cofferdams - components - Dimensions - Cell fill - Stability of cellular cofferdams - Cofferdams in Rock - Cofferdams on deep layers of sand or clay.

Unit – III Pile Foundations 9

Types of piles-Static and Dynamic pile formula-Pile load test-Negative skin friction-Pile groups-Efficiency of pile group-Settlement of piles-Batter piles-Analysis of pile groups- Structural design of under reamed and cast in situ piles –Design of pile caps

Unit – IV Well Foundations 9

Types of wells or caissons-Components-Shapes of wells- Forces acting-Construction and sinking- Design of drilled caissons

Unit – V Machine Foundations and Foundations on expansive soils 9

Introduction to vibrations- Design criteria for satisfactory action of a machine foundation- Soil spring constants- Determination-Types of foundation- Identification of swelling-Field conditions-Consequence of swelling-Design

Total: 45

References

1. Swamy Saran, Analysis and Design of Substructures, Oxford and IBH Publishing Co. Pvt. Ltd., 2006
2. P. C. Varghese, Foundation Engineering, Prentice-Hall of India Private Ltd, New Delhi, 2006
3. M. J. Thomlinson and R. Boorman, Foundation Design, Construction, ELBS Longman, 1995
4. V. N. S. Murthy, Advanced Foundation Engineering, CBS publisher, 2007
5. Bowels J. E "Foundation Analysis and Design" McGraw-Hill International Book Co.
6. Gopal Ranjan and ASR Rao., Basic and Applied Soil Mechanics,Wiley Eastern Ltd., 1991.
7. Nayak, N.V., "Foundation Design manual for Practicing Engineers", Dhanpat Rai and Sons, 1982.8. Winterkorn H.F., and Fang H.Y., "Foundation Engineering Hand Book – Van Nostrard - Reinhold - 1976.

Sona College of Technology, Salem

(Autonomous)

Subjects of Study for ME I Semester under Regulations 2010

Electronics and Communication Engineering

Branch: M.E. VLSI Design

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit
Theory						
1	P10VLD101	Applied Mathematics	3	1	0	4
2	P10VLD102	Digital Signal Processing Integrated Circuits	3	1	0	4
3	P10VLD103	Advanced Digital System Design	3	1	0	4
4	P10VLD104	VLSI Design Techniques	3	1	0	4
5	P10VLD105	Solid State Device Modeling and Simulation	3	0	0	3
6	P10VLD106	Testing of VLSI Circuits	3	0	0	3
Practical						
7	P10VLD107	VLSI Design Lab I	0	0	4	2
					Total Credits	**24**

Approved by

Chairperson, Electronics and Communication Engineering BOS
Dr.K.R.Kashwan

Member Secretary, Academic Council
Dr.B.Sathiyabhama

Chairperson, Academic Council & Principal
Dr.P.Govindarajan

Copy to:-
HOD/ECE, First Semester ME VLSI Students and Staff, COE

ESTER I

P10VLD101 - APPLIED MATHEMATICS 3 1 0 4

AIM

To introduce the students about the linear algebraic & wave equations, Random variables and Queuing theory in the engineering field.

OBJECTIVES

- To develop efficient algorithms for solving numerical methods, to acquire skills in handling situation involving random variable.
- To learn the basics and gained the skill for specialized studies and research.

LINEAR ALGEBRAIC EQUATION AND EIGEN VALUE PROBLEMS 9+3

System of equations- Solution by Gauss Elimination, Gauss-Jordan and LU decomposition method- Jacobi, Gauss-Seidal iteration method- Eigen values of a matrix by Jacobi and Power method.

WAVE EQUATION 9+3

Solution of initial and boundary value problems- Characteristics- D'Alembert's Solution -

Significance of characteristic curves - Laplace transform solutions for displacement in a long string - a long string under its weight - a bar with prescribed force on one end- free vibrations of a string.

SPECIAL FUNCTIONS 9+3

Bessel's equation - Bessel Functions- Legendre's equation - Legendre polynomials -Rodrigue's formula - Recurrence relations- generating functions and orthogonal property for Bessel functions - Legendre polynomials.

RANDOM VARIABLES 9+3

One dimensional Random Variable - Moments and MGF – Binomial, Poisson, Geometrical, Normal Distributions- Two dimensional Random Variables – Marginal and Conditional Distributions – Covariance and Correlation Coefficient - Functions of Two dimensional random variable

QUEUEING THEORY 9+3

Single and Multiple server Markovian queueing models - Steady state system size probabilities – Little's formula - Priority queues - M/G/1 queueing system – P.K. formula.

L + T = 45 + 15 = 60

TEXT BOOKS:

1. Sankara Rao.K. "Introduction to Partial Differential Equation ", PHI, 1995.
2. Taha. H.A., "Operations Research- An Introduction " 6th Edition, PHI, 1997.
3. Jain M.K. Iyengar, S.R.K. & Jain R.K., "International Methods for Scientific and Engineering Computation", New Age International (P) Ltd, Publlishers 2003..

REFERENCES:

1. Kanpur J.N. & Saxena. H.C. "Mathematical Statistics", S.Chand & Co. New Delhi, 2003.
2. Greweal B.S. "Higher Engineering Mathematics", Khanna Publishers, 2005.

P10VLD102 - DIGITAL SIGNAL PROCESSING INTEGRATED CIRCUITS 3 1 0 4

AIM

To introduce the students about the DSPICs, DSP architectures and its synthesis, Arithmetic units and logic circuit design.

OBJECTIVES

- To study DSP system design & CMOS technologies, DFT & FFT computation.
- To study the digital filters and finite word length.
- To introduce the architecture of synthesis of DSP.

UNIT I **9**

DSP INTEGARTED CIRCUITS AND VLSI CIRCUIT TECHNOLOGIES

Standard digital signal processors, Application specific IC's for DSP, DSP systems, DSP system design,Integrated circuit design. MOS transistors, MOS logic, VLSI process technologies, Trends in CMOS technologies.

UNIT II **9**

DIGITAL SIGNAL PROCESSING

Digital signal processing, Sampling of analog signals, Selection of sample frequency, Signal-processing systems, Frequency response, Transfer functions, Signal flow graphs, Filter structures, Adaptive DSP algorithms, DFT-The Discrete Fourier Transform, FFT-The Fast Fourier Transform Algorithm, Image coding, Discrete cosine transforms.

UNIT III **9**

DIGITAL FILTERS AND FINITE WORD LENGTH EFFECTS

FIR filters, FIR filter structures, FIR chips, IIR filters, Specifications of IIR filters, Mapping of analog transfer functions, Mapping of analog filter structures, Multirate systems, Interpolation with an integer factor L, Sampling rate change with a ratio L/M, Multirate filters. Finite word length effects –Parasitic oscillations, Scaling of signal levels, Round-off noise, Measuring round-off noise, Coefficient sensitivity, Sensitivity and noise.

UNIT IV **9**

DSP ARCHITECTURES AND SYNTHESIS OF DSP ARCHITECTURES

DSP system architectures, Standard DSP architecture, Ideal DSP architectures, Multiprocessors and multicomputers, Systolic and Wave front arrays, Shared memory architectures. Mapping of DSP algorithms onto hardware, Implementation based on complex PEs, Shared memory architecture with Bit – serial PEs.

UNIT V **9**

ARITHMETIC UNITS AND INTEGRATED CIRCUIT DESIGN

Conventional number system, Redundant Number system, Residue Number System .Bit-parallel and Bit- Serial arithmetic, Basic shift accumulator, Reducing the memory size, Complex multipliers, Improved shift-accumulator. Layout of VLSI circuits, FFT processor, DCT processor and Interpolator as case studies

L : 45, T:15 Total 60

TEXT BOOK:

1. Lars Wanhammer, "DSP Integrated Circuits", Academic press, New York 1999.

REFERENCES:

1. A.V.Oppenheim et.al, 'Discrete-time Signal Processing' Pearson education, 2000.
2. Emmanuel C. Ifeachor, Barrie W. Jervis, " Digital signal processing – A practical approach", Second edition, Pearson education, Asia 2001.
3. Keshab K.Parhi, 'VLSI digital Signal Processing Systems design and Implementation' John Wiley & Sons, 1999.
4. Bayoumi & Magdy A., " VLSI Design Methodologies for Digital Signal Processing Architectures", BS Publications, 2005.

P10VLD103 - ADVANCED DIGITAL SYSTEM DESIGN 3 1 0 4

AIM

To introduce the students about Sequential Circuit Design, Programmable logic circuits design and types of fault that occurs in digital circuits.

OBJECTIVES

- To learn how to design Synchronous and Asynchronous Sequential Circuit Design.
- To learn how to design Programmable logic circuits and logic synthesis compiler based on VHDL.
- To determine the types of fault that occurs in digital circuits.
- To study the system design using VHDL.

UNIT I **9**

SEQUENTIAL CIRCUIT DESIGN

Analysis of Clocked Synchronous Sequential Networks (CSSN) Modeling of CSSN – State Stable Assignment and Reduction – Design of CSSN – Design of Iterative Circuits – ASM Chart – ASM Realization.

UNIT II **9**

ASYNCHRONOUS SEQUENTIAL CIRCUIT DESIGN

Analysis of Asynchronous Sequential Circuit (ASC) – Flow Table Reduction – Races in ASC – State Assignment – Problem and the Transition Table – Design of ASC – Static and Dynamic Hazards – Essential Hazards – Data Synchronizers – Designing Vending Machine Controller – Mixed Operating Mode Asynchronous Circuits.

UNIT III **9**

FAULT DIAGNOSIS AND TESTABILITY ALGORITHMS

Fault Table Method – Path Sensitization Method – Boolean Difference Method – D Algorithm – Tolerance Techniques – The Compact Algorithm – Practical PLA's – Fault in PLA – Test Generation – Masking Cycle – DFT Schemes – Built-in Self Test.

UNIT IV **9**

SYNCHRONOUS DESIGN USING PROGRAMMABLE DEVICES

Programmable Logic Devices – Designing a Synchronous Sequential Circuit using a PAL – Realization State machine using PLD –Complex Programmable Logic Devices (CPLDs) - FPGA – Xilinx FPGA – Xilinx 3000 - Xilinx 4000

UNIT V **9**

SYSTEM DESIGN USING VHDL

VHDL Description of Combinational Circuits – Arrays – VHDL Operators – Compilation and Simulation of VHDL Code – Modeling using VHDL – Flip Flops – Registers – Counters – Sequential Machine – Combinational Logic Circuits - VHDL Code for – Serial Adder, Binary Multiplier – Binary Divider – complete Sequential Systems – Design of a Simple Microprocessor. **L :45 T:15**

Total 60

TEXT BOOKS:

1. Donald G. Givone "Digital principles and Design" Tata McGraw Hill,2002.
2. Nripendra N Biswas "Logic Design Theory" Prentice Hall of India, 2001.
3. Charles H. Roth Jr. "Fundamentals of Logic design" Thomson Learning, 2004.

REFERENCES:

1. Nelson V.P., Nagale H.T., Carroll B.D., and Irwin J.D., "Digital Logic Circuit Analysis and Design", Prentice Hall International Inc.1995.
2. Stephen Brown and Zvonk Vranesic "Fundamentals of Digital Logic with VHDL Design" Tata McGraw Hill, 2002.
3. Navabi.Z. "VHDL Analysis and Modeling of Digital Systems. McGraw International, 1998.
4. John M Yarbrough "Digital Logic applications and Design" Thomson Learning, 2001.

P10VLD104 - VLSI DESIGN TECHNIQUES **3 1 0 4**

AIM

To know the students about the CMOS processing Technology, Basic of CMOS & its characterization and Verilog HDL Programming.

OBJECTIVES

- To learn the CMOS processing technology and basic CMOS circuits, CMOS transistor theory and logic design.
- To study about Verilog HDL Programme

UNIT I

VLSI DESIGN PROCESS. **9**

VLSI Design Process – Architectural Design – Logical Design – Physical Design – Layout Styles –Full custom, Semicustom approaches. MOS TRANSISTOR THEORY AND PROCESS TECHNOLOGY. NMOS and PMOS transistors, Threshold voltage- Body effect- Design equations- Second order effects. MOS models and small signal AC characteristics. Basic CMOS technology.

UNIT II **9**

INVERTERS AND LOGIC GATES.

NMOS and CMOS Inverters, Stick diagram, Inverter ratio, DC and transient characteristics , switching times, Super buffers, Driving large capacitance loads, CMOS logic structures , Transmission gates, Static CMOS design, dynamic CMOS design.

UNIT III **9**

CIRCUIT CHARACTERISATION AND PERFORMANCE ESTIMATION

Resistance estimation, Capacitance estimation, Inductance, switching characteristics, transistor sizing, power dissipation and design margining. Charge sharing .Scaling.

UNIT IV **9**

VLSI SYSTEM COMPONENTS CIRCUITS

Multiplexers, Decoders, comparators, priority encoders, Shift registers. Arithmetic circuits – Ripple carry adders, Carry look ahead adders, High-speed adders, Multipliers

UNIT V **9**

VERILOG HARDWARE DESCRIPTION LANGUAGE

Overview of digital design with Verilog HDL, hierarchical modelling concepts, modules and port definitions, gate level modelling, data flow modelling, behavioral modelling, task & functions, Test Bench.

L :45 T:15 Total 60

TEXT BOOK:

1. Neil H.E. Weste and Kamran Eshraghian, Principles of CMOS VLSI Design, Pearson Education ASIA, 2nd edition, 2000.

REFERENCES:

1. Jan M Rabaey, " Digital Integrated Circuits" Prentice Hall of India, 2002
2. John P.Uyemura "Introduction to VLSI Circuits and Systems", John Wiley & Sons, Inc., 2002.
3. J.Bhasker, B.S.Publications, "A Verilog HDL Primer", 2nd Edition, 2001.
4. Pucknell, "Basic VLSI Design", Prentice Hall of India Publication, 1995.

P10VLD105 - SOLID STATE DEVICE MODELING AND SIMULATION 3 0 0 3

AIM

To learn the students about the modeling techniques used in solid state devices and measurement the solid state device parameters.

OBJECTIVES

- To introduce an overall idea about solid state devices and it‘s parameters.
- To study the modeling technique and different models used for the implementation of circuits using solid state devices.
- To study how to measure the solid state device parameters.

UNIT I **9**

BASIC SEMICONDUCTOR PHYSICS

Quantum Mechanical Concepts, Carrier Concentration, Transport Equation, Band gap, Mobility and Resistivity, Carrier Generation and Recombination, Avalanche Process, Noise Sources. Diodes : Forward and Reverse biased junctions – Reverse bias breakdown – Transient and AC conditions -– Static and Dynamic behavior- Small and Large signal models – SPICE model for a Diode – Temperature and Area effects on Diode Model Parameters.

UNIT II **9**

BIPOLAR DEVICE MODELING

Transistor Models: BJT – Transistor Action – Minority carrier distribution and Terminal currents - Switching- Eber - Molls and Gummel Poon Model, SPICE modeling - temperature and area effects.

UNIT III **9**

MOSFET MODELING

MOS Transistor – NMOS, PMOS – MOS Device equations - Threshold Voltage – Second order effects - Temperature Short Channel and Narrow Width Effect, Models for Enhancement, Depletion Type MOSFET, CMOS Models in SPICE.

UNIT IV **9**

PARAMETER MEASUREMENT

Bipolar Junction Transistor Parameter – Static Parameter Measurement Techniques – Large signal parameter Measurement Techniques, Gummel Plots, MOSFET: Long and Short Channel Parameters,Measurement of Capacitance.

UNIT V **9**

OPTOELECTRONIC DEVICE MODELING

Static and Dynamic Models, Rate Equations, Numerical Technique, Equivalent Circuits, Modeling of LEDs, Laser Diode and Photodetectors.

Total: 45

TEXT BOOKS:

1. S.M.Sze “Semiconductor Devices - Physics and Technology”, John Wiley and sons, 1985.
2. Tyagi M.S. “Introduction to Semiconductor Devices”, 2 nd Edition Mc Graw Hill, New York,1981

REFERENCES:

1. Ben.G..Streetman, “Solid State Devices”, Prentice Hall , 1997.
2. Giuseppe Massobrio and Paolo Antogentti, “Semiconductor Device Modeling with SPICE” Second Edition, McGraw-Hill Inc, New York, 1993.
3. Mohammed Ismail & Terri Fiez “Analog VLSI-Signal & Information Processing” 1st ED,Tata McGraw Hill Publishing company Ltd 2001.

P10VLD106 - TESTING OF VLSI CIRCUITS **3 0 0 3**

AIM

To introduce the students how to find and test the faults present in Combinational and Sequential circuits.

OBJECTIVES

- Complex digital systems in single chips, must be verify to ensure that they are functioning correctly.
- Testing of VLSI circuits deals with the nuts and bolts of such technique used verify the system in chip.

UNIT I **9**

Introduction to Testing - Faults in digital circuits - Modeling of faults - Logical Fault Models – Fault detection - Fault location - Fault dominance - Logic Simulation - Types of simulation - Delay models - Gate level Event-driven simulation.

UNIT II **9**

Test generation for combinational logic circuits - Testable combinational logic circuit design – Test generation for sequential circuits - design of testable sequential circuits.

UNIT III **9**

Design for Testability - Ad-hoc design - Generic scan based design - Classical scan based design – System level DFT approaches.

UNIT IV **9**

Built-In Self Test - Test pattern generation for BIST - Circular BIST - BIST Architectures – Testable Memory Design - Test algorithms - Test generation for Embedded RAMs

UNIT V **9**

Logic Level Diagnosis - Diagnosis by UUT reduction - Fault Diagnosis for Combinational Circuits – Selfchecking design - System Level Diagnosis.

Total 45

TEXT BOOKS:

1. P.K. Lala, "Digital Circuit Testing and Testability", Academic Press, 2002.
2. M. Abramovici, M.A. Breuer and A.D. Friedman, "Digital Systems and Testable Design" Jaico Publishing House, 2002.

REFERENCES:

1. M.L. Bushnell and V.D. Agrawal, "Essentials of Electronic Testing for Digital, Memory and Mixed-Signal VLSI Circuits", Kluwar Academic Publishers, 2002.
2. A.L. Crouch, "Design for Test for Digital IC's and Embedded Core Systems", Prentice Hall International, 2002.

P10VLD107 VLSI DESIGN LAB I **0 0 4 2**

1. Modeling of Sequential Digital system using VHDL.

2. Modeling of Sequential Digital system using Verilog.

3. Writing Test Benches Using Verilog / VHDL

4. Design and Implementation of ALU using FPGA.

5. Simulation of NMOS and CMOS circuits using SPICE.

6. Design of Static and Dynamic Logic Circuits

7. Modeling of MOSFET using C.

8. Implementation of FFT, Digital Filters.

9. Implementation of DSP algorithms using software package.

10. Implementation of MAC Unit using FPGA.