SEMESTER - VII

SEMESTER – VII

COMPUTER NETWORKS & DATA COMMUNICATION EC (ID) – 7003

Course Code	**EC (ID) – 7003**	Credits: 4	L-3, T-1, P-0
Name of the Course	**COMPUTER NETWORKS & DATA COMMUNICATION**		
Lectures to be delivered	**52 (1 Hr Each) (L = 39, T = 13 for each semester)**		
Semester End Examination	**Max. Time: 3 hrs.**	**Max. Marks: 100**	**Min. Pass Marks: 40**
Continuous Assessment (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		**Max. Marks: 50**	

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Section A

Introduction

User of computer Networks LAN, MAN, WAN, Wireless Networks, Networks software; Protocol hierarchies, design issues of layers interfaces and services. The OSI reference model, the TCP/IP reference model

The Physical Layer :

Fourier analysis, maximum data rate of a channel, transmission media, wireless transmission, narrow band ISDN, Broadband ISDN and ATM; Virtual circuits versus circuits switching.

Section B

Data link layer

Data link layer design issues; services provided to network layer, framing, error control, flow control, error detection and correction. Elementary data link protocol; an unrestricted simplex protocol. A

simplex stop and wait protocol, simplex protocol for noisy channel, sliding window protocol; one bit sliding window protocol, protocol using go back-N, protocol using selective repeat ,Protocol specification and verification, example data link protocols;HLDC- high level data link control.

SECTION C

The Medium Access Sublayer:

Channel allocation problem; static and dynamic channel allocation in LAN's and MAN's multiple access protocols- ALOHA carrier Multiple access protocol, WDMA protocol, wireless LAN protocol collision free protocols, limited contention protocols, IEEE standards 802.3 and Ethernet, IEEE standard 802.4 token bus, IEEE standard 802.5 token, ring. Distributed queue dual bus, logical link control bridges, high speed LANs, Satellite network.

SECTION D

Network, layer design issues, routing algorithms, congestion control algorithm, internetworking.

TRANSPORT LAYER: Transport services, elements of transport protocols, simple transport protocol, overview of application layer (TCP, UDP).

Reference Books:

1.Computer Networks by Tenanbaum (3rd edition)
2.Data & Computer Communication by Black.
3.Data Communication and Networking by FORAUZAN.

SEMESTER – VII
ARTIFICIAL INTELLIGENCE & EXPERT SYSTEM(CS-7001)

Course Code	**CS-7001**	Credits: 4	L-3, T-1, P-0
Name of the Course	**ARTIFICIAL INTELLIGENCE & EXPERT SYSTEM**		
Lectures to be delivered	52 (1 Hr Each) (L = 39, T = 13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 40
Continuous Assessment (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		Max. Marks: 50	

Instructions

1. For Paper Setters: The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus

and each question will carry 20% of the total marks of the semester end examination for the course.

2. For candidates: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Section-A

Introduction to AI: Problems, Techniques and programming Languages. Introduction to LISP : List manipulations, functions, predicates, and conditionals , input , output and logical variables, iteration and recursion. Lists and arrays. Introduction to PROLOG.

Problems, Problems Spaces & Search: Defining a problem as a space, search, production systems, problem characteristics, production system characteristics, issues in the design of search programs.

Section-B

Heuristic Search Techniques:

Generate – and – test, Hill Climbing, best – first search (A*), Problem Reduction (AO*), constraint satisfaction, Means End Analysis.

Knowledge Representation Issues: Representations and Mappings, approaches to knowledge representation, issues of knowledge representation, the frame problem

Section-C

USING PREDICATE LOGIC: Representing simple facts in logic representing instance & its relationships, computable functions and predicates, resolution natural deduction.

REPRENTING KNOWLEDGE USING RULES: Procedural vs declarative knowledge, logic programming, forward and backward searching, matching, control knowledge,

Section-D

GAME PLAYING AND SEARCH: Introduction Min-Max Algorithm, alpha-beta cutt off. Examples of games.

EXPERT SYSTEM: Component of an expert system, categories of an Expert System, stages in development of Expert System, Expert System Development Tools. Expert System Architecture, Frames.

TEXT BOOKS:

1. Patterson, D.W.: INTRODUCTION TO ARTIFICIAL INTELLIGENCE & EXPERT SYSTEM, Prentice hall of India, New Delhi
2. Rich, E & Knight, K: ARTIFICIAL INTELLIGENCE, Tata McGraw Hill Pub Co, New Delhi
3. Nilson, N.J.: PRINCIPLES OF ARTIFICIAL INTELLIGENCE, Narosa Pub, House
4. References:
5. Schmildt, H: ARTIFICIAL INTELLIGENCE, USING c, McGraw Hill
6. Winston, P.H.: ARTIFICIAL INTELLIGENCE, Addition - Wesley

SEMESTER – VII

DISTRIBUTED OPERATING SYSTEM (CS – 7002)

Course Code	**CS – 7002**	Credits : 4	L-3, T-1, P-0
Name of the Course	**DISTRIBUTED OPERATING SYSTEM**		
Lectures to be delivered	**52 (1 Hr Each) (L = 39, T = 13 for each semester)**		
Semester End Examination	**Max. Time: 3 hrs.**	**Max. Marks: 100**	**Min. Pass Marks: 40**
Continuous Assessment (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		**Max. Marks: 50**	

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry240% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION A:

Operating System Fundamentals: Evolution of Modern Operating Systems, Overview of System sample distributed application, Centralized Operating Systems, Network Operating Systems, Distributed Operating Systems, Cooperative Autonomous Applications. Interprocess Communication and Coordination: Selection Factors, Message Passing Communication, Pipes, Sockets, Request/Reply Communication, Transaction Communication, Name and Directory Services, Distributed Mutual Exclusion.

SECTION B:

Distributed Process Scheduling: A System Performance Model, Static Process Scheduling with Communication, Dynamic Load Sharing and Balancing, Distributed process Implementation, Real-time Scheduling.

Distributed File Systems: Transparencies and Characteristics of DFS, DFS Design and Implementation, Transaction Service and Concurrency Control, Data and File Replication.

SECTION C:

Distributed Shared Memory: Non-Uniform Memory Access Architecture's, Memory Consistency Models, Multiprocessor Cache Systems, Distributed Shared Memory, Implementation of DSM systems.

Distributed Computer Security: Fundamentals of Computer Security, Discretionary Access Control Models, Mandatory Flow Control Models, Cryptography, Distributed Authentication and Key Distribution Issues Relevant to Distributed Security.

SECTION D:

Concurrency Control: Mutual Exclusion & Critical Regions, Semaphores, Locks, Token Passing/Mutual Exclusion, Deadlocks.

Transaction Management & Consistency Models: Transaction Management, ACID Properties Of A Transaction , Consistency Models, Two Phase Commit Protocol, Nested Transactions.

Text/References:

1. Distributed Systems: Principles and Paradigms :Andrew Tannenbaum and Maarten van Steen,
2. Distributed Operating Systems : Concepts and Design: Pradeep K. Sinha.
3. Distributed Operating Systems and Algorithm Analysis : Randy Chow, Theodore Johnson,
4. Distributed Operating Systems: Andrew S. Tanenbaum

L. Galli, Distributed Operating Systems,

SEMESTER – VII

ANALYSIS & DESIGN OF ALGORITHMS (CS – 7003)

Course Code	**CS – 7003**	Credits : 4	L-3, T-1, P-0
Name of the Course	**ANALYSIS & DESIGN OF ALGORITHMS**		
Lectures to be delivered	**52 (1 Hr Each) (L = 39, T = 13 for each semester)**		
Semester End Examination	**Max. Time: 3 hrs.**	**Max. Marks: 100**	**Min. Pass Marks: 40**
Continuous Assessment (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		**Max. Marks: 50**	

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20

subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.

2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Section A

Introductory Concepts: The notation of algorithm, fundamentals of algorithmic problem solving, analysing algorithms, A review of fundamental data structures.

Fundamentals of analysis of algorithms efficiency: Asymptotic notation and standard efficiency classes, mathematical analysis of recursive and non-recursive algorithms.

Section B

Divide and Conquer: merge sort, quick sort, binary search, Selection sort.
Search : Binary trees, breadth first search , depth first search.
Dynamic Programming: All pair shortest path, Optimal binary search tree, knapsack problem, the travelling sales person problem;Flow shop scheduling.

Section C

Backtracking:the 8 queens problem, graph coloring, hamiltonian cycles.
Greedy Method: prim's algorithm, kruskal's algorithm, dijkstra's algorithm, Minimum cost spanning trees.
Branch and Bound: least cost search(LC), the 15 puzzle, bounding, fifo branch and bound, LC branch and bound.

Lower Bound Theory: comparison trees, oracles and adversary arguments, techniques for algebric problems, lower bounds on parallel computing.

Section D

NP hard and NP complete problems: Basic concepts, Cook's theorem, examples of NP hard problems and approximation algorithms. deterministic and non deterministic polynomial time algorithms.
Space and time tradeoff in algorithms.

Texts/References:

1. Horowitz Ellis And Sartaj Sahni: Fundamentals of Computer Algorithms.
2. Anany V. Levitin: Introduction to Design and analysis of algorithms

3. D.E. Kunth:The art of computer programming Vols 1 and 3
4. Aho-Hopcroft and Ullman: The Design and Analysis of computer algorithms.

SEMESTER – VII

NATURAL LANGUAGE PROCESSOR (CS-7004)

Course Code	**CS – 7004**	Credits: 4	L-3, T-1, P-0
Name of the Course	**NATURAL LANGUAGE PROCESSOR**		
Lectures to be delivered	**52 (1 Hr Each) (L = 39, T = 13 for each semester)**		
Semester End Examination	**Max. Time: 3 hrs.**	**Max. Marks: 100**	**Min. Pass Marks: 40**
Continuous Assessment (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		**Max. Marks: 50**	

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Section-A:

Components of natural language processing: lexicography, syntax, semantics, pragmatics: word level representation of natural languages prosoty & natural languages.

Section-B:

Formal languages and grammars: chomsky hierarchy, Left-Associative grammars, Ambiguous grammars, resolution of ambiguities.

Section-C:

Computation linguistics: recognition and parsing of natural language structures: ATN & RTN,General techniques of parsing: CKY, Earley & Tomitas algorithm.

Section-D:

Semantics-knowledge representation semantic networks logic and inference pragmatics, Graph models and optimization, prolog for natural language semantic.

Application of NLP: intelligent work processors: Machine translation ,user interfaces , Man- Machine interfaces, natural language querying, tutoring and authoring systems, speech Recognition commercial use of NLP.

Text Book:

1. "Natural Language Understanding" James Alien ,Benjamin-1995, ~cummings Pub. Comp. Ltd.,

Reference Rooks:

2. "Language as a cognitive process", Terry Winograd 1983,AW
3. "Natural Language processing in prolog" G.Gazder,1989,Addison Wesley.

4. "Introduction of Formal Language Theory", Mdlj Arbib & Kfaury, 1988, SpringerVerlog.

SEMESTER - VII

COMPUTER NETWORKS AND DATA COMMUNICATION LAB (EC (ID) – 7009)

Course Code	**EC(ID) – 7009**	Credits: 2	L-0, T-0, P-2
Name of the Course	**COMPUTER NETWORKS AND DATA COMMUNICATION LAB**		
Lectures to be delivered	**26 hours of Lab sessions**		
Semester End Examination	**Max. Time : 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks : 20**
Laboratory	**Continuous Assessment (based on Lab work 30%, Lab record 25%, Viva 25%, Attendance 20%)**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter/Candidates

Laboratory examination will consist of two parts:

1. *Performing a practical examination assigned by the examiner (25 marks).*
2. *Viva-voce examination (25 marks).*

Viva-voce examination will be related to the practical performed/projects executed by the candidate related to the paper during the course of the semester.

LIST OF EXPERIMENTS:

3. To study different types of transmission media.
4. To study 16 Quadrature Amplitude Multiplexing.
5. To study Serial Interface Centronics and its applications.
6. To configure the modern of a computer.
7. To make inter-connections in cables for data communication in LAN.
8. To install LAN using Tree topology.
9. To install LAN using STAR topology.
10. To install LAN using Bus topology.
11. To configure a HUB/Switch.

SEMESTER – VII

EXPERT SYSTEM LAB (CS-7005)

Course Code	**CS-7005**	Credits: 2	L-0, T-0, P-2
Name of the Course	**EXPERT SYSTEM LAB**		
Lectures to be delivered	**26 hours of Lab work**		
Semester End Examination	**Max. Time: 3 hrs.**	**Max. Marks: 50**	**Min. Pass Marks: 20**
Laboratory Continuous Assessment	Lab Work 30%, Lab record 25%, Viva/Hands on 25%, Attendance 20%	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter/Candidates

Laboratory examination will consist of two parts:

I. Performing a practical examination assigned by the examiner (25 marks)
II. Viva-voce examination (25 marks)

Viva-voce examination will be related to the practical performed/project executed by the candidate related to the paper during the course of the semester.

1. Study of PROLOG/LISP.
2. Write the following programs using PROLOG/LISP.
3. Write a program to solve 8 queens problem.
4. Solve any problem using depth first search.
5. Solve any problem using best first search.
6. Solve 8-puzzle problem using best first search
7. Solve Robot (traversal) problem using means End Analysis.
8. Solve traveling salesman problem

NOTE : *Record to be maintained both electronically and hard copy for evaluation*

SEMESTER – VII

MINOR PROJECT(CS – 7006)

Course Code	**CS – 7006**	Credits: 4	L-0, T-0, P-4
Name of the Course	**MINOR PROJECT**		
Lectures to be delivered	**52 hours of Lab session(4 hrs per week)**		
Semester End Examination	**Max. Time: 3 hrs**	**Max. Marks : 50**	**Min. Pass Marks :**
Laboratory **Continuous Assessment:**	**Viva voce and software**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter/Candidates

Project Evaluation will consists of Three parts :

1. Evaluation of the project report along with source code in a CD in the required format by an external examiner 40% marks. Continuous evaluation by the internal examiner 30% marks
2. Viva-voce examination (20%marks).
3. Software evaluation with test runs(10%).

Viva-voce examination will be related to the projects executed by the candidate during the course of the semester.

Aim of this Project :

Aim of this project is to equip student in the methodology of system analysis and design of a live project in the institution in which he is studying or in a place of work such as bank, school, college and office in the vicinity of the institute. This minor project can be a precursor to the major project to be undertaken in the eight semesters.

This will be a guided project under the close supervision of the faculty of the institute. Projects should be presented in the form of a project report giving a candidate system for solving a live problem.

SEMESTER – VII

INDUSTRIAL TRAINING (CS-7007)

Course Code	**CS – 7007**	Credits: 0	L-0, T-0, P-0
Name of the Course	**INDUSTRIAL TRAINING**		
Semester End Examination	**Max. Time = 3 hrs.**	**Max. Marks : 50**	**Min. Pass Marks: 40**
Continuous Assessment	**Lab work 30%, Lab record 25%, Viva 25%, Attendance 20%**	**Max. Marks: 50**	**Min. Pass Marks: 25**

Instructions for paper setter/Candidates

This training will be related to industrial projects/ software projects to be undertaken under the guidance of faculty preferably at industry/ software park/ incubation center or related areas. This may also be undertaken with in the institute. This training will be undertaken during vacation. Student is supposed to submit the project report at the end of the training.

Evaluation will be based on project report, presentation and comprehensive viva-voce examination related to the project.

Department Elective -I

SEMESTER – VII
UNIX/ LINUX ADMINISTRATION (CS - 7010)

Course Code	**CS – 7010**	Credits : 4	L-3, T-1, P-0
Name of the Course	**LINUX/UNIX ADMINISTRATION**		
Lectures to be delivered	**52 (1 Hr Each) (L = 39, T = 13 for each semester)**		
Semester End Examination	**Max. Time: 3 hrs.**	**Max. Marks: 100**	**Min. Pass Marks: 40**
Continuous Assessment (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		**Max. Marks: 50**	

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Section A

Introduction to LINUX and UNIX, Architecture of UNIX operating system, System Structure, User perspective, Essential tasks of system administrator, LINUX installation

Booting and shutting down : Boot strapping /Booting/Boot Loaders (LILO, GRUB), booting single user mode, rebooting and shutting down

System Management : Super user, choosing root password, system configuration, system directories & files, Performance analysis tools & processes

Section B

User management : Password files, managing user environment, adding user, removing user, login access, disabling user, account management utilities, managing groups, light weight directory access protocol.

File Management : Path names, mounting and unmounting files systems, file tree, file types, file attributes, configuring RAID devices,

Process management: components of a process, (PID, PPID, UID, EUID,) signals, send signals, (kill, killall), process states, nice and renice, monitor processes, (ps, top), runway processes

Section C

Adding a Disk : Disk interfaces, disk installation procedure, ext2 and ext3 file systems,FSCK(check and repair file systems), Adding a disk to linux

Devices and printer : serial standard, alternative connectors, hard and soft carriers, serial device files, software configuration for serial devices, configuration of hardware terminals, special character and terminal drivers, modems, common I/O ports multimedia devices(sound, video and DVD), installing sound, network & other cards

Section D

Backup devices and media ,setting up backup using dump, restore.

System and Log files: logging policies, LINUX LOG files, LOGROTATE, SYSLOG, condensing log files to useful information

Kernal Administration: precautionary steps for modifying kernel, kernal adaptation, configuration methods, building a LINUX kernel

TEXT BOOKS:

1. Richard L. Petersen " LINUX the complete reference "
2. Maurice J. Bach " The design of UNIX operating System "
3. Evi Nemath, Garth Snyder , Trent R Hein " Linux Administration Hand Book "

REFERENCE BOOKS:-

1. "The UNIX programming Environment "Brain Kernighem & Rob Pike
2. "Introduction to UNIX & LINUX " John Muster
3. Advanced UNIX programmer's Guide " Stephen Prato
4. "UNIX concepts & Applications Featuring SCO UNIX & LINUX " 2nd Ed. Sumitabha D

SEMESTER – VII

Neural Networks and Fuzzy Logic(CS – 7011)

Course Code	**CS – 7011**	Credits : 4	**L-3, T-1, P-0**
Name of the Course	**Neural Networks and Fuzzy Logic**		
Lectures to be delivered	**52 (1 Hr Each) (L = 39, T = 13 for each semester)**		
Semester End Examination	**Max. Time: 3 hrs.**	**Max. Marks: 100**	**Min. Pass Marks: 40**
Continuous Assessment (based on sessional tests (2) 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		**Max. Marks: 50**	

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION – A

Neural Network characteristics, History of development in Neural Networks Principles, Artificial Neural Net terminology, Model of a neuron, topology, learning types of learning, supervised, unsupervised, re-enforcement learning.

SECTION- B

Basic Hopfield Model, the perceptron, linear separability, Basic learning laws: Hebb's rule, Delta rule, Widrow & Hoff LMS, learning rule, correlation learning rule, instar and outstar learning rules.
Unsupervised learning, competitive learning, K-means clustering algorithm, Kohonen's feature maps.

SECTION – C

Radial Basis Function neural networks, basic learning laws in RBF nets, recurrent networks, recurrent back propagation, Real Time Recurrent learning algorithm.
Introduction to counter propagation network, CMAC network, ART networks.

SECTION – D

Fuzzy logic: Basic concepts of Fuzzy logic, Fuzzy Vs Crisp set, Linguistic variables, membership functions, operations of fuzzy sets, fuzzy IF-THEN rules, variable inference techniques, de-fuzzification techniques, basic fuzzy inference algorithm, Applications of fuzzy system, useful tools supporting design.

Reference books:

1. Fuzzy Systems Design Principles, Building Fuzzy IF-THEN Rule Bases By Riza C.Berkin & Trubatch. IEEE Press ISBN 0-7803-1151-5.
2. Yegna narayanam – Artificial Neutral Networks.
3. Bart Kosko – Neural Networks & fuzzy logic.
4. Simon Haykin – Neutral Networks.
5. Ross.T. – Fuzzy Logic.

SEMESTER – VII

DIGITAL SYSTEM DESIGN(EC (ID)– 7005)

Course Code	**EC(ID) – 7005**	Credits : 4	L-3, T-1, P-0
Name of the Course	**DIGITAL SYSTEM DESIGN**		
Lectures to be delivered	52 (1 Hr Each) (L = 39, T = 13 for each semester)		
Semester End Examination	Max. Time: 3 hrs.	Max. Marks: 100	Min. Pass Marks: 40
Continuous Assessment (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)	**Max. Marks: 50**		

Instructions

1. **For Paper Setters**: The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates**: Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

SECTION – A

INTRODUCTION: Introduction to Computer aided design tools for digital systems. Hardware description languages; introduction to VHDL, data objects, classes and data types, Operators, Overloading, Logical operators. Types of delays Entity and Architecture declaration. Introduction to behavioral, data flow and structural models.

SECTION – B

VHDL STATEMENTS: Assignment statements, sequential statements and process, conditional statements, case statement Array and loops, resolution functions, Packages and Libraries, concurrent statements.

Subprograms: Application of Functions and Procedures, Structural Modeling, component declaration, structural layout and generies.

SECTION – C

COMBINATIONAL CIRCUIT DESIGN:VHDL Models and Simulation of combinational circuits such as Multiplexers, Demultiplexers, encoders, decoders, code converters, comparators, implementation of Boolean functions etc.

SEQUENTIAL CIRCUITS DESIGN: VHDL Models and Simulation of Sequential circuits.

Shift Registers, Counters etc.

SECTION – D

DESIGN OF MICROCOMPUTER: Basic components of a computer, specifications, architecture of a simple microcomputer system, implementation of a simple microcomputer system using VHDL.

DESIGN WITH CPLDs AND FPGAs:Programmable logic devices: ROM, PLAs, PALs, GAL, PEEL, CPLDs and FPGA. Design implementation using CPLDs and FPGAs.

REFERENCE BOOKS:

1. IEEE Standard VHDL Language Reference Manual (1993).
2. Digital Design and Modelling with VHDLand Synthesis: KC Chang; IEEE Computer Society Press.
3. "A VHDL Primmer": Bhasker; Prentice Hall 1995.
4. "Digital System Design using VHDL": Charles.H.Roth; PWS (1998)
5. "VHDL-Analysis & Modelling of Digital Systems" : Navabi Z; McGraw Hill.
6. VHDL – IV Edition: Perry TMH (2002)
7. "Introduction to Digital Systems": Ercegovac. Lang & Moreno; John Wiley (1999).
8. Fundamentals of Digital Logic with VHDL Design: Brown and Vranesic; TMH (2000).
9. Modern Digital Electronics – III Edition: R.P.Jain; TMH (2003)

SEMESTER – VII

Microelectronics Devices & VLSI technology (EC - 7010)

Course Code	**EC – 7010**	Credits : 4	L-3, T-1, P-0
Name of the Course	Microelectronics Devices & VLSI technology		
Lectures to be delivered	**52 (1 Hr Each) (L = 39, T = 13 for each semester)**		
Semester End Examination	**Max. Time: 3 hrs.**	**Max. Marks: 100**	**Min. Pass Marks: 40**
Continuous Assessment (based on sessional tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)		**Max. Marks: 50**	

Instructions

1. **For Paper Setters:** The question paper will consist of five sections A, B, C, D & E. Section E will be compulsory, it will consist of a single question with 10-20 subparts of short answer type, which will cover the entire syllabus and will carry 20% of the total marks of the semester end examination for the course. Section A, B, C & D will have two questions from the respective sections of the syllabus and each question will carry 20% of the total marks of the semester end examination for the course.
2. **For candidates:** Candidates are required to attempt five questions in all selecting one question from each of the sections A, B, C & D of the question paper and all the subparts of the questions in Section E. Use of non-programmable calculators is allowed.

Section A.

INTRODUCTION

Gernal Classification of Intergarted Circuits.Advantages of IC's over Discrete Components.Introduction of Microprocessor .Computer Generation.Thick Film and Thin Film Hybrid IC's. Feature of Hybrid IC Technology . Thick Film Technology. Thick film processing Thick Film Substrates . Advantage and Application of Thick Film Hybrids. Thin Film Technology. Thin Film Processing. Advantage and Application of Thin Film Hybrids

Section B

SEMICONDUCTOR DEVICES FUNDAMENTALS

Semi-conductors Materials. Elements of Crystallography. Silicon Crystal. Electronics and Holes. P-type and N-type Silicon. P-N Junction. Basic N-P-N Transistors Action. Transistors as an Amplifier. Large Signal Behaviour of Bipole Transistors. Small Signal models of Bipolar Transistors. Large Signal Behaviour of Junction Field-Effect Transistors. Small signal Model of

JFET. Large Signal Behaviour of the MOS Field effect Transistors.Small Signal Model of the MOS Transistors in Saturation

Section C

MONOLITHIC IC PROCESSES

Refining and Growth of Silicon Crystals. SI-Wafer Preparation. Diffusion of Dopant Impurties. Diffusion System. ION Implantation. Thermal Oxidation. Photo Lithogarphy. Fine Line Lithography. Relative Plasma Etching. Chemical Vapour Deposition(CVD). Silicon on Insulators. Metallization

Section D

MONOLITHIC PROCESS

Epitaxial Devices and Their Charcterstices.Bipolar IC Process.P-N Juction Isolation. Monolithic Bipolar transistors Constructors.Dielectric Isolation.Isopalaner and other IC Structure. Monolithic Diodes. Monolithic Junction FETs . Mosfet Technology. Short Channel MOS Structures. Typical NMOS IC Technologies for VLSI Chips. Complementary – Symmetry MOSFET Technologies. Monolithic Resistors . Monolithic Capicitors. IC Crossovers. Process Facilities and Monitoring.

Reference Books:

1. Integrated Circuits – K.R. Botkar
2. VLSI Design Techniques – Geigar BR, Allenpe