THANTHAI HANS ROEVER COLLEGE(AUTONOMOUS), ELAMBALUR, PERAMBALUR

Master of Computer Science Course Structure under CBCS

(For the candidates admitted from the academic year 2018-2019 onwards)

Semester	Course	Course Code	Title of the Course	Ins. Hours/ Weeks	Credit	Exam Hours	CIA (Max)	ESE (Max)	Total (Max)
I	Core Course – I (CC)	18PCS1CC1	Mathematical Foundations for Computer Science	6	4	3	25	75	100
	Core Course -II (CC)	18PCS1CC2	Web Technologies	6	4	3	25	75	100
	Core Course –III(CC)	18PCS1CC3	Distributed Operating Systems	6	4	3	25	75	100
	Core Course - IV (CC)	18PCS1CC4	Mobile Communication	6	4	3	25	75	100
	Core Practical- I(CP)	18PCS1CP1	Web Technologies Lab	6	4	3	40	60	100
			Total	**30**	**20**	**-**	**-**	**-**	**500**
II	Core Course-V (CC)	18PCS2CC5	OOAD and UML	6	5	3	25	75	100
	Core Course-VI (CC)	18PCS2CC6	Distributed Computing	6	5	3	25	75	100
	Elective Course-I (EC)	18PCS2EC1:1	Wireless Sensor Networks	6	5	3	25	75	100
		18PCS2EC1:2	Artificial Intelligence						
		18PCS2EC1:3	Embedded Systems						
	Elective Course-II (EC)	18PCS2EC2:1	Design Thinking	6	5	3	25	75	100
		18PCS2EC2:2	Advanced Computer Architecture						
		18PCS2EC2:3	Pervasive Computing						
	Core Practical-II(CP)	18PCS2CP2	Distributed Computing Lab	6	4	3	40	60	100
			Total	**30**	**24**	**-**	**-**	**-**	**500**
III	Core Course-VII(CC)	18PCS3CC7	Data Mining and Ware Housing	6	5	3	25	75	100
	Core Course-VIII (CC)	18PCS3CC8	Compiler Design	6	5	3	25	75	100
	Elective Course-III (EC)	18PCS3EC3:1	Soft Computing	6	5	3	25	75	100
		18PCS3EC3:2	Computer Simulation and Modeling						
		18PCS3EC3:3	Pattern Recognition						
	Elective Course-IV (EC)	18PCS3EC4:1	Cryptography and Network Security	6	5	3	25	75	100
		18PCS3EC4:2	Graphics and Multimedia						

		18PCS3EC4:3	Human Computer Interaction						
	Core Practical- III (CP)	18PCS3CP3	Data Mining Lab	6	4	3	40	60	100
			Total	**30**	**24**	**-**	**-**	**-**	**500**
IV	Core Course- IX(CC)	16PCS4CC9	Parallel Computing	**6**	**5**	**3**	25	75	100
	Core Course- X (CC)	16PCS4CC10	Python Programming	**6**	**5**	**3**	25	75	100
	Elective Courser-V (EC)	16PCS4EC5:1	Big Data Analytics	6	4	3	25	75	100
		16PCS4EC5:2	MANET						
		16PCS4EC5:3	Digital Image Processing						
	Core Practical –IV (CP)	16PCS4CP4	Python Programming Lab	6	4	3	40	60	100
		16PCS4PW	Project	6	4	-	-	-	100
			Total	**30**	**22**	**-**	**-**	**-**	**500**
Grand Total				**120**	**90**	**-**	**-**	**-**	**2000**

List of Elective Courses (For 2018 – 2019)

Elective	Semester	Course Code	Title of the Course
Elective-I	II	18PCS2EC1:1	Wireless Sensor Networks
		18PCS2EC1:2	Artificial Intelligence
		18PCS2EC1:3	Embedded Systems
Elective-II		18PCS2EC2:1	Design Thinking
		18PCS2EC2:2	Advanced Computer Architecture
		18PCS2EC2:3	Pervasive Computing
Elective-III	III	18PCS3EC3:1	Soft Computing
		18PCS3EC3:2	Computer Simulation and Modeling
		18PCS3EC3:3	Pattern Recognition
Elective-IV		18PCS3EC4:1	Cryptography and Network Security
		18PCS3EC4:2	Graphics and Multimedia
		18PCS3EC4:3	Human Computer Interaction
Elective-V	IV	16PCS4EC5:1	Big Data Analytics
		16PCS4EC5:2	MANET
		16PCS4EC5:3	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

Note:
1. Theory Internal 25 marks External 75 marks
2. Practical Internal 40 marks External 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.

SEMESTER -I

CORE COURSE - I – MATHEMATICAL FOUNDATION FOR COMPUTER SCIENCE

Course Code: 18PCS1CC1 **Maximum Mark:100**

Hours : 6 **External Mark:75**

Credits: 4 **Internal Mark:25**

Objectives:

- To understand the knowledge about mathematical applications
- To acquire the problem solving ability in graph and testing of hypothesis

Unit I

Statement and notation: Connectives – Negative – Conjunctive – Disjunctive – Statement Formulae and Truth tables – Conditional and Bi-conditional statements – Well defined formulae – Tautologies – Contradictions – Other connectives.

Unit II

Normal forms: Disjunctive Normal forms – Conjunctive Normal forms – Principal Disjunctive and Conjunctive Normal forms - Ordering and uniqueness of Normal forms.

Unit III

Assignment problem and its solution by Hungarian method - Project Scheduling by PERT –CPM

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.

Unit V

Graph - Directed and undirected graphs – Sub graphs - Chains, Circuits, Paths, Cycles -Connectivity - Relations to partial ordering - adjacency and incidence matrices

Text Book(s):

1. J.P. Tremblay and R. Manohar, “Discrete mathematical Structures with applications to computer science”, Tata McGraw Hill, Thirty-ninth reprint, 2011. (Unit-1 & Unit-2)
2. KantiSwarup, P.K.Gupta and Man Mohan, "Operations Research", 16th Edition, Sultan Chand &Sons, New Delhi. (Unit-3)
3. Gupta,S.C. and V.K.Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand &Sons, New Delhi, 8th Edition, 2002.(Unit-4)
4. NarsinghDeo, “Graph Theory with applications to Engineering and Computer Science”, Prentice hall. (Unit-5)

Reference Book(s):

1. Seymour Lipschutz and Marc LarisLipson,"Discrete Mathematics", Second Edition, Schuam's Outlines by Tata McGraw- Hill publishing Company Limited, NewDelhi 1999.
2. Erwin Kryszig,"Introductory Mathematical Statistics", John Wiley & Sons, New York, 1990.

SEMESTER – I

CORE COURSE II - WEB TECHNOLOGIES

Course Code: 18PCS1CC2 **Maximum Mark:100**

Hours : 6 **External Mark:75**

Credits: 4 **Internal Mark:25**

Objectives:

- To know the fundamentals of web technology
- To understand the protocols and web servers
- To learn the client and server side scripting

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 Book(s)

1. Ivan Bayross, "Web Enabled Commercial Application Development Using HTML, DHTML, JavaScript, Perl CGI", BPB Publication,2005(**UNIT I & II)**
2. Elliotte Rusty Harold, "XML Bible", 2nd Edition, Wrox Publication,2001(**UNIT III)**
3. Vivek Chopra, Sing Li, Rupert Jones, Jon Eaves, John T. Bell, "Beginning Java Server Pages", Wrox Publications, 2005. (**UNIT IV)**
4. Ivan Bayross ,"Practical ASP", BPB Publication,2008.(**UNIT V)**

Reference Book(s)

1. Ivan Bayross," Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP", 4th Edition,2009
2. XML and JavaScript, ASP- www.w3schools.com
3. Duane K.Fields and Mark A.Kolb," Web Development with JavaServer Pages", 2nd Edition,2000

SEMESTER - I

CORE COURSE III – DISTRIBUTED OPERATING SYSTEMS

Course Code: 18PCS1CC3 **Maximum Mark:100**

Hours : 6 **External Mark:75**

Credits: 4 **Internal Mark:25**

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(s)

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

Reference Book(s)

1. Andrew S Tanenbaum , “Distributed Operating Systems”, First Edition, PHI.2002
2. George Coulouris, Jean Dollimore, and Tim Kindberg,”Distributed Systems: Concepts and Design”, 5th Edition,1988
3. Doreen L.Galli, “Distributed Operating Systems: Concepts and Practice”, 2000

SEMESTER - I

CORE COURSE IV - MOBILE COMMUNICATION

Course Code: 18PCS1CC4 **Maximum Mark:100**

Hours : 6 **External Mark:75**

Credits: 4 **Internal Mark:25**

Objectives:

- To know the basic concepts of wireless communications
- To learn the different architecture in the wireless medium
- To analyse the various broadcasting systems

Unit I

Introduction: Applications – History of wireless communication – Simplified Reference Model – Wireless Transmission: Frequencies for Radio transmission – Signals - Multiplexing – Spread Spectrum and cellular systems –

Unit II

Medium Access Control: SDMA- FDMA- TDMA – CDMA – Comparisons - Telecommunications System: GSM –DECT – UMTS and IMT 2000.

Unit III

Satellite System: Application – Basics – Routing – Localization - Handover - Wireless LAN: IEEE S02.11 – Hiper LAN – Bluetooth.

Unit IV

Mobile Network Layer: Mobile IP –Dynamic host configuration Protocol – Mobile ad-hoc networks.

Unit V

Mobility: World Wide Web - Wireless Application Protocol (version1.x) – WAP 2.0.

Text Book(s)

1. Jochen Schiller, "Mobile Communication", Pearson Education, Delhi, 2000.
   Unit I(Chapter 1,2), Unit II(Chapter 3,4), Unit III(Chapter 5,7), Unit IV(Chapter 9),
   Unit V (Chapter 11)

Reference Book(s)

1. David Tse, Pramod Viswanath, "Fundamentals of Wireless Communication", Cambridge University Press, 2005.
2. Sandeep Singhal,"The Wireless Application Protocol: Writing Applications for the Mobile Internet", Paperback, 2002.
3. Rappaport, "Wireless Communication: Principles and Practice", Second Edition Paperback, 2010.

SEMESTER - I

CORE PRACTICAL I – WEB TECHNOLOGIES LAB

Course Code: 18PCS1CP1 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 4 **Internal Mark: 25**

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.

SEMESTER - II

CORE COURSE V–OOAD & UML

Course Code: 18PCS2CC5 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 5 **Internal Mark: 25**

Objectives:

- To understand the structure approach in structure construction
- To learn various behaviours, structures and methods in UML
- To analyse the different design methodologies adopted in UML

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: Behavioural models – Structural models – Architectural models from real world problems.

Text Book(s):

1. Bahrami Ali, "Object oriented systems development", Irwin McGraw-Hill, 2005 (Unit I,II,III,& IV)
2. Booch Grady, Rumbaugh James, Jacobson Ivar, "The Unified modelling language – User Guide", Pearson education, 2006 (Unit V)

Reference Book(s)

1. Gandharba Swain, "Object-Oriented Analysis and Design Through Unified Modeling Language", Laxmi Publications, Ltd., 2010
2. Grady Booch Robert A. Maksimchuk Michael W. Engle Bobbi J. Young, Ph.D. Jim Conallen Kelli A. Houston, "Object-Oriented Analysis and Design with Applications " ,Third Edition , 2007
3. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, "Design Patterns: Elements of Reusable Object Oriented software", First Edition,1995.

SEMESTER - II

CORE COURSE VI–DISTRIBUTED COMPUTING

Course Code: 18PCS2CC6 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 5 **Internal Mark: 25**

Objectives:

- To understand the principles of distributed computing
- To illustrate the distributed system architecture
- To analyze the issues of distributed technologies

Unit I

Introduction to Distributed System: Goals, Hardware concepts, Software concepts, and Client-Server model. Examples of distributed systems

Unit II

Communication: Layered protocols, Remote procedures call, Remote object invocation, Message-oriented communication, Stream-oriented communication.

Unit III

Processes: Threads, Clients, Servers, Code Migration, Software agent. Naming: Naming entities, locating mobile entities, removing un-referenced entities- Distributed File System: Sun network file system, CODA files system

Unit IV

Synchronization: Clock synchronization, Logical clocks, Global state, Election algorithms, Mutual exclusion, Distributed transactions. Consistency and Replication: Introduction, Data centric consistency models, Client centric consistency models, Distribution protocols, Consistency protocols

Unit V

Fault Tolerance: Induction, Process resilience, Reliable client server Communication, Reliable group communication. Distributed commit, Recovery. Security: Introduction, Secure channels, Access control, Security management.

Case Study: CORBA, Distributed COM, Globe, Comparison of CORBA, DCOM, and Globe.

Text Book(s):

1. Taunenbaum, “Distributed Systems: Principles and Paradigms”,2006

Reference Book(s):

1. M. Singhal, N. Shivaratri, “Advanced Concepts in Operating Systems”, TMH.
2. Carlos A.Varela, Gul Agha, “ Programming Distributed Computing Systems : A Foundational (The MIT Press) Hardcover”, 2013
3. Ajay D.Kshemkalyani, Mukesh Singhal,” Distributed Computing: Principles, Algorithms and Systems”, Cambridge University Press, 2011

SEMESTER - II

ELECTIVE COURSE I (1) –WIRELESS SENSOR NETWORKS

Course Code: 18PCS2EC1:1 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 5 **Internal Mark: 25**

Objectives:

- To understand the basic technologies and supporting protocols of WSN
- To learn the key routing and design issues
- To illustrate various tools and platforms of WSN

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 Book(s)

1. Holger Karl & Andreas Willig, “Protocols and Architectures for Wireless Sensor Networks", John Wiley, 2005.Unit I(Chapter 1), Unit II(Chapter 2,3), Unit III(Chapter 4,5,7)
2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007 Unit IV (Chapter 4,5), Unit V(Chapter 7)

Reference Book(s)

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks-Technology, Protocols, and Applications”, John Wiley, 2007.
2. Anna Hac, John Wiley “Wireless Sensor Network Designs”, 2003.
3. Christian Poellabauer and waltenegus Dargie,” Fundamentals of Wireless Sensor Networks: Theory and Practice”, First Edition,2010

SEMESTER - II

ELECTIVE COURSE I (2) –ARTIFICIAL INTELLIGENCE

Course Code: 18PCS2EC1:2 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 5 **Internal Mark: 25**

Objectives:

- To understand basics of the AI & Expert Systems.
- To Learn 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 Book(s)

1. Elaine Rich and Kevin Knight," Artificial Intelligence", Tata McGraw Hill Publishers Company Pvt Ltd, Second Edition, 1991.
   Unit1: Chapter 1, 2, Unit2: Chapter 3, 4, Unit3: Chapter 5,Unit4: Chapter 6,Unit5: Chapter 12, 20 ,21.

Reference Book(s)

1. S Russell, P Norvig, ”Artificial Intelligence : Pearson New International Edition: A Modern Approach”, Third Edition, 2013
2. Saroj Kaushik,” Artificial Intelligence”, Cengage Learning India, 2012
3. S S V Chandra, S Anand Hareendran ” Artificial Intelligence and Machine Learning”,2014

SEMESTER - II

ELECTIVE COURSE I (3) – EMBEDDED SYSTEMS

Course Code: 18PCS2EC1:3 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 5 **Internal Mark: 25**

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 Book(s):

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

Reference Book(s):

1. Mohamed Ali Maszidi & Janice Gillispie Maszidi, "The 8051 Microcontroller and Embedded System", Pearson Publishers
2. A.P.Godse, A.O. Mulani,"Embedded Systems", Technical Publications, 2009
3. Philip Koopman," Better Embedded System Software", Drumnadrochit Education, 2010.

SEMESTER - II

ELECTIVE COURSE II (1) – DESIGN THINKING

Course Code: 18PCS2EC2:1 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 5 **Internal Mark: 25**

Objectives:

- To develop a creative thinking skill among students
- To gain deep insights about users of the product and reframe problems
- To generate alternative approaches and to finalize for solving the problem

Unit I

Design Thinking – Solving the correct Problem – The Double-Diamond Model of Design – The Human – Centered Design Process – what I Just Told You? It Doesn't Really Work – That Way – The Design Challenge – Complexity Is Good; It is Confusion – That Is Bad – Standardization and Technology – Deliberately Making Things Difficult – Design: Developing Technology for People.

Unit II

Explore: STEEP Analysis – Strategic Priorities – Activity System – Stakeholder Mapping – Opportunity Framing – Empathise: Observations – Need Finding – User Personas.

Unit III

Experiment: Ideation – Prototyping – Engage: Storyboarding – Co-creation – Idea Refinement – Evolve: Concept Synthesis – Strategic Requirement – Evolved Activity Systems – Quick Wins.

Unit IV

Refinement – Thinking in images – Thinking in signs – Appropriation – Humour – Personification – Visual metaphors – Modification – Thinking in words- Words and language – Type'faces'- Thinking in shapes – Thinking in proportions – Thinking in colour

Unit V

Design Thinking for Communication Professional – Make it Collaborative – Human- Structured – Real(ish) – Visual & Engaging – Triangle & Performative

Text Book & References:

1. The Design of Everyday Things, Revised and Expanded Edition, 2013 by Don Norman(Unit 1: 217-257)
2. Design Thinking the Guide Book(Unit2: 1-36, Unit3:37-74)
3. Design Thinking by Gavin Ambrose and Paul Harris, 2010(Unit4:82-133)
4. Design Thinking for communication Professional, PWR new media(Unit5:1-14)

SEMESTER - II

ELECTIVE COURSE II (2) - ADVANCED COMPUTER ARCHITECTURE

Course Code: 18PCS2EC2:2 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 5 **Internal Mark: 25**

Objectives:

- To understand advanced computer Architecture,
- To define theories of parallel computing, network properties
- To solve problems for cost effective computer systems to meet the 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 Multicomputer: Multiprocessor System interconnects – Message Passing Mechanisms – SIMD Computer Organizations – The Connection Machine CM 5 – Fine-Grain Multicomputer.

Unit V

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

Text Book(s)

1. Kai Hwang, "Advanced Computer Architecture ",McGraw-Hill International Edn., Singapore, 1993 Unit I (Chapter 1, 1.1-1.3), Unit II (Chapter 2, 4.1, 4.2), Unit III(Chapter 6, 6.2, 7.1), Unit IV(Chapter 7, 7.4, 8 4, 8.5), Unit V(Chapter 10, 10.1, 10.2, 10.3)

Reference Book(s):

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.
3. S S Jadhav, "Advanced Computer Architecture and Computing", Second Edition, 2009.

SEMESTER - II

ELECTIVE COURSE II (3) –PERVASIVE COMPUTING

Course Code: 18PCS2EC2:3 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 5 **Internal Mark: 25**

Objectives:

- To understand Pervasive Computing
- To define web applications and WAP fundamentals
- To learn the PDA Characteristics.

Unit I

Pervasive Computing: Past, Present and Future - Pervasive Computing Market – mBusiness – 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(s):

1. JochenBurkhardt, Horst Henn, Stefan Hepper, Thomas Schaech & Klaus Rindtorff ,"Pervasive Computing, Technology and Architecture of Mobile Internet Applications", Pearson Education, 2006.
   Unit I(Chapter 1,2),Unit II(Chapter 3),Unit III(Chapter 4,5),Unit IV(Chapter 6,7),
   Unit V (Chapter 8, 10)

Reference Book(s):

1. Frank Adelstein, Sandeep KS Gupta, Golden Richard III, Loren Schwiebert,"Fundamentals of Mobile and Pervasive Computing", McGraw Hill, 2006.
2. Martin S.Nicklous and Lothar Merk, "Pervasive Computing: The Mobile World", Springer, 2003
3. A Genco, S Sorce, " Pervasive Systems and Ubiquitous Computing", WIT Press, 2010

SEMESTER - II

CORE PRACTICAL II – DISTRIBUTED COMPUTING LAB

Course Code: 18PCS2CP2 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 4 **Internal Mark: 25**

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.

SEMESTER - III

CORE COURSE VII - DATA MINING AND WARE HOUSING

Course Code: 18PCS3CC7 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 5 **Internal Mark: 25**

Objectives:

- To understand the basic principles, concepts of data warehousing and data mining
- To develop ability to design various algorithms based on data mining techniques.
- To learn various data mining tools to solve the real time problems.

Unit – I

Introduction: Data Mining – Data Mining Functionalities – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Database or Data Warehouse System – Major Issues in Data Mining-Data Preprocessing: Descriptive Data Summarization – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

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Unit – II

Mining Frequent Patterns, Associations, and Correlations: Basic Concepts and a Road Map – Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – From Association Mining to Correlation Analysis – Constraint-Based Association Mining.

Unit – III

Classification and Prediction: Issues Regarding Classification and Prediction – Classification by Decision Tree Induction – Bayesian Classification – Rule-Based Classification – Classification by Backpropagation – Support Vector Machines –Other Classification Methods

Unit – IV

Cluster Analysis: Cluster Analysis – Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical Methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High-Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.

Unit – V

Introduction to Data Warehousing – Multidimensional Data Model – Data Warehouse Architecture – Data Warehouse Implementation – From data warehousing to Data Mining – On Line Analytical Processing – On Line Analytical Mining- Data Cube Computation and Data Generalization

Text Book(s):

1. Han. J, Kamber. M, “Data Mining: Concepts and Techniques”, Morgan Kaufmann Publishers, Second Edition, 2006. Unit I(Chapter 1,2), Unit II(Chapter 5), Unit III(Chapter 6), Unit IV(Chapter 7), Unit V(Chapter 3,4)

Reference Book(s):

1. Michael J.A. Berry, Gordon S. Linoff, “Data Mining Techniques”, John Wiley & Sons, 1997.
2. G.K.Gupta, “Introduction to Data Mining with Case Studies”, 2009.
3. Margaret H.Dauham,” Data Mining Introductory and Advanced Topics”, Pearson Education,2005.

SEMESTER - III

CORE COURSE VIII – COMPILER DESIGN

Course Code: 18PCS3CC8 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 5 **Internal Mark: 25**

Objectives:

- To understand the basic concepts and structure of compilers
- To analyze the various parsing techniques
- To learn the basic compiler construction mechanisms

Unit-I

Introduction – Structure of a Compiler – Compiler writing tools – Basic constructs of High level programming languages – Data structures – Parameter transmission. Lexical Analysis – Role of Lexical analyzer – Finite Automata – Regular Expressions to Finite Automata – Minimizing number of states of Deterministic Finite Automaton –Implementation of Lexical analyser in C

Unit-II

Parsing Techniques – Context free Grammars – Derivations and Parse trees –Ambiguity – Capabilities of Context free grammar - Top down and Bottom up Parsing – Handles – Shift Reduce parsing – Operator precedence parsing – Recursive Descent parsing – Predictive Parsing.

Unit-III

Automatic Parsing Techniques – LR parser – Canonical Collection of LR(0) items –Construction of SLR parsing tables – LR(1) sets of items construction – Construction of canonical LR parsing tables.

Unit-IV

Syntax Directed Translation – Semantic action – Implementation of syntax directed translators – Intermediate code: Prefix notation, Quadruples, Triples, and Indirect triples –Methods of translation of assignment statements, Boolean expressions and Control statements.

Unit-V

Symbol Tables and Code Generation: Representing information in a symbol table –Data structures for symbol table – Introduction to code optimization – Basic blocks –DAG representation – Error detection and Recovery – Introduction to Code generation.

Text Book(s):

1. Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, “Compilers: Principles, Techniques, and Tools”, Pearson Education Asia, 2001. Unit I(chapter 1), Unit II(Chapter 2), Unit III(Chapter 3,4), Unit IV(Chapter 5,6,7,8), Unit V(Chapter 9,10)

Reference book(s):

1. Dhamdhere D.M., “Compiler Construction: Theory and Practice”, McMillan India Ltd., 2000.
2. Holub Allen, “Compiler Design in C”, Prentice Hall of India, 2003.
3. A A Puntambeaker, “Compiler Design”, First Edition, Technical Publications Pune, 2009.

SEMESTER - III

ELECTIVE COURSE III (1) - SOFT COMPUTING

Course Code: 18PCS3EC3:1 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 5 **Internal Mark: 25**

Objectives:

- To comprehend soft computing techniques
- To impart knowledge in Fuzzy Set Theory, Optimization, Neural Networks
- To define working principles of Nero Fuzzy Modelling 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 – Adaline Backpropagation 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(s)

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

Reference Book(s)

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.
4. Ahmar, Abbas, “Grid Computing - A Practical Guide to technology and Applications”,

SEMESTER – III

ELECTIVE COURSE III (2)-COMPUTER SIMULATION AND MODELING

Course Code: 18PCS3EC3:2 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 5 **Internal Mark: 25**

Objectives:

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 a System- 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(s):

1. Jerry Banks, John S. Carson, II Barry L. Nelson.," Discrete-Event System Simulation", Fourth Edition, PHI Edition, 2009.

Reference Book(s):

1. E.Winsberg, "Science in the age of computer simulation", Chicago: University Press, 2010.
2. Huma Shaikh, Sapna Mahaldar," Computer Simulation & Modeling", Paperback, 2011.
3. Sankar Sengupta," System Simulation and Modeling", Pearson,2013

SEMESTER - III

ELECTIVE COURSE III (3)-PATTERN RECOGNITION

Course Code: 18PCS3EC3:3 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 5 **Internal Mark: 25**

Objective:

To impart knowledge in real time Pattern recognition process and algorithms

Unit I

Introduction and Bayerian Decision Theory-Introduction to pattern recognition, Systems, design cycles, learning and adoptation, Bayerian decision theory, minimum error-rate classification, classifiers, discriminant functions and decisions surfaces.

Unit II

Maximum – Likelihood and bayerian parameter estimation - Maximum – Likelihood estimation, bayerian estimation, bayerian parameter estimation, Guarian case and general theory, problems of dimeusability, Hidden marker models.

Unit III

Nonparameter Techniques - Density estimation, parazen windows, Kn – Nearest neighbour, estimation, The nearest neghlaur, rode, metris and nearest – neghron, classification, fuzzy classification, approximation by series expansions.

Unit IV

Linear Discriminant functions - Linear discriminant functions and decision surfaces, generadized linear discrminant functions, The two category unicorly separate case, minimizing the perception criterion function, relaxation procedures, nonrepersable behaviour, Minimum squared-error procedures, The Ho – Kashyap Procedures, support vexter machines, multicategory generatization.

Unit V

Multilayer Neural Networks - Feed forward operations and classifications, back propagation algorithm, error factors, back propagation as feature & mapping, back propagation, bayer theory and probability, practical techniques for improving back propagation, regularization, complexity adjustment and pruning.

Text Book(s):

1. Richard O. Duda, Peter E. Hart and David G. Stork, “Pattern Classification”, 2nd Edition, John Wiley, 2000
2. John Hertz, Andres Krogh & Richard G. Palmer, “Introduction to the theory of Neural Computation”, Addison Wesley,1991

Reference Book(s):

1. M. Narasimha Murthy and V. Susheela Devi, “Pattern Recognition”, Springer 2011
2. S.Theodoridis and K.Koutroumbas, “Pattern Recognition”, 4th Edition , Academic Press, 2009.
3. Robert J.Schalkoff, “Pattern Recognition Statistical, Structural and Neural Approaches”, John Wiley & Sons Inc., New York, 1992

SEMESTER – III

ELECTIVE COURSE IV (1)–CRYPTOGRAPHY AND NETWORK SECURITY

Course Code: 18PCS3EC4:1 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 5 **Internal Mark: 25**

Objectives:

- To know the basic mechanisms of cryptography
- To explain the various network security applications
- To discuss Email Security, IP Security, Web Security mechanisms
- To illustrate the malicious software and firewalls

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(s):

1. William Stallings," Cryptography and Network Security-Principles and Practices", Prentice-Hall, Third Edition, 2003
   Unit I(Chapter 1,2), Unit II(Chapter 3,9), Unit III(Chapter 14,15), Unit IV(Chapter 16, 17), Unit V(Chapter 18,19,20).

Reference Book(s):

1. Johannes A. Buchaman," Introduction to cryptography", Springer-Verlag, 2000.
2. Atul Kahate," Cryptography and Network Security", Third Edition, Tata McGraw Hill. 2013.
3. Ajay Kumar, Dr.S.Bose, "Cryptography and Network Security", Pearson, 2017

SEMESTER - III

ELECTIVE COURSE IV (2) –GRAPHICS AND MULTIMEDIA

Course Code: 18PCS3EC4:2 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 5 **Internal Mark: 25**

Objectives:

- To understand computational development of graphics with mathematics
- To provide profound knowledge of display systems, image synthesis, shape modelling of 3D applications

Unit I

Graphics: 2D Transformations – Translation – Scaling – Rotation – Other Transformation: Reflection – Shearing. Clipping: Window-to-Viewport Transmission – Clipping: Point Clipping – Line Clipping – Text Clipping. GUI and interactive Input methods – Picture Construction Techniques – Virtual Reality Environment

Unit II

3D Graphics: 3 D Transformation –Visible Surface Detection – Back Face Detection – Depth Buffer Method – Scan Line Method.

Unit III

Introduction to Multimedia : Components of multimedia – Overview of multimedia software tools – Multimedia authoring and tools: multimedia authoring – Some useful editing and authoring tools – popular file formats – color models in images – color models in video.

Unit IV

Fundamental concepts in video: Types of video signals – Analog video – digital video – Basics of digital Audio: Digitization of Sounds – MIDI – Quantization and transmission of audio.

Unit V

Digital Video and Animation: Video Capture and Playback Systems - Computer Animation. Computer and Multimedia Networks: OSI Network Layers – TCP/IP Protocols – Multiplexing Technologies: Basics of Multiplexing - Access Networks – Multimedia Network communications and Applications: Quality of Multimedia Data Transmission – Multimedia over IP.

Text book(s):

1. Ze-Nian Li, Mark S. Drew, “Fundamentals of Multimedia”, Pearson Education, 2008.
2. Donald Heam and M. Pauline Baker, “Computer Graphics in C Version”, Second Edition. Pearson Education

Reference Book(s):

1. Tom McReynold – David Blythe "Advanced Graphics Programming Using OpenGL", Elsevier, 2010
2. Parag havaldar and General medioni, "Multimedia Systems- Algorithms, Standards and Industry Practices", Course Technology, Cengage Learining, 2010
3. John F. Koegel Bufend, "Multimedia systems", Pearson Education, Delhi, 2002
4. Kurose and Ross, 'Computer Networks: A top down Approach' , Pearson Education, 2002

SEMESTER – III

ELECTIVE COURSE IV (3)–HUMAN COMPUTER INTERACTION

Course Code: 18PCS3EC4:3 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 5 **Internal Mark: 25**

Objectives:

- To know the HCI design basics and design rules.
- To learn the evaluation techniques in HCI
- To illustrate the various user support systems

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 rationale.

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- Designing user support systems.

Text Book(s):

1. Alan Dix, Janet Finlay, Gregory D. Abowd and Russell Beale," Human - Computer Interaction", Third Edition, ", Pearson Education, 2008. Unit I(Chapter 3,4), Unit II(Chapter 5 .6), Unit III(Chapter 7,8), Unit IV(Chapter 9,10), Unit V(Chapter 11)

Reference Book(s):

1. John C. Carroll, "Human – Computer Interaction in the New Millennium" , Pearson Education" 2002
2. Jenny Preece, Helen Sharp, Yvonne Rogers," Interaction Design: Beyond Human- Computer Interaction", Fourth Edition, 2015
3. M.G.Helander," Handbook of Human Computer Interaction", 2014

SEMESTER – III

CORE PRACTICAL III – DATA MINING LAB

Course Code: 18PCS3CP3 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 4 **Internal Mark: 25**

1. Create a dataset and demonstrate any five preprocessing techniques.
1. Create a dataset and perform any three Filter function.
2. Demonstrate the following process in the created dataset
    a. Replace Missing Values
    b. Add Expression
3. Demonstrate any three Supervised Technique Classifier function in the built-in dataset.
4. Demonstrate any three Unsupervised Technique Clusterer function in the built-in dataset
5. Demonstrate Association Rule Mining in the Build –in and User defined datasets
6. Create a dataset and demonstrate any three preprocessing techniques using Knowledge Flow
7. Create a dataset and any three Filter function using Knowledge Flow
8. Demonstrate Clustering and Classification function in the built-in dataset Using Knowledge Flow
9. Demonstrate to test the Classifier & Clusterer Function Using Experimenter

SEMESTER - IV

CORE COURSE IX- PARALLEL COMPUTING

Course Code: 18PCS4CC9 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 5 **Internal Mark: 25**

Objectives:

To introduce algorithm design for parallel computing architectures

Unit I

Parallel Computing: Scope of Parallel Computing - Implicit parallelism: Trends in microprocessor architecture – Dichotomy of parallel platforms – Physical organization of parallel platforms Communication cost in parallel machines – Routing mechanism for interconnection networks

Unit II

Principles of parallel algorithm Design – Preliminaries – Decomposition techniques – Characteristics of task and interactions – Parallel Algorithm Models

Unit III

Communication Operations: One –to – All Broadcast and All – to – One Reduction – All – to – All Broadcast and Reduction- All-to-All Personalized Communication

Unit IV

Analytical Modelling of Parallel Programs – Sources of overhead in parallel programs – Performance metrics for parallel systems – The effect of Granularity on performances – Scalability of parallel systems – Minimum execution time and minimum cost – optimal execution time – Asymptotic analysis of parallel programs

Unit V

Sorting – Issues in sorting on parallel computers – Sorting Networks – Bubble sort and its variables – Quick sort – Bucket and sample sort – Enumeration Sort – Radix Sort

Text Book(s):

1. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, ”Introduction to Parallel Computing”, Second edition, Pearson Education,2003

Reference Book(s):

1. Bchrooz Parhami, “Introduction to Parallel Processing Algorithms and Architecture”, Plenum Series, 2002
2. Zbigniew Czech,” Introduction to Parallel Computing”,2016
3. Peter Pacheco, “An Introduction to Parallel Programming”, 2011

SEMESTER – IV

CORE COURSE X – PYTHON PROGRAMMING

Course Code: 18PCS4CC10 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 5 **Internal Mark: 25**

Objectives:

- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python.

Unit I

ALGORITHMIC PROBLEM SOLVING

Introduction to Computers, Characteristics, Basic Organization of a Computer-Algorithm, building blocks of algorithms (instructions/statements, state, control flow, functions)-notation (pseudo code, flow chart, programming language)-algorithmic problem solving-simple strategies for developing algorithms (iteration, recursion).

Unit II

DATA, EXPRESSIONS, STATEMENTS

Python interpreter and interactive mode- values and types: int, float, booleans, strings and lists- variables-expressions and statements- tuple assignment- precedence of operators-comments-modules and functions function definition and use, flow of execution, parameters and arguments

Unit III

CONTROL FLOW, FUNCTIONS

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else)-Iteration: state, while, for, break, continue, pass-Fruitful functions: return values, parameters, scope: local and global, composition, recursion- Strings: string slices, immutability, string functions and methods, string module-Lists as arrays

Unit IV

COMPOUND DATA: LISTS, TUPLES, DICTIONARIES

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters-Tuples: tuple assignment, tuple as return value. Dictionaries: operations and methods-advanced list processing - list comprehension

Unit V

FILES, MODULES, PACKAGES

Files and exception: text files, reading and writing files, format operator, command line arguments, errors and exceptions, handling exceptions, Modules, packages

Text Book(s):

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', Second Edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016. (http://greenteapress.com/wp/think-python/).

Reference Book(s):

1. Anita Goel,Ajay Mittal , "Computer Fundamentals and programming in C", First Edition, Pearson India Publisher, , 2013.
2. John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press, 2013.
3. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach", Pearson India Education Services Pvt. Ltd., 2016.
4. The Python Tutorial, https://docs.python.org/2.7/tutorial/

SEMESTER - IV

ELECTIVE COURSE V (1) – BIG DATA ANALYTICS

Course Code: 18PCS4EC5:1 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 4 **Internal Mark: 25**

Objectives:

- To understand Big data
- To gain the ability to design highly scalable systems.
- To state data management techniques in handling data

Unit I:

Fundamentals of Big Data : The Evolution of Data Management – Understanding the waves of Managing Data – Defining Big Data – Building a Successful Big Data Management Architecture – Examining Big Data Types : Defining Structured Data – Defining Unstructured Data – Looking at Real Time and Non Real Time Requirements

Unit II:

Digging into Big Data Technology Components : Exploring the Big Data Stack – Redundant Physical Infrastructure – Security Infrastructure – Operational Databases – organizing data Services and Tools – Analytical Data Warehouses – Big Data Analytics – Big Data Applications-Examing the cloud and Big Data : Definig the cloud in the Context of Big Data-Understanding Cloud Deployment and Delivery Models- The Cloud as an Imperative for Big Data- Making use of the Cloud for Big Data-Providers in the Big Data Cloud Market.

Unit III

Operational Databases: RDBMS are Important in a Big Data Environment-Nonrelational Databases-Key-value Pair Databases-Document Databases-Columnar Databases-Graph Databases-Polyglot Persistence-Appliance and Big Data Warehouse: Integrating Big Data with the Traditional Data Warehouse –Big Data Analysis and the Data Warehouse –Changing the role of the Data Warehouse- Changing Deployment Models in the Big Data Era.

Unit IV

Defining Big Data Analytics: Using Big Data to get Results –Modifying Business Intelligence Products to Handle Big Data –Studying Big Data Analytics Examlbles-Big Data Analytics Solutions-Understanding Text Analytics and Big Data:Exploring Unstructured Data- Understanding Text Analytics-Analytics and Extraction Techniques-Putting Big Data to use- Text Analytics Tools for Big Data.

Unit V

Operationalzing Big Data: Making Big Data a Part of Your Operational Process - Integrating Big Data - Incorporating big data into the diagnosis of diseases - Understanding Big Data Workflows - Workload in context to the business problem - Ensuring the Validity, Veracity, and Volatility of Big Data - Security and Governance for Big Data Environments : Security in Context with Big Data - Understanding Data Protection Options - The Data Governance Challenge - Putting the Right Organizational Structure in Place - Developing a Well-Governed and Secure Big Data Environment.

Text Book(s):

1. Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman,"Big Data" ,Wiley Publications, 2014. Unit I(Chapter 1,2& 4),Unit II(Chapter 12, 13&14 (Text2)),Unit III(Chapter 17&19),Unit IV(Chapter 11 & 6),Unit V(Chapter 8, 9&10)

Reference Book(s):

1. SoumendraMohanty, MadhuJagadeesh and HarshaSrivatsa, "Big Data Imperatives : Enterprise Big Data Warehouse, BI Implementations and Analytics" , Apress Media, Springer Science + Business Media New York, 2013
2. Bart Baesens ," Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", John Wiley & Sons Publications, 2014
3. Venkat Ankam, "Big Data Analytics", Packet Publishing Ltd, 2016

SEMESTER - IV

ELECTIVE COURSE V (2) – MANET

Course Code: 18PCS4EC5:2 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 4 **Internal Mark: 25**

Objectives:

- To understand MANET
- To define principles of distributed systems
- To learn, design, issues and distributed operating system concepts

Unit I

Introduction: Introduction to adhoc networks – definition, characteristics features, applications. Characteristics of Wireless channel, Adhoc Mobility Models:- Indoor and outdoor 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

Multicast routing 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 Delivery and Security: Transport layer: Issues in designing- 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 perspective. Integration of adhoc with Mobile IP networks

Text Book(s):

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

Reference Book(s):

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”,2002
4. C. K. Toh, “Ad Hoc Mobile Wireless Networks Protocols and Systems”, Prentice Hall, PTR, 2001.

SEMESTER - IV

ELECTIVE COURSE V (3) - DIGITAL IMAGE PROCESSING

Course Code: 18PCS4EC5:3 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 4 **Internal Mark: 25**

Objectives:

- To understand Digital Image Processing concepts
- To define principles of Image Transformations
- To describe Image Data Compression and Image Reconstruction techniques

Unit I

Continuous And Discrete Images And Systems :Light, Luminance, Brightness and Contrast, Eye, The Monochrome Vision Model, Image Processing Problems and Applications, Vision Camera, Digital Processing System, 2-D Sampling Theory, Aliasing, Image Quantization, Lloyd Max Quantizer, Dither, Color Images, Linear Systems And Shift Invariance, Fourier Transform, ZTransform, Matrix Theory Results, Block Matrices and Kronecker Products.

Unit II

Image Transforms : 2-D orthogonal and Unitary transforms, 1-D and 2-D DFT, Cosine, Sine, Walsh, Hadamard, Haar, Slant, Karhunen-loeve, Singular value Decomposition transforms.

Unit III

Image Enhancement : Point operations - contrast stretching, clipping and thresholding density slicing, Histogram equalization, modification and specification, spatial operations - spatial averaging, low pass, high pass, band pass filtering, direction smoothing, medium filtering, generalized cepstrum and homomorphic filtering, edge enhancement using 2-D IIR and FIR filters, color image enhancement.

Unit IV

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

Unit V

Image Data Compression and Image Reconstruction From Projections: Image data rates, pixel coding, predictive techniques transform coding and vector DPCM, Block truncation coding, wavelet transform coding of images, color image coding. Random transform, back projection operator, inverse random transform, back projection algorithm, fan beam and algebraic restoration techniques.

Text Book(s):

1. Anil K. Jain, “Fundamentals of Digital Image Processing”, PHI, 1995.
   Unit I(Chapter 1,2,3,4), Unit II(Chapter 5), Unit III(Chapter 7),Unit IV(Chapter 8), Unit V(Chapter 10,11).
2. Sid Ahmed M.A., “Image Processing”, McGraw Hill Inc, 1995.

Reference Book(s):

1. Richard E Woods, Rafael C Gonzalaz., “Digital Image Processing”, Third Edition, 2008.
2. William. K. Pratt, “Digital Image Processing”, Wiley Interscience, Second Edition, 1991.
3. T Veerakumar, S Jayaraman, S Esakkirajan,”Digital Image Processing”, First Edition, 2009

SEMESTER – IV

CORE PRACTICAL IV- PYTHON PROGRAMMING LAB

Course Code: 18PCS4CP4 **Maximum Mark:100**

Hours : 6 **External Mark: 75**

Credits: 4 **Internal Mark: 25**

1. Write a program to compute the GCD of two numbers.
2. Write a program to find the Exponentiation (power of a number)
3. Write a program to find the maximum of a list of numbers
4. Write a program for Linear search and Binary search
5. Write a program to apply Merge sort
6. Write a program to multiply matrices
7. Write a program to take command line arguments (word count)
8. Write a program to simulate elliptical orbits in Pygame
9. Write a program to simulate bouncing ball in Pygame

SEMESTER - IV

PROJECT WORK

Course Code: 18PCS4PW

Hours : 6 **Maximum Mark:100**

Credits: 4

Objectives:

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.

S.No	**Work Description**	**Maximum Marks**
1	Dissertation	80
2	Viva voce	20
Total		100

Note: PASSING MINIMUM – 50 MARKS

I Review –December last week

- Confirmation letter from the company
- Project type & title
- Company profile
- Synopsis
- Contact number &mail_id of the external guide
- S/w selection

II Review – January3rdweek

- Data or System flow diagram
- Documentation of first three chapters
- Database design
- Input design – Forms
- Output design – Reports

III Review – February 3rdweek

- Complete coding
- Test plan with demo
- Rough documentation of the entire project

IV Review – March 1stweek

- Corrected rough draft
- Explanation of the entire project
- Execution of Implementation Work

Note:

- Attending all the review is compulsory
- PPT and necessary Documentation should be brought for each Review
- Font size in documentation has to be 12, Times New Roman, Space 1.5
- Document should be neatly aligned and justified
- No change can be made in the review marks later
- Internal mark will be submitted at the same day of review to controller section.

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