BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI – 620 024.
M.Sc. Computer Science Course Structure under CBCS

(For the candidates admitted from the academic year 2016-2017 onwards)

Updated on 12.06.2017

Sem	Course	Course Title	Ins. Hrs / Week	Credit	Exam Hrs	Marks		Total
						Int.	Ext.	
I	Core Course – I (CC)	Mathematical Foundation for Computer Science	6	4	3	25	75	100
	Core Course – II (CC)	Web Technologies	6	4	3	25	75	100
	Core Course – III (CC)	Design and Analysis of Algorithms	6	4	3	25	75	100
	Core Course – IV (CC)	Distributed Operating Systems	6	4	3	25	75	100
	Core Practical – I (CP)	Web Technologies Lab	6	4	3	40	60	100
	TOTAL		**30**	**20**				**500**
II	Core Course – V (CC)	OOAD & UML	6	5	3	25	75	100
	Core Course – VI (CC)	Distributed Technologies	6	5	3	25	75	100
	Core Practical – II (CP)	Distributed Technologies Lab	6	4	3	40	60	100
	Elective Course – I (EC)	Any one from the list	6	5	3	25	75	100
	Elective Course – II (EC)	Any one from the list	6	5	3	25	75	100
	TOTAL		**30**	**24**				**500**
III	Core Course – VII (CC)	Data Mining and Ware Housing	6	5	3	25	75	100
	Core Course – VIII (CC)	Compiler Design	6	5	3	25	75	100
	Core Practical – III (CP)	Data Mining Lab	6	4	3	40	60	100
	Elective Course – III (EC)	Any one from the list	6	5	3	25	75	100
	Elective Course – IV (EC)	Any one from the list	6	5	3	25	75	100
	TOTAL		**30**	**24**				**500**
IV	Core Course – IX (CC)	Cloud Computing	6	5	3	25	75	100
	Core Course – X (CC)	Wireless Sensor Networks	6	5	3	25	75	100
	Core Practical - IV (CP)	Open Source Lab	6	4	3	40	60	100
	Elective Course – V (EC)	Any one from the list	6	4	3	25	75	100
	Project	Project	6	4	-	-	-	100
	TOTAL		**30**	**22**				**500**
GRAND TOTAL			**120**	**90**				**2000**

List of Elective Courses (For 2016 – 2017)

Elective I		Elective II	
1	Mobile Communication	1	Embedded Systems
2	Web Services	2	Artificial Intelligence
3	Human Computer Interaction	3	Pattern Recognition
Elective III		**Elective IV**	
1	Parallel Processing	1	Network Security
2	Advanced Computer Architecture	2	Computer Simulation and Modeling
3	Pervasive Computing	3	Soft Computing
Elective V			
1	Big Data Analytics		
2	MANET		
3	Digital Image Processing		

Note:

Project : 100 Marks
Dissertation : 80 Marks
Viva Voice : 20 Marks

Core Papers - 10
Core Practical - 4
Elective Papers - 5
Project - 1

Sl. No	Subject	Internal	External
1.	Theory	25 Marks	75 Marks
2.	Practical	40 Marks	60 Marks

Note:

1. Theory Internal 25 marks External 75 marks

2. Practical " 40 marks " 60 marks

3. Separate passing minimum is prescribed for Internal and External

a) The passing minimum for CIA shall be 40% out of 25 marks (i.e. 10 marks)
b) The passing minimum for University Examinations shall be 40% out of 75 marks (i.e. 30 marks)
c) The passing minimum not less than 50% in the aggregate.

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CORE COURSE I

MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE

Objective :

To learn the basis of the mathematical applications for developing the program.

Unit I

Propositions - evaluation - precedence rules -tautologies - reasoning using equivalence transformation - laws of equivalence - substitution rules - a natural deduction system. Deductive proofs - inference rules - proofs - sub proofs.

Unit II

Introduction - Cryptography – Ceaser Cyphor Coding - Matrix encoding - scrambled codes - Hamming metric - Hamming distance - Error detecting capability of an encoding.

Unit III

Assignment problem and its solution by Hungarian method. Project Scheduling by PERT - CPM: Phases of project scheduling - Arrow diagram - Critical path method - Probability and Cost Considerations in project scheduling - Crahing of Networks.

Unit IV

Testing of hypothesis : Tests based on normal population - Applications of chi-square, Student's-t, F-distributions - chi-square Test - goodness of fit - Test based on mean, means, variance, correlation and regression of coefficients.

Unit V

Graph - Directed and undirected graphs - Subgraphs - Chains, Circuits, Paths, Cycles - Connectivity - Relations to partial ordering - adjacency and incidence matrices - Minimal paths - Elements of transport network - Trees - Applications.

Text Books

1. "The Science of Programming", David Gries. Narosa Publishing House, New Delhi, 1993.
2. "Application Oriented Algebra", James L. Fisher, Dun Donnelly Publisher, 1977.
3. "Operation Research - An Introduction", Hamdy A.Taha, Macmillan Publishing Co., 4th Edn., 1987.
4. "Fundamentals of Mathematical Statistics", Gupta,S.C. and V.K.Kapoor, Sultan Chand & Sons, New Delhi, 8th Edn., 1983.
5. "Fundamentals of Applied Statistics", Gupta.S.C. and V.K.Kapoor, Sultan Chand & Sons, New Delhi, 2nd Edn., 1978.

References

1. "Discrete Mathematics", Seymour Lipschutz and Marc Laris Lipson, Second edition, Schuam's Outlines by Tata McGraw- Hill publishing Company Limited, New Delhi 1999.
2. "Operations Research", Kanti Swarup, P.K.Gupta and Man Mohan, Sultan Chand & Sons, New Delhi, 1994.
3. "Introductory Mathematical Statistics", Erwin Kryszig, John Wiley & Sons, New York, 1990.
4. "Probability and Statistics Engineering and Computer Science", Milton, J.S. and J.C.Arnold, McGraw Hill, New Delhi, 1986.

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CORE COURSE II

WEB TECHNOLOGIES

Objectives :

To provide fundamental concept of Internet, JavaScript, XML, JSP, ASP with a view to developing professional software development skills.

UNIT I

Internet Basics: Basic Concepts – Internet Domains – IP Address – TCP/IP Protocol – The WWW – The Telnet — Introduction to HTML: Web server - Web client / browser - Tags – Text Formatting – Lists – Tables – Linking Documents - Frames.

UNIT II

JavaScript: JavaScript in Web Pages – The Advantages of JavaScript – Writing JavaScript into HTML – Syntax – Operators and Expressions – Constructs and conditional checking – Functions – Placing text in a browser – Dialog Boxes – Form object's methods – Built in objects – user defined objects.

UNIT III

XML: Comparison with HTML – DTD – XML elements – Content creation – Attributes –Entities – XSL – XLINK – XPATH – XPOINTER – Namespaces – Applications – integrating XML with other applications.

UNIT IV

JSP Fundamentals: Basics – Directive basics – Page directive – The taglib directive – The include directive – JSP Standard Actions – Java Beans – Error Handling.

UNIT V

ASP: Introduction to ASP – Objects – Components – Working with HTML forms – Connecting to Microsoft SQL Server & MS–Access Database – SQL statements with connection object – Working with record sets.

Text Books

1. "Web Enabled Commercial Application Development Using HTML, DHTML, JavaScript, Perl CGI", Ivan Bayross, BPB Publication. **UNIT I & II**
2. "XML Bible", Elliotte Rusty Harold, 2nd Edition, Wrox Publication. **UNIT III**
3. "Beginning Java Server Pages", Vivek Chopra, Sing Li, Rupert Jones, Jon Eaves, John T. Bell, Wrox Publications. **UNIT IV**
4. "Practical ASP", Ivan Bayross, BPB Publication. **UNIT V**

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CORE COURSE III

DESIGN AND ANALYSIS OF ALGORITHMS

Objectives :

To study the concepts of algorithms and analysis of algorithms using divide and conquer, greedy method, dynamic programming, backtracking, and branch and bound techniques

UNIT I

Introduction: Algorithm Definition – Algorithm Specification – Performance Analysis. Elementary Data Structures: Stacks and Queues – Trees – Dictionaries – Priority Queues – Sets and Disjoint Set Union – Graphs

UNIT II

Divide and Conquer: The General Method – Defective Chessboard – Binary Search – Finding The Maximum And Minimum – Merge Sort – Quick Sort – Selection - Strassen's Matrix Multiplication.

UNIT III

The Greedy Method: General Method - Container Loading - Knapsack Problem - Tree Vertex Splitting – Job Sequencing With Deadlines - Minimum Cost Spanning Trees - Optimal Storage On Tapes – Optimal Merge Patterns - Single Source Shortest Paths.

UNIT IV

Dynamic Programming: The General Method – Multistage Graphs – All-Pairs Shortest Paths – Single-Source Shortest Paths - Optimal Binary Search Trees - String Editing - 0/1 Knapsack - Reliability Design - The Traveling Salesperson Problem - Flow Shop Scheduling. Basic Traversal and Search Techniques: Techniques for Binary Trees – Techniques for Graphs – Connected Components and Spanning Trees – Biconnected Components and DFS.

UNIT V

Backtracking: The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem Branch and Bound: The Method - 0/1 Knapsack Problem.

Text Book

Ellis Horowitz, Satraj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Universities Press, Second Edition, Reprint 2009.

References

1. Data Structures Using C - Langsam, Augenstien, Tenenbaum, PHI
2. Data structures and Algorithms, V.Aho, Hopcropft, Ullman , LPE
3. Introduction to design and Analysis of Algorithms - S.E. Goodman, ST. Hedetniem- TMH

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CORE COURSE IV

DISTRIBUTED OPERATING SYSTEMS

Objectives :

To study the concepts of distributed computing systems and cryptography.

Unit I

Fundamentals: What is Distributed Operating System – Evolution of Distributed Computing System – Distributed Computing System Models – Why are Distributed Computing Systems gaining popularity – What is a Distributed Computing System – Issues in Designing Distributed Computing System – Introduction to Distributed Computing Environment. Introduction to Computer Networks – Network types – LAN –WAN – Communication protocols – Internetworking – ATM Technology

Unit II

Message Passing: Introduction – Desirable features – Issues in PC Message Passing – Synchronization – Buffering – Multidatagram Messages – Encoding and Decoding – Process Addressing – Failure Handling – Group Communication

Unit III

Distributed Shard Memory: Introduction – General Architecture of DSM system – Design and Implementation Issues of DSM – Granularity – Structure of Shared Memory –Replacement Strategy – Thrasing –Heterogeneous DSM – Advantages Synchronization: Introduction – Clock Synchronization – Event Ordering – Mutual Exclusion – Deadlock – Election Algorithm

Unit IV

Distributed File System: Introduction – Desirable features – File Models – File Accessing Models – File Sharing Semantics – File Caching Schemes – File Replication – Fault Tolerance – Atomic Transactions – Design Principles

Unit V

Security: Introduction – Potential Attacks to Computer System – Cryptography – Authentication – Access Control – Digital Signatures – Design Principles

Text Book :

Distributed Operating Systems – Concepts and Design, Pradeep K Sinha, PHI, 2003.

References:

Distributed Operating Systems 1e, Andrew S Tanenbaum, PHI.

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CORE PRACTICAL I

WEB TECHNOLOGIES LAB

Objectives :

To provide fundamental concept of Internet, JavaScript, XML, JSP, ASP with a view to Developing professional software development skills.

1. Write a XML program for job listing in HTML.
2. Write a JavaScript code block, which checks the contents entered in a form's text element. If the text entered is in the lower case, convert to upper case.
3. Write a JavaScript code block, which validates a username and password.
   a) If either the name or password field is not entered display an error message.
   b) The fields are entered do not match with default values display an error message.
   c) If the fields entered match, display the welcome message.
4. Write a JavaScript code to display the current date and time in a browser.
5. Write a JSP Program for user authentication.
6. Write a JSP Program for a simple shopping cart.
7. Write a JSP Program to prepare a bio data and store it in database.
8. Write an ASP Program using Response and Request Object.
9. Write an ASP Program using AdRotator Component.
10. Write an ASP program using database connectivity for student's record.

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CORE COURSE V

OOAD & UML

Objective :

To give a detailed knowledge on Structured approach to system construction, Various object oriented methodologies, Object oriented analysis, Object oriented design and UML examples.

Unit I

Structured approach to system construction : SSADM/SADT - An overview of object oriented systems development & Life cycle

Unit II

Various object oriented methodologies – Introduction to UML

Unit III

Object oriented analysis – Use cases- Object classification, relationships, attributes, methods

Unit IV

Object oriented design – Design axioms – Designing classes – Layering the software design :- data access layer, User interface layer, Control/business logic layer

Unit V

UML - Examples on :Behavioral models – Structural models – Architectural models from real world problems.

TEXT BOOK:

1. **Bahrami Ali**, Object oriented systems development, Irwin McGrawHill, 2005 (First 4 units covered here).
2. **Booch Grady, Rumbaugh James, Jacobson Ivar**, The Unified modeling language – User Guide, Pearson education, 2006 (ISBN 81-7758-372-7) (Unit: -5 covered here).

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CORE COURSE VI

DISTRIBUTED TECHNOLOGIES

Objectives :

This course aims to build concepts regarding the fundamental principles of distributed systems. The design issues and distributed operating system concepts are covered.

Unit I

Introduction to distributed Computing – Challenges involved in establishing remote connection – Strategies involved in remote computation – Current Distributed computing practices through Dot Net and Java technologies.

Unit II

Advanced ADO, NET – Disconnected Data Access – Gridview, Details View, Form View controls – Crystal Reports – Role of ADO, NET in Distributed Applications.

Unit III

Advanced ASP, NET – AdRotator, Multiview, Wizard and Image Map Controls – Master Pages – Site Navigation – Web Parts – Uses of these controls and features in Website development.

Unit IV

Advanced features of ASP.NET – Security in ASP, NET – State Management in ASP, NET – Mobile Application development in ASP, NET – Critical usage of these features in Website development.

Unit V

Web services – Role of Web services in Distributed Computing – WSDL, UDDI, SOAP concepts involved in Web Services – Connected a Web Service to a Data Base – Accessing a Web Service through n ASP, NET application.

Text Book

1. Walther, ASP, NET 3.5, SAMS Publication, 2005.

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CORE PRACTICAL II

DISTRIBUTED TECHNOLOGIES LAB

Objectives :

To provide fundamental concept of Internet, JavaScript, XML, JSP, ASP with a view to developing professional software development skills

1. Create a table and insert a few records using Disconnected Access.
2. Develop a project to update and delete few records using Disconnected Access.
3. Develop a project to view the records using GridView, DetailsView, FormView Controls.
4. Develop a project to generate a crystal report from an existing database.
5. Design a web page that makes uses of Ad Rotator Control.
6. Design a web page involving Multi View or Wizard Control.
7. Make use of Image Control involving two hot spots in a web page.
8. Design a simple web site that makes use of Master Pages.
9. Establish the security features in a simple web site with five pages.
10. Use state management concepts in a mobile web application.
11. Develop a web service that has an ASP.NET client.
12. Develop a web service to fetch a data from a table and send it across to the client.

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CORE COURSE VII

DATA MINING AND WARE HOUSING

Objective :

On successful completion of the course the students should have: Understood data mining techniques- Concepts and design of data warehousing**.**

UNIT I

Introduction – What is Data mining – Data Warehouses – Data Mining Functionalities – Basic Data mining tasks – Data Mining Issues – Social Implications of Data Mining– Applications and Trends in Data Mining.

UNIT II

Data Preprocessing : Why preprocess the Data ? –Data Cleaning - Data Integration and Transformation – Data Reduction – Data cube Aggregation – Attribute Subset Selection Classification: Introduction – statistical based algorithms – Bayesian Classification. Distance based algorithms – decision tree based algorithms – ID3.

UNIT III

Clustering: Introduction - Hierarchical algorithms – Partitional algorithms – Minimum spanning tree – K-Means Clustering - Nearest Neighbour algorithm. Association Rules: What is an association rule? – Methods to discover an association rule–APRIORI algorithm – Partitioning algorithm .

UNIT IV

Data Warehousing: An introduction – characteristics of a data warehouse – Data marts – other aspects of data mart .Online analytical processing: OLTP & OLAP systems.

UNIT V

Developing a data warehouse : Why and how to build a data warehouse – Data warehouse architectural strategies and organizational issues – Design consideration – Data content – meta data – distribution of data – tools for data warehousing – Performance considerations

TEXT BOOKS

1. Jiawei Han and Miceline Kamber , “Data Mining Concepts and Techniques “ , Morgan Kaulmann Publishers, 2006. (Unit I – Chapter 1 -1.2, 1.4 , Chapter 11-11.1) (Unit II – Chapter 2 - 2.1,2.3, 2.4, 2.5.1,2.5.2)
2. Margaret H Dunham , “Data mining Introductory & Advanced Topics”, Pearson Education , 2003.(Unit I – Chapter 1 -1.1 , 1.3, 1.5) , (UNIT II – Chapter 4 – 4.1, 4.2, 4.3, 4.4) (UNIT III – Chapter 5 – 5.1,5.4, 5.5.1, 5.5.3,5.5.4, Chapter 6 – 6.1,6.3.
3. C.S.R.Prabhu, “Data Warehousing concepts, techniques, products & applications”, PHI, Second Edition.) (UNIT IV & V)

REFERENCES:

1. Pieter Adriaans, Dolf Zantinge, “Data Mining” Pearson Education, 1998.
2. Arun K Pujari, “Data Mining Techniques”,Universities Press(India) Pvt, 2003.
3. S.Rajashekharan, G A Vijaylakshmi Bhai,”Neural Networks,Fuzzy Logic,and Genetic Algorithms synthesis and Application”, PHI
4. Margaret H.Dunham,” Data Mining Introductory and Advanced topics”,Pearson Eductaionn 2003.

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CORE COURSE VIII

COMPILER DESIGN

OBJECTIVES :

On successful completion of the subject the students should have Understood the different phases of compiler and needs of the compiler.

UNIT I

Introduction to compilers – Analysis of source program – Phase of compiler – Cousins of compilers – Grouping of phases – Simple one pass compiler: overview – Syntax definition Lexical analysis: removal of white space and comments – Constants – Recognizing identifiers and keywords – Lexical analysis – Role of a lexical analyzer – Input buffering –Specification of tokens – Recognition tokens.

UNIT II

Symbol tables: Symbol table entries – List data structures for symbol table – - Hash tables – Representation of scope information – Syntax Analysis: Role of parser – Context free grammar – Writing a grammar – Top down parsing – Simple bottom up parsing – Shift reducing parsing.

UNIT III

Syntax directed definition: Construction of syntax trees – Bottom up evaluation of S-Attributed definition – L-Attributed definitions – Top down translation - Type checking: Type systems – Specifications of simple type checker.

UNIT IV

Run-time environment: Source language issues – Storage organizations – Storage allocation strategies - Intermediate code generation: Intermediate languages – Declarations – Assignment statements.

UNIT V

Code generation: Issue in design of code generator – The target machine – Runtime storage management – Basic clocks and flow graphs - Code optimization: Introduction – Principle source of code optimization – Optimization of basic blocks

Text Books:

1. AHO, ULLMAN, "**COMPILERS, PRINCIPLES AND TECHNIQUES AND TOOLS",** PEARSON EDUCATION – 2001 6TH EDITION.

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CORE PRACTICAL - III

DATA MINING LAB

Objective : To get hands on experience in developing applications using data mining tool.

Practical	Practical List
Exercise 1	Preprocessing a. Datatype Conversion b. Data Transformation
Exercise 2	Filters- **Practical** a. Replace Missing Values b. Add Expression
.	Feature Selection Select Attributes- **Practical** a. Filter b. Wrapper c. Dimensionality Reduction
Exercise 4	Supervised Technique Classifier - Function - **Practical** a. Multilayer Perceptron Tree - **Practical**J48
Exercise 5	Classifier- Bayes –**Practical** a. Naive Bayes Rule- **Practical** b. ZeroR
Exercise 6	Unsupervised Techniques Clustering- Theory Partitioned – Algorithm – Practical Hierarchical Algorithm – Practical Semi Supervised Algorithm – Practical
Exercise 7	Association Rule Mining A-Priori –Algorithm –Practical Predictive A-Priori –Practical
Exercise 8	Experimenter Dataset – Test – Practical Algorithm based –Test –Practical
Exercise 9	Knowledge Flow Feature Selection – Practical Clustering –Practical
Exercise 10	Knowledge Flow Classification – Practical

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CORE COURSE IX

CLOUD COMPUTING

Objective:

To provide understanding on concepts & technologies associated with Cloud Computing.

UNIT I FOUNDATIONS : Introduction to Cloud Computing :

Cloud Computing in a Nutshell – Roots of Cloud Computing – Layers and types of Clouds – Desired features of a Cloud – Cloud Infrastructure Management – Challenges and Risks – Migrating into a Cloud: - Introduction – Broad Approaches – The Seven step model – Enriching the 'Integration as a Services' Paradigm for the Cloud Era: - Introduction – The Evolution of SaaS – The Challenges of SaaS Paradigm – Approaching the SaaS Integration Enigma – New Integration Scenarios – The Integration Methodologies – SaaS Integration Services – The Enterprise Cloud Computing Paradigm: - Introduction – Background – Issues – Transition Challenges – The Cloud Supply Chain.

UNIT II INFRASTRUCTURE AS A SERVICE : Virtual Machine Provisioning and Migration Services:

Introduction – Background – Manageability – Migration Services – Management of Virtual Machines for Cloud Infrastructures: - Anatomy of Cloud Infrastructures – Distributed Management of Virtual Infrastructures – Scheduling techniques for Advance Reservation of Capacity – Enhancing Cloud Computing Environments Using a Cluster as a Service: - Introduction – Related Work – RVWS Design – The Logical Design – Secure Distributed Data Storage in Cloud Computing: - Introduction – Cloud Storage from LANs to WANs – Technologies for Data Security – Challenges.

UNIT III PLATFORM AND SOFTWARE AS SERVICE (PAAS/IAAS) Aneka Integration of Private and Public Clouds :

Introduction– Technologies and Tools – Aneka Cloud Platform - Aneka Resource Provisioning Service – Hybrid Cloud Implementation – CometCloud: An Autonomic Cloud Engine: - Introduction – CometCloud – Architecture – Autonomic Behavior of CometCloud – Overview of CometCloud-based Applications – Implementation and Evaluation

UNIT IV PLATFORM AND SOFTWARE AS SERVICE (PAAS/IAAS) TSystems Cloud-based Solutions for Business Applications:

Introduction – Enterprise Demand of Cloud Computing – Dynamic ICT Service – Importance of Quality and Security in Clouds – Dynamic Data CentreProducing Business-ready; Dynamic ICT Services – The MapReduce Programming Model and Implementations: - Introduction – MapReduce Programming Model – MapReduce implementations for the Cloud.

UNIT V MONITORING AND MANAGEMENT: An Architecture for Federated Cloud Computing

Introduction – A typical Usecase – The Basic Principles of Cloud Computing – A Federated Cloud Computing Model – Security Considerations – Service Providers Perspective of SLA Management in Cloud Computing: - Traditional Approaches to SLO Management – Types of SLA – Life Cycle of SLA – SLA Management in Cloud –Automated Policy-based Management – Performance Prediction for HPC on Clouds: - Introduction – Background – Grid and Cloud – Performance related issues of HPC in the Cloud.

Text Book:

Rajkumar Buyya, James Broberg, Andrzej Goscinsky, "Cloud Computing Principles and Paradigms", Wiley India Pvt. Ltd., 2011.

Reference Books:

1. Barrie Sosinsky, "Cloud Computing Bible", 1st Edition, Wiley India Pvt. Ltd., New Delhi, 2011.
2. Michael Miller, "Cloud Computing", 1st Edition, Pearson Education Inc., New Delhi, 2008.

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CORE COURSE X

WIRELESS SENSOR NETWORKS

Objective:

On Successful completion of the course the students should have understanding wireless sensor nodes, networks and tools.

UNIT I OVERVIEW OF WIRELESS SENSOR NETWORKS:

Challenges for Wireless Sensor Networks, Enabling Technologies For Wireless Sensor Networks.

UNIT II ARCHITECTURES :

Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

UNIT III NETWORKING SENSORS :

Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC , The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols-Energy-Efficient Routing, Geographic Routing.

UNIT IV INFRASTRUCTURE ESTABLISHMENT:

Topology Control, Clustering, Time synchronization, Localization and Positioning, Sensor Tasking and Control.

UNIT V SENSOR NETWORK PLATFORMS AND TOOLS:

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

TEXT BOOKS

1. Holger Karl & Andreas Willig, “Protocols And Architectures for Wireless Sensor Networks" , John Wiley, 2005.
2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

REFERENCES

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks-Technology, Protocols, And Applications”, John Wiley, 2007.
2. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.

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CORE PRACTICAL IV

OPEN SOURCE LAB

Objectives:

To provide fundamental concept of Internet, JavaScript, XML, JSP, ASP with a view to developing professional software development skills.

1. Write a server side PHP program that displays marks, total, grade of a student in tabular format by accepting user inputs for name, number and marks from a HTML form.
2. Write a PHP program that adds products that are selected from a web page to a shopping cart.
3. Write a PHP program to access the data stored in a mysql table.
4. Write a PHP program interface to create a database and to insert a table into it.
   i). Write a PHP program using classes to create a table.
   ii). Write a PHP program to upload a file to the server.

5. Write a PHP program to create a directory, and to read contents from the directory.
6. Write a shell program to find the details of an user session.
7. Write a shell program to change the extension of a given file.
8. Create a mysql table and execute queries to read, add, remove and modify a record from that table.

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Project Work

Objective:

The student can get the knowledge to prepare the document , to implement tools for the specific problem and learn the industrial need programs for their placement .

PROJECT WORK

SL	Area of Work	Maximum marks
1.	PROJECT WORK: (i) Plan of the Project	20
	(ii) Execution of the plan / Collection of data /Organization of materials/ Fabrication Experimental study / Hypothesis, Testing etc., and Presentation of the report.	45
	(iii) Individual Initiative	15
2.	VIVA VOCE EXAMINATION	20
	TOTAL	100

Note : PASSING MINIMUM – 50 MARKS

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ELECTIVE COURSE I

1.1 MOBILE COMMUNICATION

Objective :

On successful completion of this subject, the students should have understood Wireless networks WAP architecture

Unit I

Introduction: Applications-Mobile and Wireless Devices – Simplified Reference Model – Need for Mobile Computing – Wireless Transmission – Multiplexing – Spread Spectrum and cellular systems – Medium Access Control – Comparisons

Unit II

Telecommunications System: Telecommunication System– GSM – Architecture – Protocols – Hand over - Security – UMTS and IMT 2000 – UMTS System Architecture-UTRAN-Core Network-Handover- Satellite System

Unit III

Wireless LAN : IEEE S02.11 –System Architecture- Protocol Architecture-Medium Access Control Layer-MAC Frame-MAC Management—Roaming-Bluetooth:Architecture-Link Manager Protocol- Security -and Link Management.

Unit IV

Mobile IP: Goals – Packet Delivery – Strategies – Registration – Tunneling and Reverse Tunneling – Adhoc Networks – Routing Strategies

Unit V

WIRELESS APPLICATION PROTOCOL: Wireless ApplicationProtocol (WAP) – Architecture – XML – WML Script – Applications

Text Books

1. J.Schiller, Mobile Communication, Addison Wesley, 2000.

References

1. William C.Y.Lee, Mobile Communication Design Fundamentals, John Wiley, 1993.
2. William Stallings, Wireless Communication and Networks, Pearson Education, 2003.
3. Singhal, WAP-Wireless Application Protocol, Pearson Education, 2003.

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ELECTIVE COURSE I

1.2 WEB SERVICES

OBJECTIVES:

On successful completion of this subject student should have: understood how to build real world application using web services

Unit I

Introduction-What are web services-SOAP-WSDL-UDDI Basic web services standards, technologies and concepts: XML fundamentals: Documents-Namespaces-schema-processing XML-Simple API for XML(SAX)-Document object model(DOM)

Unit II

SOAP and WSDL: The SOAP model-SOAP messages-SOAP encoding WSDL: Structure-The types element-Managing WSDL descriptions-Using SOAP and WSDL Service implementation and Invoking web services.

Unit III

UDDI: Introduction- UDDI specification - UDDI and lifecycle management. Conversation: Overview-web services conversation language-WSCL interface components.

Workflow: Business process management-workflows and workflow management. Quality of Service: What is QoS- Why is QoS important for web services- QoS metrics for web services-QoS enabled web services. Mobile and Wireless mobile services- challenges with mobile.

Unit IV XML and HTML:

The limits of HTML-The scope of HTML-Structure-Structure and Content-Structure and Synthesis-Structure and Presentation-Representing Structure. **The XML Language**: Markup languages-Defining Markup Languages in XML.

Unit V Linking in XML:

Links(Information, Resources, and Hot Spots)-Link Management-Working with names-Choosing the linking methodology. **XML Style**: The publishing Process-At which stage do I structure my data?-Where do I process from one stage to the next?-When do I Convert?-Publishing data-Choosing a Client-side processing Application-Choosing a Server-side processing application

Text Book:

1. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services: An Architects Guide", Prentice Hall, Nov 2003
   Unit I : Chapter 1 (Pg. 1 to 8), Chapter 2 (Pg.19 to 64)
   Unit II : Chapter 3 (Pg. 71 to 86 , 100 – 119)
   Unit III: Chapter 4 (Pg. 121 to 122, Pg. 129 , Pg. 137 to 139), Chapter 5 (Pg. 147-166)
   Chapter 6 (Pg. 177-183), Chapter 9 (Pg. 345– 350, Pg. 364-368) Chapter 10 (Pg. 377-387)
2. Rick Darnell "HTML 4 Unleashed" Techmedia Publication, Second Edition,
   Unit IV: Chapter 27 (Pg. 564-591), Chapter 28 (Pg. 606-626)
   Unit V: Chapter 29 (Pg. 636-649,660-661) Chapter 30 (Pg. 664-670,672-674)

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ELECTIVE COURSE I

1.3 HUMAN COMPUTER INTERACTION

Objective:

To impart knowledge related to the various concepts, methods of Human Computer Interaction techniques with design basics, design rules and evaluation techniques

Unit I The Interaction

Introduction – Models of interaction – Frameworks and HCI Ergonomics – Interaction styles – Elements of the WIMP interface – Interactivity – The context of the interactions. Paradigms : Introduction – Paradigms for interaction.

Unit II Interaction, Design basics

Introduction – What is design? – User focus – Scenarios – Navigation design – Screen design and layout – Interaction and prototyping. HCL in the Software Process : Introduction – The software lifecycle – Usability engineering – interactive design and prototyping – Design rationate.

Unit III Design Rules

Introduction – Principles to support usability – Standards – Guidelines – Golden rules and heuristics – HCI patterns. Implementation Support : Introduction – Elements of windowing systems – Programming the application Using toolkits – User interface management systems.

Unit IV Evaluation Techniques

What is evaluation – Goals of evaluation – Evaluation through expert analysis – Evaluation through user participation – Choosing an evaluation method. Universal Design : Introduction – Universal design principles – Multi-modal interaction – Designing for diversity – Summary.

Unit V User Support

Introduction Requirements of user support – Approaches to; user support – Adaptive help systems designing user support systems.

Text Book :

1. Human - Computer Interaction, Third Edition, “Alan Dix, Janet Finlay, Gregory D. Abowd and Russell Beale”, Pearson Education, 2004.

Reference Book :

1. Human – Computer Interaction in the New Millennium, “John C. Carroll”, Pearson Education” 2002.

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ELECTIVE COURSE II

2.1: EMBEDDED SYSTEMS

Objectives:

To provide fundamental concept of Embedded systems and real time operating systems.

UNIT I

Introduction to Embedded systems – processor in the system – software embedded into a system – structural units in a processor – processor, memory selection, Memory devices - Allocation of memory to program segments and blocks and memory map of a system.

UNIT II

Device drivers – Interrupt servicing mechanisms – context and periods for context switching - Programming concepts and Embedded programming in C and C++: Software programming in ALP and in high level language 'C' – 'C' program elements: Header source files and preprocessor directives – Macros and functions: Data types – data structures – modifiers – statements – loops and pointers – Embedded programming in C++ and Java.

UNIT III

Program modeling concepts in single and multiprocessor systems – software – development process: modeling process for software analysis – programming model for event controlled or response time constrained real time program- modeling of multiprocessor systems. Multiple processes – sharing data by multiple tasks and routines – inter process communications.

UNIT IV

Real time operating systems: OS services – IO sub systems – Real time and embedded operating systems – Interrupt routines in RTOS environment – RTOS task scheduling models, Interrupt latency and response times of the task as performance metrics – performance metrics in scheduling models.

UNIT V

Hardware Software code design: Embedded system project management – Embedded system design and Co-design Issues – Design Cycle – uses of target system – use of software tools for development – use of scopes and logic analysers for system hardware tests – issues in embedded system design.

Text Books:

1. Embedded systems – Architecture, Programming and Design By Raj Kamal – TMH, 2007.

REFERENCE:

1. Mohamed Ali Maszidi & Janice Gillispie Maszidi, "The 8051 Microcontroller and Embedded System", Pearson Publishers

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ELECTIVE COURSE II

2.2 ARTIFICIAL INTELLIGENCE

Objective:

On Successful completion of the course the students should have: understood the AI & Expert Systems.- Learnt the Heuristic techniques and reasoning

UNIT I

Introduction: AI Problems - Al techniques - Criteria for success. Problems, Problem Spaces, Search: State space search - Production Systems

UNIT II

Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First - Means-end analysis. Knowledge representation issues: Representations and mappings -Approaches to Knowledge representations -Issues in Knowledge representations - Frame Problem.

UNIT III

Using Predicate logic: Representing simple facts in logic - Representing Instance and Is a relationships - Computable functions and predicates - Resolution.

UNIT IV

Representing knowledge using rules: Procedural Vs Declarative knowledge – Logic programming - Forward Vs Backward reasoning - Matching - Control knowledge.

UNIT V

Game playing – The minimax search procedure – Expert System - Perception and Action

TEXT BOOKS

1. Elaine Rich and Kevin Knight," Artificial Intelligence", Tata McGraw Hill Publishers company Pvt Ltd, Second Edition, 1991.
   Unit1: Chapter 1(1.1,1.3.1.5), Chapter 2(2.1,2.2)
   Unit2: Chapter 3(3.1,3.2,3.3,3.6), Chapter 4(4.1,4.2,4.3,4.4).
   Unit3: Chapter 5(5.1,5.2,5.3,5.4).
   Unit4: Chapter 6.
   Unit5: Chapter 12(12.1,12.2),Chapter 20 and Chapter 21.

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ELECTIVE COURSE II

2.3 PATTERN RECOGNITION

Objective:

1. To understand Fuzzy Pattern Classifiers and Perception.
2. To explore different classification models.
3. To study about feature extraction and structural pattern recognition.
4. To know about Supervised and unsupervised Learning.

UNIT I PATTERN CLASSIFIER

Overview of Pattern recognition – Discriminant functions – Supervised learning – Parametric estimation – Maximum Likelihood Estimation – Bayesian parameter Estimation – Problems with Bayes approach– Pattern classification by distance functions – Minimum distance pattern classifier.

UNIT II CLUSTERING :

Clustering for unsupervised learning and classification – Clustering concept – C Means algorithm – Hierarchical clustering – Graph theoretic approach to pattern Clustering – Validity of Clusters.

UINT III FEATURE EXTRACTION AND STRUCTURAL PATTERN RECOGNITION 9 KL

Transforms – Feature selection through functional approximation – Binary selection -Elements of formal grammars - Syntactic description - Stochastic grammars - Structural representation.

UNIT IV HIDDEN MARKOV MODELS AND SUPPORT VECTOR MACHINE 9

State Machines – Hidden Markov Models – Training-classification-support vector machine-Feature selection.

UNIT V RECENT ADVANCES 9

Fuzzy logic – Fuzzy Pattern Classifiers – Pattern Classification using Genetic Algorithms – Case Study Using Fuzzy Pattern Classifiers and Perception.

REFERENCES:

1. M. Narasimha Murthy and V. Susheela Devi, “Pattern Recognition”, Springer 2011.
2. S.Theodoridis and K.Koutroumbas, “Pattern Recognition”, 4th Ed., Academic Press, 2009.
3. Robert J.Schalkoff, “Pattern Recognition Statistical, Structural and Neural Approaches”, John Wiley & Sons Inc., New York, 1992.
4. C.M.Bishop, “Pattern Recognition and Machine Learning”, Springer, 2006.
5. R.O.Duda, P.E.Hart and D.G.Stork, “Pattern Classification”, John Wiley, 2001
6. Andrew Webb, “Stastical Pattern Recognition”, Arnold publishers, London, 1999.

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ELECTIVE COURSE III

3.1 PARALLEL PROCESSING

Objective:

To study the Parallel computer Architecture, theories of parallel computing, interconnection networks and applications of cost effective computer systems.

UNIT I

Introduction to Parallel Processing – Evolution of Computer Systems – Parallelism in Uniprocessor Systems – Parallel Computer Structures – Architectural Classification Schemes– Parallel Processing Applications.

UNIT II

Memory and Input-Output Subsystems – #Hierarchical Memory Structure# – Virtual Memory System – Memory Allocation and Management – Cache Memories and Management – Input-Output Subsystems.

UNIT III

Principles of Pipelining and Vector Processing – Pipelining : An Overlapped Parallelism – Instruction and Arithmetic Pipelines – Principles of Designing Pipelined Processors – Vector Processing Requirements.

UNIT IV

Vectorization and Optimization methods – Parallel Languages for Vector Processing – Design of Vectorizing Compiler – Optimization of Vector Functions – SIMD Array Processors – SIMD Interconnection Networks

UNIT V

Multiprocessors Architecture and Programming – Functional Structures – Interconnection Networks - Parallel Memory Organizations – Multiprocessor Operating Systems – Language Features to Exploit Parallelism – Multiprocessor Scheduling Strategies.

Text Book:

Kai Hwang and Faye A. Briggs,Computer Architecture and Parallel Processing,McGraw Hill International Edition, 1985. [Chapters : 1, 2, 3, 4.5.1 – 4.5.3, 5.1, 5.2, 5.4, 6.3, 7.1, 7.2.1, 7.2.2, 7.2.3, 7.3.1, 7.3.3, 7.4, 7.5.1, 8.3]

UNIT I Chapter 1 Section 1.1 – 1.5
UNIT II Chapter 2 Sections 2.1 – 2.5
UNIT III Chapter 3 Sections 3.1 – 3.4
UNIT IV Chapter 4 Sections 4.5 , Chapter 5 Sections 5.1 ,5.2 , 5.4
UNIT V Chapter 7 7.1 – 7.4, 7.5-7.5.1, Chapter 8 Sections 8.3

Books for Reference:

1. Richard Kain, Advanced Computer Architecture, PHI, 1999.
2. V. Rajaraman and C. Siva Ram Murthy, Parallel Computers, Architecture and Programming, PHI, 2000.

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ELECTIVE COURSE III

3.2 ADVANCED COMPUTER ARCHITECTURE

Objectives:

To study the advanced computer Architecture, theories of parallel computing, network properties and applications of cost effective computer systems to meet the above requirements.

UNIT I

Parallel computer models :- The state of computing - Multiprocessors and multicomputers – Multivector and SIMD computers.

UNIT II

Program and Network properties:- Conditions of parallelism – Program partitioning and scheduling – program flow mechanisms – system interconnect architectures.

UNIT III

Processors and memory hierarchy :- Advanced processor Technology – Super scalar and vector processors – Linear Pipeline Processors – Nonlinear pipeline Processors.

UNIT IV

Multiprocessors and Multicomputers:- Multiprocessor System nterconnects – Message Passing Mechanisms – SIMD Computer Organizations – The Connection Machine CM 5 – Fine-Grain Multicomputers.

UNIT V

Software for Parallel Programming:- Parallel Programming Models – Parallel Languages and Compilers – Dependence Analysis of Data Arrays.

Text Book

1. Kai Hwang, “Advanced Computer Architecture “McGraw-Hill International Edn., Singapore , 1993. Chapters 1.1-1.3, 2, 4.1, 4.2, 6.2, 7.1, 7.4, 8 4, 8.5, 10.1, 10.2, 10.3

Reference Books:

1. Kai Hwang and Faye A.Briggs, “Computer Architecture and Parallel Processing”, McGraw- Hill International Editions, Singapore , 1985.
2. Michael J.Quinn, “Parallel Computing, Theory and Practice”, McGraw-Hill International Edn., Singapore , 1994.

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ELECTIVE COURSE III

3.3. PERVASIVE COMPUTING

Objective: :

On successful completion of the course the students should have: Understand the concept of web applications and WAP fundamentals. Learn the PDA.

Unit I

Pervasive Computing: Past, Present and Future - Pervasive Computing Market – m-Business – Application examples: Retail, Airline check-in and booking – Health care – Car information system – E-mail access via WAP and voice.

Unit II

Device Technology: Hardware – Human Machine Interfaces – Biometrics – Operating Systems – Java for Pervasive devices.

Unit III

Device Connectivity: Protocols – Security – Device Management - Web Application Concepts: WWW architecture – Protocols – Transcoding - Client Authentication via Internet.

Unit IV

WAP and Beyond: Components of the WAP architecture – WAP infrastructure – WAP security issues – WML – WAP push – Products – i-Mode - Voice Technology: Basics of Speech recognition- Voice Standards – Speech applications – Speech and Pervasive Computing.

Unit V

PDA: Device Categories – PDA operation Systems – Device Characteristics – Software Components - Standards – Mobile Applications - PDA Browsers - Pervasive Web Application architecture: Background – Development of Pervasive Computing web applications - Pervasive application architecture.

Text Book:

Pervasive Computing, Technology and Architecture of Mobile Internet Applications, JochenBurkhardt, Horst Henn, Stefan Hepper, Thomas Schaech & Klaus Rindtorff, Pearson Education, 2006.

Reference Book:

Fundamentals of Mobile and Pervasive Computing, Frank Adelstein, Sandeep KS Gupta, Golden Richard III, Loren Schwiebert, McGraw Hill edition, 2006.

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ELECTIVE COURSE IV

4.1 NETWORK SECURITY

Objective:

To impart knowledge related to the various concepts, methods of Network Security using cryptography basics, program security, database security, and security in networks.

Unit I

Overview-Symmetric Ciphers: Classical Encryption Techniques

Unit II

Symmetric Ciphers: Block ciphers and the Data Encryption Standards Public-key Encryption and Hash Functions: Public-Key Cryptography and RSA

Unit III

Network Security Practices: Authentication applications-Electronic Mail Security

Unit IV

Network Security Practices: IP Security-Web Security

Unit V

System Security: Intruders-Malicious Software-Firewalls

Text Book:

1. William Stallings, Cryptography and Network Security-Principles and Practices, Prentice-Hall, Third edition, 2003 **ISBN:** 8178089025

References:

1. Johannes A. Buchaman, Introduction to cryptography, Springer-Verlag 2000.
2. AtulKahate, Cryptography and Network Security, Tata McGraw Hill. 2007

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ELECTIVE COURSE IV

4.2 COMPUTER SIMULATION AND MODELING

Objective :

To impart knowledge in real time modeling process and the simulation of any system using the real time mode

Unit I :

Introduction to Simulation: When Simulation is the Appropriate Tool- When Simulation is not Appropriate- Advantages and Disadvantages of Simulation- Areas of Application- Systems and System Environment- Components of a System- Discrete and Continuous Systems- Model of aSystem- Types of Models- Discrete-Event System Simulation –Steps in a simulation study.Simulation Examples: Simulation of Queuing Systems, Simulation of Inventory Systems.

Unit II :

Simulation Software: History of Simulation Software- Selection of Simulation Software- Simulation in JAVA, Simulation in GPSS, Simulation in SSF- Simulation software – Experimentation and Statistical and analysis tools .

Unit III :

Statistical Models in Simulation: Review of Terminology and Concepts- Useful Statistical Models- Discrete Distributions- Continuous Distributions- Poisson process. Queuing models- Characteristics of queuing systems.

Unit IV :

Random-Number Generation: Properties of Random Numbers-Generation of Pseudo- Random Numbers-Techniques for Generating Random Numbers-Linear congruential Method- Random number streams -Tests for random numbers-Frequency tests - Test for Autocorrelation.Random-Variate Generation: Inverse Transform Technique-Exponential Distribution-Uniform Distribution- Weibull Distribution.

Unit V :

Input Modeling: Data Collection - Identifying the Distribution with Data- parameter estimation- goodness of fit tests. Verification and Validation of Simulation Models: Model Building, Verification, and Validation-Verification of Simulation Models-Calibration and Validation of Models.

Text Book:

1. Jerry Banks, John S. Carson, II Barry L. Nelson., *Discrete-Event System Simulation*, FourthEdition, PHI Edition, 2009.
   Unit:I :Chapter 1 Sections (1.1-1.11), Chapter 2 Sections (2.1, 2.2)
   Unit:II :Chapter 4 Sections (4.1, 4.2, 4.4-4.7)
   Unit:III :Chapter 5 Sections (5.1-5.5), Chapter 6 Sections (6.1)
   Unit:IV :Chapter 7 Sections (7.1, 7.2, 7.3.1, 7.3.3, 7.4), Chapter 8 Sections (8.1.1-8.1.3)
   Unit:V :Chapter 9 Sections (9.1-9.4), Chapter 10 Sections (10.1-10.3)

Book for Reference:

E.Winsberg, Science in the age of computer simulation, Chicago: University Press, 2010.

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ELECTIVE COURSE IV

4.3 SOFT COMPUTING

Objective:

To impart knowledge in Fuzzy Set Theory, Optimization, Neural Networks, Nero Fuzzy Modeling and Application Of Computational Intelligence

Unit I FUZZY SET THEORY :

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set – Theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

Unit II OPTIMIZATION :

Derivative based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative Free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

Unit III NEURAL NETWORKS:

Supervised Learning Neural Networks – Perceptrons – AdalineBackpropagation Multilayer perceptrons – Radial Basis Function Networks – Unsupervised Learning and Other Neural Networks – Competitive Learning Networks – Kohonen Self – Organizing Networks – Learning Vector Quantization – Hebbian Learning.

Unit IV NEURO FUZZY MODELING:

Adaptive Neuro – Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework – Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

Unit V APPLICATION OF COMPUTATIONAL INTELLIGENCE:

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

TEXT BOOK

1. J.S.R. Jang, C.T. Sun and E. Mizutani, "Neuro Fuzzy and Soft Computing", PHI, Pearson Education, 2004.

REFERENCE BOOK

1. Timothy J. Ross, "Fuzzy Logic with Engineering Application, "McGraw Hill, 1977.
2. Davis E. Goldberg, "Genetic Algorithms Search, Optimization and Machine Learning", Addision Wesley, 1989.
3. S. Rajasekaran and G.A.V. Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003. Emereo Pty Limited, July 2008.
4. Ahmar, Abbas, "Grid Computing - A Practical Guide to technology and Applications", Charles River media, 2003.

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ELECTIVE COURSE V

5.1 BIG DATA ANALYTICS

Objective:

To impart knowledge in Fundamentals, Big Data Analytics, Technologies and databases, Hadoop and Map Reduce Fundamentals

Unit I

Introduction to big data: Data, Characteristics of data and Types of digital data: Unstructured, Semi-structured and Structured, Sources of data, Working with unstructured data, Evolution and Definition of big data, Characteristics and Need of big data, Challenges of big data, Data environment versus big data environment

Unit II

Big data analytics: Overview of business intelligence, Data science and Analytics, Meaning and Characteristics of big data analytics, Need of big data analytics, Classification of analytics, Challenges to big data analytics, Importance of big data analytics, Basic terminologies in big data environment

Unit III

Big data technologies and Databases: Introduction to NoSQL, Uses, Features and Types, Need, Advantages, Disadvantages and Application of NoSQL, Overview of NewSQL, Comparing SQL, NoSQL and NewSQL, Introduction to MongoDB and its needs, Characteristics of MongoDB, Introduction of apache cassandra and its needs, Characteristics of Cassandra

Unit IV

Hadoop foundation for analytics: History, Needs, Features, Key advantage and Versions of Hadoop, Essential of Hadoop ecosystems, RDBMS versus Hadoop, Key aspects and Components of Hadoop, Hadoop architectures

Unit V

HadoopMapReduce and YARN framework: Introduction to MapReduce, Processing data with Hadoop using MapReduce, Introduction to YARN, Components, Need and Challenges of YARN, Dissecting YARN, MapReduce application, Data serialization and Working with common serialization formats, Big data serialization formats

Text Book

Seema Acharya and Subhashini Chellappan, “Big Data and Analytics”, Wiley India Pvt. Ltd., 2016

Reference Books

1. 1.“Big Data” by Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman, Wiley Publications, 2014.
2. 2.“Big Data Imperatives : Enterprise Big Data Warehouse, BI Implementations and Analytics” by Soumendra Mohanty, Madhu Jagadeesh and Harsha Srivatsa, Apress Media, Springer Science + Business Media New York, 2013
3. “Mining of Massive Datasets”, Anand Rajaraman, Jure Leskovec, Jeffery D. Ullman, Springer, July 2013.
4. “Hadoop: The definitive Guide”, Tom White, O'Reilly Media, 2010.

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ELECTIVE COURSE V

5.2 MANET

Objective:

This course aims to build concepts regarding the fundamental principles of distributed systems. The design issues and distributed operating system concepts are covered

UNIT I INTRODUCTION :

Introduction to adhoc networks – definition, characteristics features, applications. Charectristics of Wireless channel, Adhoc Mobility Models:- Indoor and out door models. Ad hoc Wireless Networks – What is an Ad Hoc Network? Heterogeneity in Mobile Devices – Wireless Sensor Networks – Traffic Profiles – Types of Ad hoc Mobile Communications – Types of Mobile Host Movements – Challenges Facing Ad hoc Mobile Networks – Ad hoc wireless Internet.

UNIT II AD HOC ROUTING PROTOCOLS :

Introduction – Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks – Classifications of Routing Protocols – Table–Driven Routing Protocols – Destination Sequenced Distance Vector (DSDV) – Wireless Routing Protocol (WRP) – Cluster Switch Gateway Routing (CSGR) – Source–Initiated On–Demand Approaches – Ad hoc On–Demand Distance Vector Routing (AODV) – Dynamic Source Routing (DSR) –Temporally Ordered Routing Algorithm (TORA) – Signal Stability Routing (SSR) –Location–Aided Routing (LAR) – Power–Aware Routing (PAR) – Zone Routing Protocol (ZRP).

UNIT III MULTICASTROUTING IN ADHOC NETWORKS :

Introduction – Issues in Designing a Multicast Routing Protocol – Operation of Multicast Routing Protocols – An Architecture Reference Model for Multicast Routing Protocols –Classifications of Multicast Routing Protocols – Tree–Based Multicast Routing Protocols– Mesh–Based Multicast Routing Protocols – Summary of Tree and Mesh based Protocols – Energy–Efficient Multicasting – Multicasting with Quality of Service Guarantees – Application – Dependent Multicast Routing – Comparisons of Multicast Routing Protocols

UNIT IV END-END DELIVERY AND SECURITY :

Transport layer : Issues in desiging- Transport layer classification, adhoc transport protocols. Security issues in adhoc networks: issues and challenges, network security attacks, secure routing protocols.

UNIT V CROSS LAYER DESIGN AND INTEGRATION OF ADHOC FOR 4G

Cross layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, Cross layer cautionary prespective. Intergration of adhoc with Mobile IP networks.

TEXT BOOKS

1. C.Siva Ram Murthy and B.S.Manoj, Ad hoc Wireless Networks Architectures and protocols, 2nd eition, Pearson Education. 2007.
2. Charles E. Perkins, Ad hoc Networking, Addison – Wesley, 2000

REFERENCES

1. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, Mobilead hoc networking, Wiley-IEEE press, 2004.
2. Mohammad Ilyas, The handbook of adhoc wireless networks, CRC press, 2002.
3. T. Camp, J. Boleng, and V. Davies “A Survey of Mobility Models for Ad Hoc Network”
4. C. K. Toh, “Ad Hoc Mobile Wireless Networks Protocols and Systems”, Prentice Hall, PTR, 2001.
5. Charles E.Perkins,”Ad Hoc Networking”, Addison Wesley, 2000

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ELECTIVE COURSE V

5.3 DIGITAL IMAGE PROCESSING

Objective:

To study the various concepts, methods and algorithms of digital image processing with image transformation, image enhancement, image restoration, image compression techniques

Unit I CONTINUOUS AND DISCRETE IMAGES AND SYSTEMS :

Light, Luminance,Brightness and Contrast, Eye, The Monochrome Vision Model, ImageProcessing Problems and Applications, Vision Camera, Digital ProcessingSystem, 2-D Sampling Theory, Aliasing, Image Quantization, Lloyd MaxQuantizer, Dither, Color Images, Linear Systems And Shift Invariance, FourierTransform, ZTransform, Matrix Theory Results, Block Matrices and KroneckerProducts.

Unit II IMAGE TRANSFORMS :

2-D orthogonal and Unitary transforms, 1-D and 2-DDFT, Cosine, Sine, Walsh, Hadamard, Haar, Slant, Karhunen-loeve, Singularvalue Decomposition transforms.

Unit III IMAGE ENHANCEMENT :

Point operations - contrast stretching, clipping andthresholding density slicing, Histogram equalization, modification andspecification, spatial operations - spatial averaging, low pass, high pass, bandpass filtering, direction smoothing, medium filtering, generalized cepstrum andhomomorphic filtering, edge enhancement using 2-D IIR and FIR filters, colorimage enhancement.

Unit IV IMAGE RESTORATION :

Image observation models, sources of degradation,inverse and Wiener filtering, geometric mean filter, non linear filters, smoothingsplines and interpolation, constrained least squares restoration.

Unit V IMAGE DATA COMPRESSION AND IMAGE RECONSTRUCTION FROM PROJECTIONS:

Image data rates, pixel coding, predictive techniques transformcoding and vector DPCM, Block truncation coding, wavelet transform coding ofimages, color image coding. Random transform, back projection operator,inverse random transform, back projection algorithm, fan beam and algebraicrestoration techniques.

Book for study :

1. Anil K. Jain, “Fundamentals of Digital Image Processing”, PHI, 1995.
2. Sid Ahmed M.A., “Image Processing”, McGraw Hill Inc, 1995.
3. Gonzalaz R. and Wintz P., “Digital Image Processing”, Addison Wesley, 2nd Ed, 1987.

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