GOA UNIVERSITY

FINAL YEAR OF BACHELOR'S DEGREE COURSE IN INFORMATION TECHNOLOGY

SCHEME OF INSTRUCTION AND EXMINATION

SEMESTER VII

Sub Code	Subjects	Scheme of Instruction Hrs/Week			Scheme of Examination					
		L	T	P	Th. Dur (Hrs)	Marks				
						Th.	S	P	O	Total
IT 7.1	Distributed Systems	3	1	2	3	100	20 + 5	-	50	175
IT 7.2	Principles of Compilers	3	1	2	3	100	20 + 5	-	50	175
IT 7.3	Mobile Computing	3	1	2	3	100	20 + 5	-	-	125
IT 7.4	Elective I	3	1	2	3	100	20 + 5	-	50	175
IT 7.5	Elective II	3	1	0	3	100	20 + 5	-	-	125
IT 7.6	Project	-	-	4	-	-	25	-	50#	75
	TOTAL	15	05	12	-	500	150	-	200	850

25 Sessional marks will be split as follows: 20 marks are for the Internal Test, 5 marks are for continuous evaluation of Practicals/Assignments

Seminar and Oral

Electives: A student must take One Elective from each Group.

Group I: Subjects for IT 7.4

a) Data Mining & warehousing

b) Genetic Algorithms

c) Bio Informatics

d) E-Commerce

Group II: Subjects for IT 7.5

a) Geographical Information System

b) Cyber laws & Computer Forensic

c) Financial Engineering

d) IT Business Methodology

SEMESTER VIII

Sub Code	Subjects	Scheme of Instruction Hrs/Week			Scheme of Examination					
		L	T	P	Th. Dur (Hrs)	Marks				
						Th.	S	Pract/ Report	O	Total
IT 8.1	Image processing & Pattern Recognition	3	1	2	3	100	20 + 5	-	50	175
IT 8.2	Computer Cryptography and Network Security	3	1	2	3	100	20 + 5	-	50	175
IT 8.3	Elective III	3	1	2	3	100	20 + 5		50	175
IT 8.4	Elective IV	3	1	2	3	100	20 + 5	-	50	175
IT 8.5	Project	-	-	8	-	-	50	50	50#	150
	TOTAL	12	04	16	-	400	150	50	250	850

25 Sessional marks will be split as follows: 20 marks are for the Internal Test,
5 marks are for continuous evaluation of Practicals/Assignments
Demonstration & Oral

Electives: A student must take One Elective from each Group.

Group III: Subjects for IT 8.3

a) Web Services

b) Operation Research

c) Design Patterns & Frameworks

d) Fuzzy Logic and Neural Networks

Group VI: Subjects for IT 8.4

a) VLSI Design

b) Embedded System Design

c) System Performance & Evaluation

d) Advanced Computer Architecture

IT7.1DS DISTRIBUTED SYSTEMS

Lectures per week	: (3 + 1 + 2)
Max marks for theory paper	: 100
Max marks for sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module.)

Course objectives:

- Present the principles underlying the functioning of distributed systems.
- Create an awareness of the major technical challenges in distributed systems design and implementation.
- Expose students to past and current research issues in the field of distributed systems.
- Provide experience in the implementation of typical algorithms used in distributed systems.

Instructional Objectives:

After completing this course students will be able to:

- Explain what a distributed system is, why you would design a system as a distributed system, and what the desired properties of such systems are.
- List the principles underlying the functioning of distributed systems, describe the problems and challenges associated with these principles, and evaluate the effectiveness and shortcomings of their solutions.
- Recognize how the principles are applied in contemporary distributed systems, explain how they affect the software design, and be able to identify features and design decisions that may cause problems.

MODULE I

Introduction to Distributed System. Goals: Connecting Users and Resources , Transparency, Openness, Scalability. Hardware Concepts: Multiprocessors, Homogeneous Multicomputer Systems, Heterogeneous Multicomputer Systems. Software Concepts: Distributed Operating Systems, Network Operating Systems,

Middleware. The Client-Server Model: Clients and Servers, Application Layering, Client-Server Architectures. (5 Hrs)

Layered Protocols: Lower-Level Protocols, Transport Protocols, Higher-Level Protocols. Remote Procedure Call: Basic RPC Operation , Parameter Passing , Extended RPC Models, Example: DCE RPC. Remote Object Invocation: Distributed Objects, Binding a Client to an Object, Static versus Dynamic Remote Method Invocations, Parameter Passing, DCE Remote Objects, Java RMI 95. Message-Oriented Communication: Persistence and Synchronicity in Communication, Message-Oriented Transient Communication, Message-Oriented Persistent Communication. Stream-Oriented Communication: Support for Continuous Media, Streams and Quality of Service, Stream Synchronization. (5 Hrs)

MODULE II

Processes: Introduction to Threads, Threads in Distributed Systems, Clients, User Interfaces, Client-Side Software for Distribution Transparency. Servers- General Design Issues, Object Servers, Approaches to Code Migration, Migration and Local Resources, Migration in Heterogeneous Systems. D'Agents. Software Agents 173, Software Agents in Distributed Systems, Agent Technology (6 Hrs)

Clock Synchronization: Physical Clocks, Clock Synchronization Algorithms, Use of Synchronized Clocks. Logical Clocks: Lamport timestamps, Vector timestamps. Global State. Election Algorithms, The Bully Algorithm, A Ring Algorithm. Mutual Exclusion: Centralized, Distributed, and Token Ring Algorithms. A Comparison of the Three Algorithms. Distributed Transactions: The Transaction Model, Classification of Transactions, Implementation of Concurrency Control. (4 Hrs)

MODULE III

Introduction to consistency and replication: Reasons for Replication, Object Replication, Replication as Scaling Technique. Data-Centric Consistency Models, Strict, Linearizability and Sequential, Causal, FIFO, Weak, Release, Entry Consistency models: Client-Centric Consistency Models: Eventual Consistency, Monotonic Reads, Monotonic Writes, Read Your Writes, Writes Follow Reads and Implementation. Distribution Protocols: Replica Placement, Update Propagation, Epidemic Protocols, Consistency, Primary-Based, Replicated-Write, Cache-Coherence Protocols. (5 Hrs)

Introduction To Fault Tolerance: Basic Concepts, Failure Models, Failure Masking by Redundancy. Process Resilience: Design Issues, Failure Masking and Replication, Agreement in Faulty Systems. Reliable Client-Server Communication: Point-to-Point Communication, RPC Semantics in the Presence of Failures. Reliable Group Communication: Basic Reliable-Multicasting Schemes, Scalability in Reliable Multicasting, Atomic Multicast. Distributed

Commit: Two-Phase Commit, Three-Phase Commit. Recovery: Check pointing, Message Logging. (5 Hrs)

MODULE IV

Distributed Object-Based Systems: Communication, Processes, Naming, Synchronization, Caching and Replication, Fault Tolerance and security issues with CORBA and DCOM. Comparison of CORBA and DCOM. (6 Hrs)

Distributed File Systems: Communication, Processes, Naming, Synchronization, Caching and Replication, Fault Tolerance and security issues with Sun Network File System, (02 Hrs)

Distributed Document-Based Systems: Communication, Processes, Naming, Synchronization, Caching and Replication, Fault Tolerance and security issues with World Wide Web

TEXT BOOK :

1. Distributed Systems: Principles and Paradigms by Andrew S. Tanenbaum and Maarten van Steen, Prentice Hall, ISBN-81-7808-789-8

REFERENCE BOOKS :

1. Distributed Systems: Concepts and Design - By G.Coulouris, J. Dollimore and T.King Berg., Addison Wesley, ISBN-10-0201619180

IT7.2POC PRINCIPLES OF COMPILERS

Lectures per week	: (3 + 1 + 2)
Max marks for theory paper	: 100
Max marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module.)

Course Objectives:

This subject introduces essential theory, algorithms, and tools used in compiler construction. Major topics include lexical, syntax, and semantic analysis of source files, syntax trees, symbol tables, code generation, and optimization techniques.

Instructional Objectives:

After completing this course students will be able to know the major steps involved in compiling a high-level programming language down to a low-level target machine language.

MODULE I

Brief overview of Assemblers, Macro processors, Linkers, Loaders, Debuggers and Text editor. (2 Hrs)

Compilers and translators. Structure of a compiler. Phases of compilation. Bootstrapping and Porting. Compiler-writing tools. (2 Hrs)

The role of a lexical analyser. Design of lexical analyzer. Implementation of lexical analyzer.

A Language for specifying lexical analyzer. Study of the features and applications of LEX/FLEX tool. (5 Hrs)

MODULE II

Overview of Context free grammar. Derivations and Parse trees, Ambiguity, Left recursion, Left factoring. Shift-reduce parsers. Operator precedence parsers, LR parsers. (5 hrs)

Recursive descent parsing and Predictive parsers (3 hrs)

Study of YACC Tool: Programming with YACC. Combining YACC and FLEX. (2 hrs)

MODULE III

Intermediate Code Generation: Intermediate Language, Declarations, Assignment statements, Boolean expressions, Case statement, Backpatching, Procedure call. (3 Hrs)

Run Time environments: Source language issues, Storage organization, Storage allocation strategies, Access to non-local names. (3 Hrs)

Symbol tables: The content of a symbol table, Data structures for Symbol Table, Representing scope information. Error detection and recovery: Lexical phase errors, Syntactic phase errors, Semantic errors. (4 Hrs)

MODULE IV

Code generation: Issues in the design of a code Generator, Basic blocks and flow graphs, Next-use information, A simple Code generator, The DAG representation of Basic blocks, Peephole Optimization, Generating code from DAGS. (6 Hrs)

Code optimization: The principle sources of optimization, Optimization of basic blocks, Machine dependent optimization, Register allocation optimization. (4 Hrs)

TEXT BOOKS

1. Principles of Compiler Design by Aho and Ulman, Narosa publishing House, ISBN: 81-85015-61-9.
2. Compilers, Principles, techniques and tools, Aho, Ulman and Sethi, Pearson Education Asia, ISBN: 81-7808-046-X.
3. Compiler design with FLEX and YACC by Vinu V. Das, PHI publication, ISBN:978-81-203-3251-5

REFERENCE BOOKS

1. Compiler Construction, Principles and Practice by Louden, Galgotia Publication, ISBN:0-534-93972-4
2. Theory and Practice of Compiler Writing by P. Trembly, McGraw Hill International Edition, ISBN:0-07-066616-4.
3. Modern Compiler Design by D. Grune, H. Bal C. Jacobs K. Langendoen , Wiley Publication; 1st Edition, ISBN:0471976970
4. Compiler design in C by Holub A I , Prentice-Hall, ISBN:0-87692-778-9
5. lex and yacc by Doug Brown, John Levine, Tony Mason , O'Reilly Media, ISBN:1-56592-000-7.

IT7.3MC MOBILE COMPUTING

Lectures per week	: (3 + 1 + 2)
Max. Marks for Theory paper	: 100
Max. Marks for Sessionals	: 20 + 5
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module).

Course Objectives:

The advent of small, inexpensive, yet powerful portable computers has coincided with the exponential growth of the Internet, making it possible to access computing resources and information at nearly any location at almost any time. This new phenomenon, mobile computing, is poised to become the main technology driver for a decade to come. The objective of this course is to provide valuable insights into the major topics of this emerging discipline.

Instructional Objectives:

There are many challenges that make mobile computing a hot research and development area. This subject explores the benefits and challenges of the field. It provides technical information about all aspects of mobile computing, from basic concepts to research-level material, with learned analysis of future directions.

MODULE I

Medium Access Control: (7 Hrs)

Motivation for a specialized MAC

SDMA, FDMA, TDMA, CDMA

Comparison of S/T/F/CDMA

Telecommunication System: (5 Hrs)

GSM

DECT

MODULE 2

Mobile Network Layer (5 Hrs)

Mobile IP

Dynamic Host Configuration Protocol

Mobile ad-hoc networks

Mobile Transport Layer **(**5 Hrs)

Traditional TCP

Classical TCP improvements

TCP over 2.5/3G wireless networks

Performance Enhancing Proxies

MODULE 3

Multimedia Messaging Service: (6 hrs)

MMS Architecture, MMS Interfaces, Addressing in MMS, Technical Specifications, Supported Formats, MMS Messages. Message Submission, Message Transfer, Delivery Report, Read-Reply Reports, Message Notification, Message Retrieval, Message Forwarding

Location Management Techniques for Mobile Computing Environments: (5 hrs)

Location Management, Location Update, Location Inquiry, Delay Constraint. Location Management Cost, Network Topology. Mobility Pattern: Memoryless (Random Walk) Movement Model, Markovian Model, Cell History, Directional History,Shortest Distance Model,

MODULE 4

Simulation Models and Tool for Mobile Location-Dependent Information Access:

(5 hrs)

Spatial Model, Location Models, Spatial Information Models. Mobility: Existing Mobility Models, Random Mobility Models, Advanced Models, Generic Mobility Model. Information Access Model: Zipf Distribution, Location-Dependent Access. A Tool for User Mobility Modeling: Objectives, Software Architecture, Usage.

Securing Mobile Ad Hoc Networks: (6 hrs)

Threats and Challenges, Trust Management. Secure Routing: The Secure Routing Protocol, The Neighbor Lookup Protocol, The Basic Secure Route Discovery Procedure, Priority-Based Query Handling, The Route Maintenance Procedure, The SRP Extension. Secure Data Forwarding, Secure Message Transmission Protocol.

TEXT BOOKS:

1. Mobile Communications by Jochen Schiller, Pearson Education, Second Edition, 2003, ISBN:978-81-317-2426-2
2. Mobile Computing Handbook by Mohammad Ilyas, Imad Mahgoub, CRC Press, Auerbach Publications.

IT7.4.a.DMW DATA MINING & WAREHOUSING (Elective I)

Lectures per week	: (3 + 1 + 2)
Max. Marks for Theory paper	: 100
Max. Marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

Course Objectives:

The course is designed to introduce the students to the basic concepts and techniques of data mining. Data mining intends to search through data for hidden relationships and patterns. The first half of the course covers various aspects of data mining such as data preprocessing, data modeling, DMQL, the association rules, classification and prediction methods and also the several clustering techniques. The course also includes the several anomaly detection schemes. The later half of the course focuses on data warehousing concepts including the warehousing components and building of a warehouse and OLAP severs. It also introduces the concept of web mining to the students.

Instructional Objectives:

At the end of the course students will be familiar with:

1. Understand data mining fundamentals and mechanisms.
2. Explores data mining techniques to implement data mining algorithms.
3. Learn data warehousing concepts and components.
4. Learn the importance of outlier detection.
5. Learn Web mining.

MODULE 1

Introduction to Data Mining: Basic Data Mining Tasks, Data Mining Functionalities, Data Mining from a Database Perspective, Data Mining Issues. Data Preprocessing: Data Cleaning, Data Integration & Transformation, Data Reduction, Discretization & Concept Hierarchy generation. (3 hrs)

Data Modeling. Data Mining Query Language. (4 hrs)

Data Mining Association Rules. Association Rule Mining. Mining Single Dimensional Boolean Association Rules from Transactional Databases. (3 hrs)

MODULE 2

Introduction to Classification & Prediction: Classification by Decision tree induction, Bayesian Classification, k-Nearest Neighbor Classifier, Introduction to Prediction Concept.

(4 hrs)

Introduction to Cluster Analysis. Types of data in cluster analysis, Clustering Methods, Partitioning Methods, Hierarchical Methods, Density Methods, Grid-Based Methods, Model-Based Clustering Methods. (6 hrs)

MODULE 3

Data Mining Anomaly Detection: Variants of Anomaly/Outlier Detection Problems, Applications. Types of anomaly detection schemes: Graphical & Statistical-based, Distance-based, and Model-based. (3 hrs)

Data Warehousing: Concepts and Mechanisms: Need, Functions & Application. Data Warehousing Components: Overall architecture, Data Warehouse Implementation, Multidimensional Data Model, Efficient Computation of Data Cube, OLTP v/s Data Warehousing. (4 hrs)

Building a Data Warehouse: Planning a Data Warehouse, Conceptual Data Warehouse Modeling. (3 hrs)

MODULE 4

OLAP Servers: Need for OLAP, Multidimensional v/s Multi relational OLAP. Categorization of OLAP tools: MOLAP, ROLAP. OLAP tools & Internet. (2 hrs)

Mapping Data Warehouse to Multiprocessor Architecture: Types of parallelism, Intraquery and Interquery parallelism. Data Partitioning. Database Architecture for parallel processing: Shared memory architecture, Shared disk architecture, Shared nothing architecture and Combined architecture. (3 hrs)

Data Extraction, Cleanup and transformation. Metadata. Query and Reporting tools. Web Data Mining. Web Content Mining: Web documents categorization and clustering. Web Usage Mining: Mining for user behavior on the web, Internet marketing. (5 hrs)

TEXT BOOKS

1. Data mining - Concepts and Techniques -Jiawei Han and Micheline Kamber, Morgan Kuaffman publisher, ISBN:1-55860-489-8
2. Data Warehousing, Data Mining & OLAP – Alex Berson, Stephen J. Smith, TMH publication, ISBN: 0-07-058741-8

REFERENCE BOOKS

1. Introduction to Data Mining with case studies- G.K. Gupta, PHI Publisher, ISBN:81-203-3053-6
2. Mastering Data Mining-Michel. J. A. Berry. Gordon S.Linoff, Wiley Publications, ISBN: 978-0-471-33123-0
3. Data Mining-Pieter Adriaans and Dolf Zantinge.- PEA, ISBN:8178084252

IT7.4.b.GA GENETIC ALGORITHMS (Elective I)

Lectures per week	: (3 + 1 + 2)
Max. Marks for Theory paper	: 100
Max. Marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module).

Course Objective:

The aim of the course is to introduce genetic algorithms and to give students an insight into the various types of algorithms and their industrial applications. The course will help them to be able to assess the suitability of genetic algorithms for specific problems.

Instructional Objective:

To familiarize students with genetic and evolutionary computation techniques and to enable them to read the literature and solve practical problems of their choosing

MODULE I

Introduction to Genetic Algorithms: Robustness of Traditional Optimization and Search Methods, Goals of Optimization, Difference between Genetic Algorithms and Traditional Methods, Simple Genetic Algorithm and its major operators, Example using Genetic Algorithm, Similarity Templates Schemata. (4 hrs)

Mathematical Foundations: Fundamental theorem, Schema Processing, Two-armed and K-armed bandit problem, Building block hypothesis, Minimal deceptive, Similarity templates as hyper planes. (6 Hrs)

MODULE II

Computer Implementation Of Genetic Algorithms: Data structures, Reproduction, crossover and mutation, Mapping objective functions to fitness form, Fitness scaling. (5 hrs)

Applications Of Genetic Algorithms: De Jong and Function optimization, Structural optimization via genetic algorithm, Medical image registration with genetic algorithms, Iterated prisoner's dilemma problem. (5 hrs)

MODULE III

Advanced Operators And Techniques In Genetic Algorithm Search: Dominance, Diploidy and Abeyance, Inversion and other Re-ordering Operators, Macro operators, Niche and Specialization, Multi objective optimization. (5 hrs)

Knowledge based techniques, Genetic Algorithms and Parallel processors, Genetic Based machine learning, Classifier systems. (5 hrs)

MODULE IV

Industrial Application Of Genetic Algorithms: Data Mining using genetic Algorithms Approaches to search in data mining. (6 hrs)

Genetic Algorithm Specifics. (4 hrs)

TEXT BOOKS:

1. David E.Goldberg, Genetic Algorithms in search, optimization machine leaning Pearson Education,6th Edition ISBN 81-7808-130-X(chapter 1,2,3,4,5,6)
2. Charles L Karr and L.Michael Freeman, Industrial applications of Genetic Algorithms, CRC Press, Washington DC, 1999 (chapter 9), ISBN:0-8493-9801-0

REFERENCE BOOKS:

1. Intelligent agents adaptive control: Industrial applications-L.C.Jain and C.W.de Silva
2. Handbook of Genetic Algorithms -Davis, Lawrence, ISBN:0-442-00173-8.
3. An Introduction to Genetic Algorithms-Melanie Mitchell, ISBN:81-203-1358-5

IT7.4.c.BI BIOINFORMATICS (Elective I)

Lectures per week : (3 + 1 + 2)

Max marks for theory paper : 100

Max marks for sessionals : 20 + 5

Max marks for orals : 50

Duration of paper : 3 hours

Total no. of modules : 4

No. of questions from each module : 2

Total no. of questions to be answered : 5 (At least one question from each module with two compulsory questions from any one module).

Course Objectives:

The course will introduce the students to the broad scope of bioinformatics, discuss the theory and practice of computational methods, and demonstrate the basic programming tools used in the field of genomics.

Instructional Objectives:

At the end of the course, the students would be familiar with the following:

1. Methods and tools used in bioinformatics
2. Genome Analysis and Gene Mapping
3. Phylogenetic Analysis and Sequence Analysis

MODULE I

Introduction to Bioinformatics: Introduction, Historical Overview and Definition, Bioinformatics applications, Major databases in bioinformatics, Data Management and Analysis, Molecular Biology and Bioinformatics, Central Dogma of Molecular Biology. Information Search and Data Retrieval: Tools for web search, Data Retrieval Tools, Data Mining of biological databases. (4 Hrs)

Genome Analysis and Gene Mapping: Genome Analysis, Gene Mapping, The Sequence Assembly Problem, Genetic Mapping and Linkage Analysis, Physical Maps, Cloning Entire Genome, Genome Sequencing, Applications of Genetic Maps, Sequence Assembly Tools, Identification of Tools in Contigs, Human Genome Project. (6 Hrs)

MODULE II

Alignment of Pairs of Sequences: Biological Motivation of alignment problems, Methods of sequence alignments, Using scoring Matrices, Measuring sequence detection efficiency.

(3 Hrs)

Alignment of Multiple Sequences and Phylogenetic Analysis: Methods of multiple sequence alignment, Evaluating multiple alignments, Applications, Phylogenetic Analysis, Methods of Phylogenetic Analysis, Tree evaluation, Problems in Phylogenetic Analysis, Dual automated tools. (4 Hrs)

Tools for Similarity Search and Sequence Alignment: Working with FASTA, Working with BLAST, Filtering and Gapped BLAST, FASTA and BLAST algorithm comparison. (3 Hrs)

MODULE III

Profiles and Hidden Markow Models: Using Profiles, Hidden Markow Models. (2 Hrs)

Gene Identification and Prediction: Basics of Gene Prediction, Pattern Recognition, Gene Prediction methods, Other Tools (3 Hrs)

Gene Expression and Microarrays: Working with DNA Microarrays, Clustering Gene Expression Profiles, Data sources and tools for microarrays analysis, Applications – Functional Genomes, Comparative Genomics, Medical Applications, Microarrays in Pharmaceutical industries, DNA Microarrays. (5 Hrs)

MODULE IV

Protein Classification and Structure Visualisation: Overview of protein structure, Protein Structure Visualisation, Structure based protein classification, Protein Structure databases, Protein Structure Visualisation Database and Tools, Protein Structure Alignment, Domain Architecture Databases, Tools for Plotting Protein-Ligand Interaction, Protein Classification Approach. (6 Hrs)

Introduction to Drug Discovery: Areas influencing drug discovery, Pharmacogenetics and Pharmacogenomics applications, Analysis of Single Nucleotide Polymorphism, Important parameters in Drug Discovery. (4 Hrs)

TEXT BOOKS:

1. Bioinformatics – Methods and Applications, S.C. Rastogi, N. Mendiratta and P. Rastogi, 3rd Edition, PHI, ISBN: 8120325826 ISBN-13: 9788120325821, 978-8120325821

REFERENCE BOOKS:

1. Bioinformatics- A Beginner's Guide, Jean-Michel Claveriw, Cerdric Notredame WILEY dreamlech India Pvt. Ltd, ISBN:81-265-0380-7
2. Introduction to Bioinformatics, Arthur M. Lesk, OXFORD publishers (Indian Edition) ISBN-10: 0199251967 ISBN-10: 0199251967

3. Introduction to Bioinformatics, T K Attwood & D J Parry-SmithAddison Wesley Longman, ISBN 0 582 327881

IT7.4.d.ECOM E – COMMERCE (Elective I)

Lectures per week	: (3 + 1 + 2)
Max marks for Theory paper	: 100
Max marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module).

Course objective:

This goal of this course is to teach students how to conduct business online and how to manage the technological issues associated with constructing an electronic-commerce Web site. It also examines strategies and products available for building electronic-commerce sites.

Instructional objective:

Upon successfully completing the course, the student should:

- Identify the steps to develop an e-commerce Web site based on information architecture
- Be able to explain the methods to establish and retain customers in e-commerce

MODULE I

Introduction to Electronic Commerce: Defining Electronic Commerce, Brief History of Electronic Commerce. Forces Fueling Electronic Commerce: Electronic Forces, Marketing and Customer Interaction Forces, Technology and Digital Convergence, Implications of Various Forces.Electronic Commerce Industry Framework. The Information Superhighway, Multimedia Content and Network Publishing, Messaging and Information Distribution, Common Business Services Infrastructure, Other Key Support Layers.Types of Electronic Commerce. (6 Hrs)

World Wide Web--Concepts and Technology: Key Concepts behind the Web, Overview of the Web's Technical Architecture, Web and Database Integration, Web Database Products, HTML Forms and CGI Programs. Web Software Developmental Tools. (4 Hrs)

MODULE II

Electronic Payment Systems: Overview of the Electronic Payment Technology. Electronic or Digital Cash, Electronic Checks, Online Credit Card-Based Systems, Other Emerging Financial Instruments, Consumer, Legal, and Business Issues. (5 Hrs)

Electronic Commerce and Banking: Changing Dynamics in the Banking Industry, Banking via Online Services, Open versus Closed Models, Management Issues in Online Banking, Differentiating Products and Services, Managing Financial Supply Chains, Pricing Issues in Online Banking, Marketing Issues: Attracting Customers, Marketing Issues: Keeping Customers, Back-Office Support for Online Banking. (5 Hrs)

MODULE III

Electronic Commerce and Retailing. Changing Retail Industry Dynamics, Mercantile Models from the Consumer's Perspective, Management Challenges in Online Retailing.

(4 Hrs)

Electronic Commerce and Online Publishing: Online Publishing Strategies, Online Publishing Approaches, Edutainment = Education + Entertainment, Online Publishing Success Stories, Advertising and Online Publishing, An Online Publishing Missing Piece: Measurement, Digital Copyrights and Electronic Publishing, Online Copyright Protection Methods. (4 Hrs)

Intranets and Supply-Chain Management: Supply-Chain Management Fundamentals, Pull versus Push Supply-Chain Models, Elements of Supply-Chain Management, Integrating Functions in a Supply Chain, Managing Retail Supply Chains, The Order Management Cycle (OMC), Supply-Chain Application Software,Software for Supply-Chain Management.

(3 Hrs)

MODULE IV

Intranets and Customer Asset Management: Challenges in Implementing Customer Asset Management, Customer Asset Management and Supply Chains, Online Sales Force Automation: Elements of Online Sales Automation, Intranets and Sales Automation, Management issues. Online Customer Service and Support: The Web and Customer Service, The Role of Technology in Customer Service. Technology and Marketing Strategy, Marketing Decision Support Systems, Marketing Decision Support Applications. (6 Hrs)

Intranets and Corporate Finance, Understanding the Different Software Modules, Transaction Accounting and Electronic Commerce, Financial Analysis and Management Accounting, Inventory Accounting,

Human Resources Management Systems, HRMS Functions, Size/Structure of Financials Software Market. (4 Hrs)

TEXT BOOK:

1. E-Commerce, Ravi Kalakota & Andrew B, Whinston, Pearson Education India ISBN: 81-7808-158-X.

REFERENCE BOOK:

1. E-Business (R) Evolution by Daniel Amor (Pearson Education), ISBN: 981-405-826-2.

IT7.5.a.GIS GEOGRAPHICAL INFORMATION SYSTEM (Elective II)

Lectures per week : (3 + 1 + 0)
Max marks for Theory paper : 100
Max marks for Sessionals : 20 + 5
Duration of paper : 3 hours

Total no. of modules : 4
No. of questions from each module : 2

Total no. of questions to be answered : 5 (At least one question from each module with two compulsory questions from any one module).

Course Objective:

To learn and understand the various concepts of geographical information systems Starting from fundamentals the course helps to understand maps and way it is represented in digital form. Further in the course the quality of the data is discussed and also different ways of processing of GIS related data is covered. Finally,

Instructional Objective:

On completion of this course students will understand what a Geographic Information System is. They will first understand maps and related terminology that will help them to understand GIS data. They will also learn how GIS data is digitally represented and how the data is processed. The students will gain the knowledge of implementing a GIS and will understand applications of GIS with case studies.

Module I

Introduction to Geographic Information System: Definition of GIS and related terminology, The evolution of GIS, Components of GIS. (2 Hrs)

Maps and GIS: Map Scale, Classes of Maps, Mapping Process, Plane Coordinate System and Transformations, Geographical Coordinate System of Earth, Georeferencing, Topographic Mapping. (6 Hrs)

Uses of Geographical Information System, Technologies and Trends of GIS. (2 Hrs)

MODULE II

Digital Representation of Geographic data: Technical issues pertaining to digital representation of Geographic data, Database and database management system, Raster geographic data representation, Vector data representation, Object oriented geographic data representation, Relationship between data representation and data analysis in GIS. (5 Hrs)

Data Quality and Data Standards: Concepts and definition of Data Quality, Components of geographic Data Quality, Assessment of Data Quality, Managing Spatial Data Standards, Geographic Data standards and GIS Development, (5 Hrs)

MODULE III

Raster Based Data Processing: Acquiring and handling raster Geographic Data, Raster based GIS data Analysis, Output functions of raster data processing, Cartographic Modeling,

(4 Hrs)

Vector Based Data Processing: Characteristics of Vector based GIS data processing, Vector data input functions, Non – topological GIS analysis functions, Feature based topological functions, Layer based topological functions, Vector topological functions, Vector based output functions, Application Programming. (6 Hrs)

MODULE IV

GIS Implementation and project Management: Software engineering as applied to GIS, GIS project Planning, System analysis and User requirements studies, Geographic database design methodology, System implementations in technology roll out, System maintenance and Technical Support. (5 Hrs)

GIS Issues and Prospects: Issues of implementing GIS, The trends of GIS development.

(3 Hrs)

Case Studies: A case study in GIS Implementation: Clinton Towship, MI. A case study in GIS Implementation: Prince William County, VA. (2 Hrs)

TEXT BOOKS:

1. Concepts And Techniques Of Geographic Information Systems by C. P. Lo; Albert K. W. Yeung, , 2002 Edition, Prentice Hall of India, ISBN:81-203-2230-4

REFERENCE BOOKS:

1. An Introduction to Geographical Information Systems (2nd Edition) By Ian Heywood, Sarah Cornelius, Steve Carver, Pearson Education, ISBN:81-7808-982-3
2. The GIS Book by George B. Korte, 5th Edition Onward Press, ISBN:0-7668-2820-4.
3. Introduction to Geographical Information Systems by Kang – tsung Chang, 2002 Edition, Tata McGraw Hill, ISBN:0-07-049552-1

IT7.5.b.CLCF CYBER LAW AND COMPUTER FORENSICS (Elective II)

Lectures per week : (3 + 1 + 0)
Max marks for Theory paper : 100
Max marks for Sessionals : 20 + 5
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2

Total no. of questions to be answered : 5 (At least one question from each module with two compulsory questions from any one module).

Course Objectives:

Cyber law describes the legal issues related to use of inter-networked information technology. While grounded in real individuals, physical computers and other electronic devices, the Internet is independent of any geographic location. Hence the laws should be fundamentally different from laws that govern geographic nations today. This course would therefore familiarize students with cyber law applicable to India and also the involved investigation process through forensic study.

Instructional Objectives:

At the end of the course, the students would be familiar with the following:

- Cyber Crimes and jurisdiction in the cyber world
- IT Contracts and Copyright Protection
- Forensic Process and Investigation

MODULE I

Power of Arrest without Warrant under the IT Act, 2000: A Critique: Section 80 of the IT Act 2000, Forgetting the line between Cognizable and Non-Cognizable Offences, Necessity of Arrest without warrant from any place, public or otherwise. Cyber Crime and Criminal Justice: Concept of Cyber Crime and the IT Act 2000, Hacking, Teenage web vandals, Cyber fraud and cyber cheating. Virus on the Internet. Defamation, harassment and E-mail abuse, Monetary penalties, adjudication and appeals under IT Act 2000, Nature of cyber criminality, strategies to tackle cyber crime and trends, Criminal justice in India and Implications on Cyber crime. (4 Hrs)

Contracts in the Infotech World: Contracts in the Infotech world, Click-wrap and Shrink-wrap contracts, Contract formation under the Indian Contract Act 1872, Contract formation on the Internet, Terms and Conditions of Contracts, Software product license. (3 Hrs)

Jurisdiction in the Cyber World: Civil law of Jurisdiction in India, Cause of action, Jurisdiction and the Information Technology Act 2000, Place of cause of action in contractual and IPR disputes, Exclusion clauses in Contracts, Abuse of exclusion clauses. (3 Hrs)

MODULE II

Battling Cyber Squatters and Copyright Protection in the Cyber World: Concept of Domain name and reply to Cyber Squatters, Battle between freedom and control on the internet, Works in which copyright subsists and meaning of Copyright, Copyright Ownership and Assignment, License of

Copyright, Copyright term and respect for foreign works, Copyright Infringement, Remedies and Offences, Copyright protection of content on the Internet, Copyright notice, disclaimer and acknowledgment, Napster and its Cousins, Computer Software Piracy. (5 Hrs)

Digital signatures, Digital Signature Certificate, Certifying Authorities and Liability in the Event of Digital Signature Compromise, E-Governance in India. The Indian Evidence Act of 1872 v/s Information Technology Act, 2000: Status of Electronic Records as Evidence, Proof and Management of Electronic Records, Proving Digital Signature, Proof of Electronic Agreements, Proving Electronic Messages, Other Amendments in the Indian Evidence Act by the IT Act. (5 Hrs)

MODULE III

Protection of Cyber Consumers in India: Goods and Services, Consumer Complaints, Defect in Goods and Deficiency in Services, Restrictive and Unfair Trade Practices, Instances of Unfair Trade Practices, Relief under CPA, Consumer Foras, Jurisdiction and Implications on Cyber Consumers in India. (5 Hrs)

The Forensics Process: Types of Investigations, The Role of the Investigator, Elements of a Good Process, Defining a Process. Forensic Lab Environment Preparation: The Ultimate Computer Forensic Lab, Forensic Computers, Forensic Hardware and Software Tools, The Flyaway Kit, Linux Vs Windows. (5 Hrs)

MODULE IV

Forensically Sound Evidence Collection- Collecting Evidence from a Single System, Common Mistakes in Evidence Collection. Remote Investigations and Collections- Privacy Issues, Remote Investigations, Remote Collections, Encrypted Volumes or Drives, USB Thumb Drives. (3 Hrs)

Forensic Investigation Techniques: Microsoft Windows Systems Analysis, Windows File Systems, Recovering Deleted Files, Windows Artifacts. The Linux File System, Linux Analysis. Defeating Anti-Forensic Techniques: Obscurity Methods, Privacy Measures

(5 Hrs)

E-mail Analysis: Finding E-mail Artifacts, Client-Based E-mail, Web-Based Email, Investigating E-Mail Headers. Documenting the Investigation: Read Me, Internal Report, Declaration, Expert Report. (2 Hrs)

TEXT BOOKS:

1) Cyber Law Simplified, Vivek Sood, Tata McGraw-Hill, ISBN 0-07-043506-5.

2) Hacking Exposed™ Computer Forensics Secrets & Solutions, Chris Davis, David Cowen & Aaron Philipp, Tata McGraw-Hill Publishing Company Limited, ISBN 0-07-059895-9

IT7.5.c.FE FINANCIAL ENGINEERING (Elective II)

Lectures per week	: (3 + 1 + 0)
Max marks for Theory paper	: 100
Max marks for Sessionals	: 20 + 5
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2

Total no. of questions to be answered : 5 (At least one question from each module with two compulsory questions from any one module).

Course Objectives:

The course presents an introduction to financial engineering and some important derivative securities traded in the financial markets including forwards, futures, swaps and options and their risk management techniques.

Instructional Objectives:

The goal of the course is to show how students can utilize capital markets technology to create value. The course would explore how new financial technologies can be used to

1. Manage financial risks and position firms to exploit strategic opportunities;
2. Lower firms' financing costs

MODULE I

An Introduction to Financial Engineering: Scope of Financial Engineering, Tools of Financial Engineering, Financial Engineering versus Financial Analysis, The Financial Engineering Team, Productizing the solution, Career Opportunities for Financial Engineers. (5 Hrs)

Factors Contributing to the growth of financial Engineering: The Environmental factors, Intra-firm Factors, Innovative products of the last twenty years, The changing face of security Industry. The Knowledge Base of the Financial Engineer: Theory, Modeling skills, Product Knowledge, Knowledge of relevant Technology, Accounting Tax and Legal. (5 Hrs)

MODULE II

Valuation Relationships and Applications: Cash Flows, Time Value, Sensitivity Analysis of Time Value, Applications, Spreadsheets, Compounding, Absolute Valuation Versus Relative Valuation. Measuring Return: Utility, Measuring Return: Profit versus rate, Rates of return - before and after taxes, Rates of return and Compounding, Investment Horizons. (4 Hrs)

Risk: Portfolio Considerations, investment Horizons Leverage: Volatility: The Source of price risk, Expressing Price Risk in Percent Form, The mathematics of Portfolio Analysis, Risk Aversion and Portfolio Analysis, Role of The Investment Horizon(The Time Dimension), Elements of Multiperiod Model, The Multiperiod Efficient Set. An Intuitive Demonstration of the Importance of the Investment Horizon. Drawdown Criterion: The Optional Portfolio in the Absence of a Riskless asset, The Riskless Assets, Long and Short Positions and the Role of Leverage. Measuring Risk: Advanced Topics: Measuring exposure of Price Risk, Managing Risk. (6 Hrs)

MODULE III

The Physical Tools of the Financial Engineer: Product Development, Products Defined, A Model for New Product Development, Instrument Preview. Futures Forwards, Forward rate Agreements(FRA's), FRA's and Swaps. (5 Hrs)

Rate Conversion, The structure of a swap, Interest rate Swaps, Currency Swaps , Commodity Swaps, Variants, Swap Dealers Role. Single Period Options: Calls and Puts, Payoff Profiles, Hedging with options, Cash Settled Options. (5 Hrs)

MODULE IV

Financial Engineering Processes and Strategies: Assets/Liability management, The Evolution of assets/Liability Management, The Foundation Concept , The changing Face of Liquidity Management, Margin Management, The Investment banker in Asset/Liability Management. Hedging and Related Risk Management Techniques: Hedge Ratios and Their Uses, Recent Improvements in Hedging Theory, The Cost of Hedging, The building Block Approach to hedging, Miscellaneous Risk Management Issues and Instruments. (5 Hrs)

Corporate Restructuring and the LBO: Corporate Restructuring, Going Private: The Leveraged Buyout, The Typical Leveraged Buyout, The Investment Bank in an LBO : The Finance Engineer at Work. Arbitrage and Synthetic Instruments: Arbitrage : Form the Ancient to the Modern, Synthetic Securities, Synthesizing Derivatives, The Cash and carry synthetic, cash and Carry in Arbitrage: Enhancing Portfolio Return, Creating Synthetic Long Bonds, Using Swaps to synthesize Positions, Qualitative Differences Between Synthetic and Real Securities. (5 Hrs)

TEXT BOOK :

1. Financial Engineering A Complete Guide to Financial Innovations By John F. Marshall and Vipul K. Bansal, Prentice Hall of India, ISBN: 81-203-1013-6.

IT7.5.d.ITBM IT BUSINESS METHODOLOGY (Elective II)

Lectures per week	: (3 + 1 + 0)
Max marks for Theory paper	: 100
Max marks for Sessionals	: 20 + 5
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module).

Course Objectives:

- The objective of the course is to explain the main concepts and issues related to business management in the Information Technology field. The activities will be studied in the form of processes describing workflows, and their operation using conceptual models and tools typical of computer science.
- The major goal is to help students acquire the basic understanding of the major enterprise wide business processes and their integration through IT enabled applications, and to develop a managerial perspective to leverage them for competitive advantage.

Instructional Objectives:

At the end of this course, students will be familiar with the technical terminology of the area, based on several models that can be used to structure and compose business processes from the managerial perspective. Moreover, they will be encouraged to experiment with some advanced tools for the design and analysis of these processes in Information Technology.

MODULE I

Management Information Systems: Need, Role of managers, Business and technology trends, Re-engineering. Transaction Management and E-commerce: Data Capture, EDI, Electronic and mobile commerce, Payment mechanisms, Data Quality, Accounting. (4 Hrs)

Models and Decision Support: Need, Understanding processes, Decision Support Systems (DSS), examples, Executive Information Systems (EIS), Geographical Information Systems (GIS). Complex Decision Support and Expert Systems: Specialized problems, Expert Support Systems (ESS), Building ESS, Knowledge, Management, AI Systems, Importance of Intelligent Systems (6 Hrs)

MODULE II

Strategic Analysis: Competitive environment, External agents, IS techniques to gain competitive Advantage, Need for innovation, Costs and dangers of strategies, Quality management: Operations, tactics and strategy. Organizing Businesses and Systems: Production Chain, Entrepreneurship, Planning. (4 Hrs)

Systems Development: Building Information Systems, SDLC, System analysis, Process analysis. Information management and Society: Individual perspective, Business perspective: Vendor, Consumer, Education and training, Social interaction, Responsibility and ethics.

(6 Hrs)

MODULE III

Introduction to Enterprise Resource Planning: Evolution of Enterprise applications, Reasons for the growth of the ERP market advantages of Enterprise Wide Applications, ERP package failure and use. Enterprise - An Overview: Integrated management information, Business modeling, Integrate business model. ERP and Related technologies: BPR, MIS, DSS, EIS, Data warehousing, Data mining, OLAP, Supply Chain Management. (6 Hrs)

ERP : A Manufacturing Perspective: ERP, CAD/CAM, MRP,BOM, closed loop MRP, MRP-II, DRP, JIT and Kanban, CAD/CAM, PDM, MTO and MTS, ATO, ETO, CTO. (4 Hrs)

MODULE IV

ERP Modules: Finance, Plant management, Quality management, Materials management. Benefits of ERP: Reduction of lead time, On-time shipment, Reduction in cycle time, Improved resource utilization, Better customer satisfaction, Improved supplier, Performance, Increase flexibility, Reduced quality costs, Improved information, accuracy and decision making capability. (5 Hrs)

ERP Implementation Lifecycle: Pre-evaluation screening, Package evaluation, Project planning phase, Gap analysis, Reengineering, Configuration, Implementation team engineering, Testing, Going live, End-user training, Post implementation. Vendors, Consultants and users**:** in-house implementation, Vendors, Consultants, End-users. (5 Hrs)

TEXT BOOKS:-

1. Management Information Systems By Gerald V. Post and David L. Anderson (TMH), ISBN: 0-07-049940-3
2. Enterprise Resource Planning By Alexis Leon, TMH, ISBN: 0-07-463712-6

REFERENCE BOOKS:-

1. Information System for Modern Management By Robert G. Murdick, Joel E. Ross and James R. Claggett (PHI), ISBN: 81-203-0397-0.
2. Management Information Technology in the E-business Enterprise by James A. O'Brien, Irwin McGraw Hill, ISBN: 0-07-115811-1
3. Enterprise Resource Planning by Vinod Kumar Garg & N. K. Venkita Krishna, PHI, ISBN: 81-203-1436-0

IT8.1IPPR IMAGE PROCESSING AND PATTERN RECOGNITION

Lectures per week : (3 + 1 + 2)
Max marks for Theory paper : 100
Max marks for Sessionals : 20 + 5
Max marks for orals : 50
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5 (At least one question from each module with two compulsory questions from any one module.)

Course Objectives:

The goal of this course is to provide an introduction to basic concepts and methodologies in digital image processing, and to develop a foundation that can be used as the basis for further study and research in image processing.

Instructional Objectives:

Upon successfully completing the course, the student should:

1. Have a fundamental understanding of digital image processing techniques, including image enhancement, restoration, compression and segmentation.
2. Be able to implement basic image processing algorithms
3. Have the skill base necessary to further explore advanced topics of Digital Image Processing.

MODULE I

Introduction to Digital Image Processing. Fundamental Steps in Digital Image Processing, Components of an Image Processing System. Digital Image Fundamentals: Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships between Pixels. (5 Hrs)

Image Enhancement in the spatial domain: Background, Some Basic Intensity Transformation Functions, Histogram Processing , Histogram Equalization, Histogram Matching (Specification), Enhancement using arithmetic/logic operations, Basics of Spatial filtering, Smoothing Spatial Filters, Sharpening Spatial Filters. (5 Hrs)

MODULE II

Image Enhancements in the Frequency Domain: Introduction to the Fourier Transform and the Frequency Domain. Smoothing Frequency Domain Filters: Ideal Lowpass Filters, Butterworth Lowpass Filters, Gaussian Lowpass Filters. Sharpening Frequency Domain Filters: Ideal Highpass Filters, Butterworth Highpass Filters, Gaussian Highpass Filters. Properties of 2-D FT, Convolution and Correlation theorems. (5 Hrs)

Image Restoration: A Model of the Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise, Mean Filters, Order-Statistics Filters, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering. (5 Hrs)

MODULE III

Color Image Processing: Color Fundamentals, Color Models, Basics of Full-Color Image Processing. Color Transformations: Formulation, Color Complements, Color Slicing, XTone and Color Corrections, Histogram Processing. Smoothing and Sharpening: Color Image Smoothing, Color Image Sharpening. Morphological Image Processing : Preliminaries, Erosion and Dilation,

Opening and Closing, The Hit-or-Miss Transformation, Some Basic Morphological Algorithms. (5 Hrs)

Image Segmentation: Detection of Discontinuities. Edge Linking and Boundary Detection. Local Processing, Global Processing via the Hough Transform. Thresholding : Basic Global Thresholding, Basic Adaptive Thresholding, Optimal Global and Adaptive Thresholding, Region-Based Segmentation. (5 Hrs)

MODULE IV

Representation and Description: Boundary Descriptors , Some Simple Descriptors, Shape Numbers, Fourier Descriptors, Statistical Moments. Regional Descriptors: Some Simple Descriptors, Topological Descriptors. (5 Hrs)

Object Recognition: Patterns and Pattern Classes. Recognition Based on Decision-Theoretic Methods, Matching, Optimum Statistical Classifiers. Structural Methods: Matching Shape Numbers, String Matching, Syntactic Recognition of Strings. (5 Hrs)

TEXT BOOKS

1. Digital Image Processing - By R.C. Gonzalez and R.E. Woods, Second Edition, Addison Wesley, ISBN: 81-7808-629-8.

REFERENCE BOOKS

1. Fundamentals of Digital Image Processing - By A.K.Jain, PHI, ISBN: -81-203-0929-4
2. Digital Image Processing - By W.K.Pralt, McGraw Hill, ISBN: 9-814-12620-9
3. Image Processing, Analysis and Machine Vision by Milan Sonka, Vaclav Hlavac, Roger Boyle, ISBN: 981-240-061-3

IT8.2CCNS COMPUTER CRYPTOGRAPHY AND NETWORK SECURITY

Lectures per week	: (3 + 1 + 2)
Max marks for Theory paper	: 100
Max marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4

No. of questions from each module : 2
Total no. of questions to be answered : 5 (At least one question from each module with two compulsory questions from any one module.)

Course Objectives:

In this course, the students will learn about various cryptographic techniques and their applications.

Instructional Objectives:

After learning this course the student will be able to know about cryptography, Symmetric and Asymmetric Encryption, Substitution and transposition techniques, Message authentication and Hash Functions, Digital Signatures, Web security, Electronic mail Security, Authentication applications and Firewalls.

MODULE I

Services, Mechanisms and Attacks. OSI Security Architecture, Model for Network Security. Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Steganography. (6 Hrs)

Intruders, Intrusion Detection, Password Management, Malicious Software: Viruses and Related Threats, Virus Countermeasures. (4 Hrs)

MODULE II

Block Ciphers Principles, Data Encryption Standard, Strength of DES, Block Cipher Modes of Operation, Triple DES. (5 Hrs)

Confidentiality Using Symmetric Ciphers, Placement of Encryption Function, Traffic Confidentiality, Key Distribution. Introduction To Number Theory: Fermat's and Euler's Theorem, Chinese Remainder Theorem, Discrete Logarithms. (5 Hrs)

MODULE III

Public Key Cryptography: Principles of Public Key Cryptosystems, RSA Algorithm. Key Management, Diffie-Hellman Key Exchange. (5 Hrs)

Message Authentication And Hash Functions: Authentication Requirements, Authentication Functions. Hash Algorithms: MD5 Message Digest Algorithm, Overview of Secure Hash Algorithm. Digital Signatures: Digital Signature Standard. (5 Hrs)

MODULE IV

Authentication Applications: Kerberos, X.509 Authentication Service. (3 Hrs)

Electronic Mail Security: Pretty Good Privacy, S/MIME. (2 Hrs)

Brief overview of IPSec and SSL/TLS. (2 Hrs)

Secure Electronic Transaction, Firewall Design Principles. (3 Hrs)

TEXT BOOK:

1. Cryptography And Network Security By William Stallings, 4th Edition, Prentice Hall Of India, ISBN:81-203-3018-8 OR

   Pearson Education, ISBN: 978-81-7758-774-6

REFERENCE BOOKS

1. Cryptography And Network Security By Behrouz A. Forouzan, Tata McGraw Hill, ISBN-13:978-0-07-066046-5, ISBN-10:0-07-066046-8
2. Cryptography And Network Security By Atul Kahate, Tata McGraw Hill, ISBN-13:978-0-07-064823-4, ISBN-10:0-07-064823-9.

IT8.3.a.WS WEB SERVICES (Elective III)

Lectures per week	: (3 + 1 + 2)
Max marks for Theory paper	: 100
Max marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module.)

Course Objectives:

The course gives a good overview of the various standards and techniques that exists in the Web service landscape. Major topics include some of the Web services open industry standards such as XML, SOAP, UDDI, WSDL, WSCL, and BPEL.

Instructional Objectives:

1. To know the fundamentals of XML
2. To understand SOAP protocol.
3. To Generate, read and understand the WSDL, WSCL, BPEL files.
4. To Understand Web service security issues

MODULE 1

Introduction and apllications of web services. Web services and Enterprises. (3 Hrs)

Web Services architecture: concepts and relationships, Stakeholder's Perspectives(4 Hrs)

Web Services Architecture Usage Scenarios. Use Cases. Web Service Management: Service Life Cycle (3 Hrs)

MODULE 2

XML Fundamentals. XML, XML Documents, XML Namespaces. (3 Hrs)

XML Schema (3 Hrs)

Processing XML. XML Parsing: SAX, COM, JAXB. Xpath, XQuery. (4 Hrs)

MODULE 3

SOAP: The SOAP model, SOAP,SOAP Messages, SOAP Encoding, SOAP RPC, Using Alternative SOAP Encoding, Document, RPC, Literal, Encoded. (4 Hrs)

WSDL: Using SOAP and WSDL. (3 Hrs)

UDDI: UDDI at a glance, The UDDI Business registry, UDDI under covers, Accessing UDDI, How UDDI is Playing out. (3 Hrs)

MODULE 4

Conversations: Web service conversation Language, WSCL Interface component, Relationship between WSCL and WSDL. (2 Hrs)

Workflow: Business Process Management, Workflow and workflow Management systems, Business Process Execution Language (BPEL). (3 Hrs)

Security: Everyday Security Basics, Security Is An End-to-End Process, Web Service Security Issues, Types of Security Attacks and Threats, Web Services Security Roadmap, WS-Security. (3 Hrs)

Case Study: JAVA Web Service, .NET Web Service. (2 Hrs)

TEXT BOOKS

1. Developing Enterprise Web Services – An Architect's Guide, Sandeep Chatterjee, James Webber, Pearson Education, ISBN: 0-13-140160-2
2. Web Services: A Technical Introduction by Harvey M.Dietel & Paul J.Dietel, Prentice Hall PTR, ISBN: 0130461350

REFERENCE BOOKS

1. Understanding Web services XML, WSDL, SOAP and UDDI by Newcomer E, Pearson Education India, ISBN: 81-7808-704-9
2. XML and Web Services by Scmeizer R, Pearson Education, ISBN: 81-7808-759-6
3. XML, Web Services and the Data Revolution by Coyle F.P, Pearson Education Asia, ISBN: 81-7808-628-X
4. Java Web Services- David A.Chappel, O'Reilly Publication, ISBN: 0-596-00269-6
5. Web services Essentials- Cerami, O'Reilly, ISBN: 0-596-00224-6
6. Programming .NET Web Services by Ferrara A., MacDonald M., O'Reilly, ISBN: 81-7366-438-2

Additional References

1. W3C Documentation on Web Services

   a) Web Services Architecture http://www.w3.org/TR/ws-arch/
   b) Web Services Architecture Usage Scenarios http://www.w3.org/TR/ws-arch-scenarios/
   c) Web Service Management: Service Life Cycle http://www.w3.org/TR/wslc/

2. W3School Online Web tutorial: http://www.w3schools.com/

IT8.3.b.OR OPERATION RESEARCH (Elective III)

Lectures per week	: (3 + 1 + 2)
Max marks for Theory paper	: 100
Max marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module.)

Course Objective:

To understand the computer oriented approach in problem solving with the important methods of Operations Research in solving realistic problems. To study the models involving optimum decision making.

Instructional Objectives:

Students on completion of this course will know to apply the following techniques in solving real-life problems: Linear Programming, Integer Programming, Dynamic Programming, Branch and Bound Techniques, Sequencing problems, Queuing theory, Network Models.

MODULE 1

Introduction to OR, Classification of problems in Operations Research, Mathematical Modelling in Operations Research. (2 Hrs)

Introduction to Linear Programming, Formulation of Linear Programming models, Graphical Solutions of Linear Programming models, Maximization and Minimization of functions with constraints, Simplex method, Transportation problems, Assignment problems. (8 hrs)

MODULE 2

Introduction to Integer Programming, Implicit Enumeration Algorithm for 0-1 integer programming problems, Cutting plane technique. (5 Hrs)
Branch and Bound Algorithm for Assignment problems, Branch and Bound Algorithm for Travelling Salesman problem , Branch and Bound Algorithm for Integer Programming.
(5 Hrs)

MODULE 3

Introduction to Dynamic Programming, Investment problems, Stage-coach problem, Production Scheduling, Knapsack problem. (6 Hrs)

Introduction to Sequencing problems: N-job two machine sequencing problem, N-job three machine sequencing problem. (4 Hrs)

MODULE IV

Introduction to PERT, PERT network, Time estimates for activities, Critical Path, Probability of completing event on schedule. (5 Hrs)

Queuing Theory: Notations and Assumptions, Queuing Models with Poisson Input –Exponential service, Queuing Models with Poisson Input –Arbitrary service time. (5 Hrs)

TEXT BOOKS :

1. Introduction to Operations Research: A Computer Oriented Algorithm Approach - By Billey E. Gillett, TMH, ISBN:0-07-099319-X

REFERENCE BOOKS :

1. Operations Research - H.A. Taha ,PHI, (6^{th} Edition), ISBN: 81-2003-1222-8
2. Operations Research - Fredericks ,Hiller and Liberman ,TMH, ISBN: 0-07-047387-0
3. Operations Research – Theory and Applications – J. K. Sharma, MacMillan India Ltd., ISBN: 0333 939204

IT8.3.c.DPF DESIGN PATTERNS AND FRAMEWORKS (Elective III)

Lectures per week	: (3 + 1 + 2)
Max marks for Theory paper	: 100
Max marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module.)

Course Objectives: The Course will provide the student with an in depth knowledge of the various Design Patterns used in Software Engineering.

Instructional Objectives:

At the end of this course, the students will gain practical knowledge of different design patterns and their use in J2EE and .NET frameworks.

MODULE I

Introduction to Design Pattern: Describing Design Patterns, Organizing One Catalog, How to Design Patterns solve Design Problems, How to select a Design Pattern, How to Use a Design Pattern. Design Problems: Document Structure, Formatting, Embellishing the User-Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations, Spelling Checking and Hyphenation. (4 Hrs)

Design Pattern Catalog**:** Creational Patterns, Abstract Factory, Builder, Factory Method, Prototype, Singleton. (6 Hrs)

MODULE II

Structural Patterns: Adapter, Composite, Fly weight. (4 Hrs)

Behavioral Patterns: Chain of Responsibility, Command, Interpreter, Iterator. **(**6 Hrs)

MODULE III

J2EE Servlets, Java Server Pages: J2EE Specification, Developing J2EE Applications, The Model View Controller (MVC) Business Development Model. (3 Hrs)

Enterprise Java Beans, Interfaces and JDBC Persistence: EJB Interfaces, Exploring Implementation Classes, EJB from Client Perspective, Examining How EJB Systems Function. (3 Hrs)

Microsoft .NET Internal Inter operability. .NET Language Integration Components: Defining key .NET Objectives, . NET Role in Windows Family, Examining the .NET framework, Reflection, Understanding the common type specification, Examining the Common Language Specification, Creating a Strong Name,Locate on Assembly. (4 Hrs)

MODULE IV

ASP .NET Architecture: ASP .NET Name spaces, ASP .NET Page Class, Defining Web Form Functionality, Creating User Control, Error Handling and Security. (3 Hrs)

Applying best practices: Examining the Container's Role, Separating Business logic from presentation, Use ASP.NET Code Behind Feature, Maximize benefits from both Thin-Client and Rich-Client Applications where applicable, Client-side session state, Using hidden fields, Rewriting URLs, Using Cookies, Using the HTTP Session Interface in J2EE, Using HTTP Application State Class, Synchronizing Access to Application State, Using ASP.NET Session State, Enabling Session State, Storing Session State In-Process and Out-of-Process, Securing an Enterprise Application. (7 Hrs)

TEXTBOOKS:

1. Design Patterns- Elements of Object Oriented Software by Eric Gamma, Richard Helm, Ralph Johnson & John Ulissides, Pearson Education Asia, ISBN: 8178081350
2. .NET & JZEE Interoperability by Dwight Peltzer, Tata Mc Graw Hill Edition, ISBN: 0-07-058688-8

IT8.3.d.FLNN FUZZY LOGIC AND NEURAL NETWORKS (Elective III)

Lectures per week	: (3 + 1 + 2)
Max marks for Theory paper	: 100
Max marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module.)

Course Objectives:

The aim of the course is to introduce Neural Networks and Fuzzy Logic and to understand the applications of Neural Networks and Fuzzy Logic.

Instructional Objectives:

The objective is to provide a simplified yet comprehensive description of the concepts and the potential applications of neural networks and fuzzy logic, to give an insight into fuzzy neural networks and to demonstrate their applicability through examples.

MODULE I

History of Neural Networks. Structure and function of a single neuron. Neural Net Architecture. Neural Learning. Common usage of neural networks in classification, clustering, vector quantization. pattern association, function approximation and forecasting. Evaluation of networks. Implementation of neural networks. (3 hrs)

Perceptrons. Linear Separability Perceptron Training Algorithm, Guarantee of Success, Pocket algorithm, Adaline, (3 hrs)

Multilayer networks, Multilevel discrimination, Architecture, objectives and working of Backpropagation algorithm. Setting the parameter values of Backpropagation algorithm. Accelerating learning process and applications of Backpropagation algorithm. (4 hrs)

MODULE II

Prediction tasks using Recurrent Networks and feedforward networks, Radial basis functions. Polynomial networks. (3 hrs)

Unsupervised learning. Hamming networks, simple competitive learning. counter-propagation network, adaptive resonance theory, Self organizing maps. (4 hrs)

Non-iterative procedures for association, Discrete Hopfield Network, Brain-State_in_a_box Network, Boltzmann Machine, Bi-directional Associate memory. (4 hrs)

MODULE III

History and Motivation for Fuzzy Logic. Classical sets, Fuzzy sets, Operations of Fuzzy sets, Properties of Fuzzy sets, A Geometric interpretation of Fuzzy sets, possibility theory. (03 hrs) Fuzzy relations, composition of Fuzzy relations, Fuzzy graphs and numbers, Functions with Fuzzy arguments, arithmetic operations on Fuzzy numbers. (2 hrs)

Basics of Fuzzy rules, Fuzzy mapping rules, Fuzzy implication rules, Fuzzy rule based models for function approximation, Theoretical foundation of fuzzy mapping rules, Types of fuzzy rule based models: Mamdani model, TSK model, and standard additive model.(5 hrs)

MODULE IV

Propositional logic and first order predicate calculus. Fuzzy logic: Fuzzy implication, approximate reasoning, Criteria of Fuzzy implications, Three families of Fuzzy implications. Possibility versus Probability, Probability of a Fuzzy event. Probabilistic interpretation of Fuzzy sets. (5hrs).

Fuzzy Logic in Expert Systems. intelligent agents and Mobile robot navigation,.

Fuzzy logic in database systems, Fuzzy relational data models and operations, Fuzzy object oriented database. Fuzzy information Retrieval and Web search. (5 hrs)

TEXT BOOK

1. Elements of Artificial Neural Networks by Kishan Mehrotra, Chilukuri Mohan, and Sanjay Ranka, Penram International Publishing (India)

2. Fuzzy Logic, Intelligence, Control and Information by John Yen and Reza Langari, Pearson Education

REFERENCE BOOK

1. Neural Networks and Fuzzy Systems: A dynamical Systems Approach toi Machine Intelligence, by Bart Kosko, PHI
2. Neural Networks: A comprehensive Foundation, - By Simon Haykin, Pearson Education
3. Introduction to Artificial Neural Networks, - By Jacek M. Zurada, Jaico PublishingHouse
4. Neural Networks, Fuzzy Logic, and Genetic Algorithms Synthesis and Applications by S. Rajasekaran, G.A. Vijayalakshmi Pai, PHI
5. Foundation to Fuzzy sets and Fuzzy Logic by M. Ganesh, PHI

IT8.4.a.VLSI VLSI DESIGN (Elective IV)

Lectures per Week : (3 + 1 + 2)
Max Marks for Theory Paper : 100
Max Marks for Sessionals : 20 + 5
Max marks for orals : 50
Duration of Paper : 3 hrs
Total No of Modules : 4
No. of Questions from each module : 2
Total no. of questions to be answered : 5(At least one question from each module with two compulsory questions from any one module)

Course Objective:

The subject is designed for graduate level to explore the methods of digital circuit design and Integrated circuit design procedures.

Instruction Objectives:

The first module is related to IC fabrication and materials required for IC fabrication

second and third module are providing the conceptual knowledge of CMOS architecture, working and its usage in making digital circuits, fourth module explain the procedures of testing integrated circuit designs.

MODULE I

MOS transistor switches: CMOS logic- Inverter, NOR, NAND and combinational logic, compound gates, Multiplexers, Transmission gates, latches and Registers. (2 Hrs)
MOS Transistor: Structures, MOS system under external bias, operation of MOS transistor (MOSFET), threshold voltage, MOSFET I-V characteristics, Channel Length Modulation, substrate bias effect, measurements of parameters – K_N, V_{TP} & γ, MOSFET capacitance. (5 Hrs)
MOS Inverters:Static load MOS Inverters, CMOS Inverter Design, Operation, DC Characteristics, Noise margins, Power and Area considerations. (3 Hrs)

MODULE II

Modeling of MOS transistor circuits using SPICE (level1 model equations) (3 Hrs)
Switching Circuit Characteristics: Rise , fall and delay time, Gate delays, Transistor sizing, static and dynamic power dissipations. (3 Hrs)
CMOS logic gate design: Fan –in and fan out, NOR , NAND and Complex logic gates and their layouts (Euler paths). CMOS logic- Inverter, NOR, NAND and combinational logic, compound gates, Multiplexers, Transmission gates, latches and Registers. (4 Hrs)

MODULE III

Silicon semiconductor Technology: Wafer processing, Oxidation, Epitaxy, Deposition, Ion-implantation and Diffusion silicon gate process. (4 Hrs)
Basic CMOS technology: n-well and p-well CMOS process, Silicon on insulator. (2Hrs)
MOSIS layout design: rules (full-custom mask layout designs), stick diagrams, layout editors (Magic/Micro Wind) and circuit extraction. FPGA and CPLD. (4Hr)

MODULE 4

VLSI design methodologies: VLSI design flow, design analysis, simulations: circuit, timing, switch-level, gate-level (or logic). Using HDLs : VHDL. (5Hrs)
Design verification: Electrical, timing, functional. Design synthesis: Circuit and logic Synthesis. Testing: Test procedure, Design for Testability, Scan Based Test, Boundary- Scan Design, Built in self test . (3 Hrs)
Automatic Test-Pattern generation (ATPG). Fault models and its simulation. (2Hrs)

TEXTBOOKS:

1. Digital Integrated Circuits (Analysis and Design) by Yusuf and Kong.
2. Principles of CMOS VLSI Design by Neil H.E. Weste, Kamran Eshranghian.
3. Digital Integrated Circuits – (Design perspective) by Jan M. Rabaey.
4. Fundamentals of Digital logic with VLSI design by Stephen Brown, Zvonco Vranesic

REFERENCE BOOKS:

1. Basic VLSI Design by Douglas Pucknell, Kamran Eshraghian, PHI.
2. Modern VLSI design (Systems on Silicon) by Wayne Wolf.
3. Introduction to VLSI design by Eugene D. Gabricius.

IT8.4.b.ESD EMBEDDED SYSTEM DESIGN (Elective IV)

Lectures per week	: (3 + 1 + 2)
Max marks for Theory paper	: 100
Max marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module.)

Course Objectives:

The main objective of this course is to provide the student with the basic understanding of design process in embedded system. This includes system requirements specifications, architectural and detailed design, and implementation, focusing on real-time applications of embedded system.

Instructional Objectives:

At the end of this course student will be exposed to microcontroller-based embedded systems design and hardware architecture, It includes embedded systems and its hardware organization, microcontroller architecture, interfacing technique ,embedded programming in C ,Real Time operating System(RTOS) concepts.

MODULE I

Introduction to Embedded System: Processor in the system, Hardware units, Software embedded into a system, Exemplary embedded system. (2 Hrs)

8051 Microcontroller Architecture: Hardware, Input/output pins, Ports and circuits, Interfacing to external memory, Counters and timers, Serial data input and output, Interrupts.

(3 Hrs)

8051 Instruction Set: Addressing Modes, Data movement instruction: External Data move. Code memory Read-Only-Data moves, Push and Pop opcodes , Data exchanges. Logic operation: Bit and Byte level, Rotate and Swap. (5 Hrs)

MODULE II

The 8051 Instruction Set: Arithmetic operations: Flags, Incrementing, decrementing, Addition, subtraction, Multiplication and division, Decimal arithmetic. (3 Hrs)

Jump and call Instructions: Jump and call program range, Jumps, Call and subroutine, Interrupts and returns in details. (3 Hrs)

Timer|Counter Programming: Programming 8051 timer, Counter programming, Programming timer 0 and 1 in 8051 C. (4 Hrs)

MODULE III

Serial Communication: Basics of Serial Communication , 8051 connections to RS-232, 8051 serial Communication Programming in C. (3 Hrs)

Interrupt Programming: 8051 Interrupts, Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupt, Interrupt Priority in the 8051, interrupt Programming in C. (4 Hrs)

8051 programming in C: Data type and time delay in 8051 C, I/O programming in 8051 C , Logic operation in 8051 C, Data conversion program in 8051 C , Accessing code ROM space in 8051 C, Data serialization using 8051 C. (3 Hrs)

MODULE IV

Interfacing 8051: LCD Interfacing, Keyboard interfacing, Digital to Analog Converter (DAC) interfacing, Sensor interfacing and signal conditioning. (2 Hrs)

Real Time Operating Systems (RTOS): Operating system services , I/O subsystems, Network Operating system, Real-Time & embedded system operating system, Interrupt routine in RTOS environment, RTOS task scheduling models, Performance metric in scheduling models, Action in preemptive scheduler, Strategy for synchronization, Embedded Linux internals, OS security issues, Mobile OS. (5 Hrs)

Embedded software development tools: Code generation tools, Simulator, Testing and debugger, Integrated Development Environments (IDE) for 8051 systems, Memory and Processor sensitive program and device drivers. (3 Hrs)

TEXT BOOKS:

1. The 8051 Microcontroller, Architecture, Programming & applications-Second edition by Kenneth J. Ayala, Penram International, ISBN: 81-90828-4-1.
2. The 8051 Microcontroller and Embedded Systems using assembly & C by Muhammad Ali Mazidi and Janice Mazidi, Prentice-Hall of India, ISBN: 013119402X

REFERENCE BOOKS:

1. Embedded System: architecture, programming and design By Raj Kamal ,Tata Mc-Graw-Hill publishing company limited, ISBN: 0-07-049470-3

IT8.4.c.SPE SYSTEM PERFORMANCE AND EVALUATION (Elective IV)

Lectures per week	: (3 + 1 + 2)
Max marks for Theory paper	: 100
Max marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module.)

Course objectives:

In this course we aim to provide students with a deeper understanding of Computer System evaluation techniques. In particular we focus on various tuning parameters with respect to web, database and operating system

Instructional Objectives:

After completing this course students will be able to:

1. Understand in depth the concepts and techniques applied to the performance evaluation of computer systems.
2. Consider performance in design and development stages of computer systems such as hardware components, networks, operating systems and database systems

MODULE I

Evolution of computer systems architectures. Evolution of database systems, Evolution of operating system, Evolution of computer networks, Need for performance evaluation, Role of performance evaluation in computer engineering. (5 Hrs)

Overview of performance evaluation methods, Performance metrics and evaluation criteria. Fundamental Concepts and Performance Measures: Time, Events, Measurements, Intervals, Response, Independence, Randomness, workloads, Problems encountered in model development and use. (5 Hrs)

MODULE II

Capacity Planning: Bandwidth, speed of server and memory requirements. Performance monitoring: Parameters of performance, Latency and throughput, Utilization, Efficiency, Monitoring web performance. (5 Hrs)

Load testing: Load test preparation, Trade –offs with load testing Tools, Writing your own load testing tools, Benchmark Specification and Benchmark Tests. Performance Analysis: Using analysis.cgi to find a bottleneck, snooping HTTP with Sprocket, Look at connections, Log file Analysis, Hits per second. (5 Hrs)

MODULE III

Database Systems Performance Analysis: The testbed system, The database systems, Testbed performance analysis testing, The results, Index tuning: Types of queries, Key Types, Datastructures, Sparse verses dense indexes, To cluster or not to cluster, Joins, foreign key constrains and indexes. (6 Hrs)

Tuning Relational systems: Table Schema and normalization, Clustering two tables, Aggregate Maintenance, Query Tuning, Triggers. (4 Hrs)

MODULE IV

Analysis of operating system components: System architecture, Workloads, Experimental design and, Simulation, Experimental analysis and conclusion. (4 Hrs)

Analysis of computer Network components: Analytical modeling examples, simulation modeling of local area networks. (3 Hrs)

Case Studies: Database Table growing without limit, Reverse DNS lookups slows logging, Kinked cable, Database connection pool growth limits Performance. (3 Hrs)

TEXT BOOKS:

1. Computer Systems performance Evaluation and Prediction by Paul J. Fortier & Howard E. Michel, Elevier India Pvt. Ltd., ISBN: 1-55558-260-5
2. Web Performance Tuning by Patrick Killelea, O'relly- Shroff Publications, ISBN: 81-7366-441-2
3. Database Tuning Principles, Experiments and Trouble Techniques by Dennis Shasha and Philippe Bonnet, Elsevier Publication, ISBN: 81-8147-324-8

REFERENCE BOOKS:

1. The Art of Computer Systems Performance Analysis by Raj Jain

IT8.4.d.ACA ADVANCED COMPUTER ARCHITECTURE (Elective IV)

Lectures per week	: (3 + 1 + 2)
Max marks for Theory paper	: 100
Max marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module.)

Course Objective:

The aim of the course is to introduce Advance computer architecture and to give students an insight into the various types of processors. The course will help them to be able to learn the internal architecture of various types of processors.

Instructional Objective:

To familiarize the students, how modern computer systems work and are built. Methods are discussed which have been developed in order to improve the performance of current microprocessors and parallel systems.

MODULE I

Introduction to parallel processing: Evolution of computer systems, Parallelism in uniprocessors, Parallel computer modes, Architectural classification schemes, Parallel processing applications, Conditions of parallelism, Types of parallelism. (5 Hrs)

Introduction to pipelining: Linear pipeline processor, Non-linear pipeline processors, Instruction and Arithmetic pipeline design, principles of designing pipelined processors.

(3 Hrs)

Memory and Input/Output Subsystems: Hierarchical memory technology, Addressing schemes, Locality of References, Hierarchy optimization. (2 Hrs)

MODULE II

Principles of Pipelining and Vector Processing: Vector processing principles, Vector loops and chaining, pipelined vector processing methods, Architecture or Cray-1,Vectorization and Optimization methods. (6 Hrs)

Structures and Algorithms for Array Processors: Introduction to SIMD Computer Organization, Interconnection networks, parallel algorithms for array processors, The Illiac-IV System architecture and applications. (4 Hrs)

MODULE III

Associative array processing: Associative memory organization. (2 Hrs)

Multiprocessors Architecture and Programming: Functional structures, Interconnection networks, Cache coherence and solutions, Interleaved memory organization, Multiprocessor operating systems, Language features to exploit parallelism, Process synchronization mechanisms, system deadlocks and protection, Cray X-MP system architecture and multitasking. (8 Hrs)

MODULE IV

Dataflow computers: Control flow versus data flow computers, Data flow architectures, Static and Dynamic data flow computers, Demand-driven mechanism, Data flow graphs and languages. Advantages and potential problems in data flow computers. (6 Hrs)

RISC processor and CISC processor: Parallel Model, Parallel languages and compiler, Loop parallization and pipelining. Parallel programming environment: Software development tools. (4 Hr)

TEXT BOOKS:

1. Computer architecture and parallel processing by Hwang and Briggs, TMH, ISBN:0-07-031556-6.

REFERENCE BOOKS

1. Computer Architecture by Nicholas Carter, TMH, ISBN: 0-07-048332-5
2. Advanced computer architecture by Kai Hwang, TMH, ISBN: 0-07-031622-8