

Curriculum & Syllabus
of
M.Tech. Information Technology
(For the batch admitted in 2014-15 onwards)
R 2014



**K.S.RANGASAMY COLLEGE OF
TECHNOLOGY
TIRUCHENGODE – 637 215**

(An Autonomous Institution affiliated to Anna University Chennai and approved by AICTE New Delhi)

K.S.RangasamyCollege of Technology, Tiruchengode – 637 215

| Regulation | | R 2014 | | | | | | | | | |
|--|--|------------------------------------|----|----|------------------|--------------|---|--------------|----|----|--------|
| Department | | Information Technology | | | | | | | | | |
| Programme Code & Name | | IT: M.Tech. Information Technology | | | | | | | | | |
| Curriculum for the Programme under Autonomous Scheme | | | | | | | | | | | |
| Semester I | | | | | Semester II | | | | | | |
| Course Name | | Hours/Week | | | Credit | Course Name | | Hours / Week | | | Credit |
| | | L | T | P | | | | C | L | T | |
| THEORY | | | | | THEORY | | | | | | |
| 40 PIT 101 | Resource Management Techniques | 3 | 1 | 0 | 4 | 40 PIT 201 | Object Oriented Software Engineering | 3 | 0 | 0 | 3 |
| 40 PIT 102 | Advanced Java Technologies | 3 | 0 | 0 | 3 | 40 PIT 202 | Advanced Operating Systems | 3 | 0 | 0 | 3 |
| 40 PIT 103 | Advanced Data Structures and Algorithms | 3 | 0 | 0 | 3 | 40 PIT 203 | Wireless Mobile Networking | 3 | 0 | 0 | 3 |
| 40 PIT 104 | High Speed Networks | 3 | 0 | 0 | 3 | 40 PIT 204 | Data Mining Techniques | 3 | 0 | 0 | 3 |
| 40 PIT 105 | Information Security and Cyber Laws | 3 | 0 | 0 | 3 | 40 PIT E1* | Elective I | 3 | 0 | 0 | 3 |
| 40 PIT 106 | Advanced Database Technology | 3 | 0 | 0 | 3 | 40 PIT E2* | Elective II | 3 | 0 | 0 | 3 |
| PRACTICAL | | | | | PRACTICAL | | | | | | |
| 40 PIT 1P1 | Advanced Data Structures and Internet Programming Laboratory | 0 | 0 | 3 | 2 | 40 PIT 2P1 | Data Mining Laboratory | 0 | 0 | 3 | 2 |
| 40 PIT 1P2 | Network and Simulation Laboratory | 0 | 0 | 3 | 2 | 40 PIT 2P2 | Technical Report Preparation and Presentation | 0 | 0 | 2 | 0 |
| Total | | 18 | 01 | 06 | 23 | Total | | 18 | 00 | 05 | 20 |
| Semester III | | | | | Semester IV | | | | | | |
| THEORY | | | | | PRACTICAL | | | | | | |
| 40 PIT 301 | Cloud Computing | 3 | 0 | 0 | 3 | 40 PIT 4P1 | Project Work - Phase II | 0 | 0 | 40 | 15 |
| 40 PIT E3* | Elective III | 3 | 0 | 0 | 3 | | | | | | |
| 40 PIT E4* | Elective IV | 3 | 0 | 0 | 3 | | | | | | |
| PRACTICAL | | | | | | | | | | | |
| 40 PIT 3P1 | Project Work - Phase I | 0 | 0 | 12 | 5 | | | | | | |
| Total | | 09 | 00 | 12 | 14 | Total | | 00 | 00 | 40 | 15 |

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| Programme Code & Name | | PIT : Information Technology | | | |
| Curriculum for the Programme under Autonomous Scheme | | | | | |
| Course Name | | Hours / Week | | | Credit |
| | | L | T | P | C |
| Elective I | | | | | |
| 40 PIT E11 | Ontology and Semantic Web | 3 | 0 | 0 | 3 |
| 40 PIT E12 | Bioinformatics | 3 | 0 | 0 | 3 |
| 40 PIT E13 | Soft Computing | 3 | 0 | 0 | 3 |
| 40 PIT E14 | Big Data Analytics | 3 | 0 | 0 | 3 |
| 40 PIT E15 | XML and Web Services | 3 | 0 | 0 | 3 |
| 40 PIT E16 | Digital Image Processing | 3 | 0 | 0 | 3 |
| 40 PIT E17 | User Interface Design | 3 | 0 | 0 | 3 |
| Elective II | | | | | |
| 40 PIT E21 | Principles of Distributed Systems | 3 | 0 | 0 | 3 |
| 40 PIT E22 | Service Oriented Architecture | 3 | 0 | 0 | 3 |
| 40 PIT E23 | Information Retrieval Techniques | 3 | 0 | 0 | 3 |
| 40 PIT E24 | Mobile and Pervasive Computing | 3 | 0 | 0 | 3 |
| 40 PIT E25 | Compiler Design | 3 | 0 | 0 | 3 |
| 40 PIT E26 | Adhoc and Sensor Networks | 3 | 0 | 0 | 3 |
| 40 PIT E27 | Software Testing Methodologies | 3 | 0 | 0 | 3 |
| Elective III | | | | | |
| 40 PIT E31 | Enterprise Resource Planning | 3 | 0 | 0 | 3 |
| 40 PIT E32 | Network Routing Algorithm | 3 | 0 | 0 | 3 |
| 40 PIT E33 | Multicore Architecture | 3 | 0 | 0 | 3 |
| 40 PIT E34 | Natural Language Processing | 3 | 0 | 0 | 3 |
| 40 PIT E35 | Web Data Mining | 3 | 0 | 0 | 3 |
| 40 PIT E36 | Information Storage Management | 3 | 0 | 0 | 3 |
| 40 PIT E37 | Open Source Architecture | 3 | 0 | 0 | 3 |
| 40 PIT E38 | Cyber Security and Forensics | 3 | 0 | 0 | 3 |
| Elective IV | | | | | |
| 40 PIT E41 | C# and .Net | 3 | 0 | 0 | 3 |
| 40 PIT E42 | Hadoop Fundamentals | 3 | 0 | 0 | 3 |
| 40 PIT E43 | Information System Design | 3 | 0 | 0 | 3 |
| 40 PIT E44 | Research Methodology - Engineering and Management Studies | 3 | 0 | 0 | 3 |
| 40 PIT E45 | Fuzzy Logic and Neural Networks | 3 | 0 | 0 | 3 |
| 40 PIT E46 | Artificial Intelligence and Expert Systems | 3 | 0 | 0 | 3 |
| 40 PIT E47 | Advanced Computer Architecture | 3 | 0 | 0 | 3 |
| 40 PIT E48 | Game Theory | 3 | 0 | 0 | 3 |

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| Semester I | | | | | | | | |
| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ES | Total |
| 40 PIT 101 | RESOURCE MANAGEMENT TECHNIQUES | 3 | 1 | 0 | 4 | 50 | 50 | 100 |
| Objective(s) | Introduce the methods of Optimization Techniques - Emphasize the mathematical procedures of nonlinear programming search techniques - Introducing advance topics such as CPM, PERT and Dynamic programming- Relate the course material to research activities. | | | | | | | |
| <p>LINEAR PROGRAMMING Linear Programming: Mathematical Formulation-Simplex method-Two Phase simplex method- Big-M method-Duality - Dual Simplex method-Revised Simplex method.</p> <p>APPLICATION OF LPP & NON LINEAR PROGRAMMING Application Of LPP: Transportation problem– North-west corner rule-Least cost method-VAM (MODI method), Assignment problem- Unbalanced assignment problem – Travelling salesman problem. Non Linear Programming: Unconstrained optimization techniques- Kuhn–Tucker method, Wolfe’s method.</p> <p>INTEGER PROGRAMMING Formulation of Integer Programming problems - Gomory’s cutting plane methods, Branch and Bound Techniques</p> <p>DYNAMIC PROGRAMMING AND GAME THEORY Characteristics of Dynamic Programming, Bellman’s principle of optimality, Concepts of dynamic programming, calculus method of solution. Game Theory: Two Person zero sum Games – Games without saddle Points- Graphic Solution of 2 x n and m x 2 Games- Dominance Property .</p> <p>PERT/CPM Network Construction-computation of earliest start time, latest start time, Total, free and independent float time- Crashing-Computation of optimistic, most likely Pessimistic and expected time – problems.</p> <p style="text-align: right;">Total hours to be taught: 60</p> | | | | | | | | |
| Text book (s) : | | | | | | | | |
| 1 | Kanti Swarup, P.K.Gupta, Man Mohan “ Operations Research” Twelfth Edition Sultan Chand & Sons , New Delhi, 2004. | | | | | | | |
| 2 | Winston.W.L. “Operations Research”, Fourth Edition, Thomson – Brooks/Cole, 2003. | | | | | | | |
| 3 | Taha, H.A. “Operations Research: An Introduction”, Ninth Edition, Pearson Education Edition, Asia, New Delhi, 2002. | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1 | Robertazzi. T.G. “Computer Networks and Systems – Queuing Theory and Performance Evaluation”, Third Edition, Springer, 2002 Reprint. | | | | | | | |
| 2 | Ross. S.M., “Probability Models for Computer Science”, Academic Press, 2002. | | | | | | | |

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| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | | |
| | | L | T | P | C | CA | ES | Total | |
| 40 PIT 102 | ADVANCED JAVA TECHNOLOGIES | 3 | 0 | 0 | 3 | 50 | 50 | 100 | |
| Objective(s) | Understand the changing scenario in software development and recent advances in Object Oriented Programming. To design and develop Java Applications, applets and introduce the concepts of JSP and EJB. | | | | | | | | |
| <p>INTRODUCTION TO JAVA PROGRAMMING JAVA Features – Exception Handling– Types – Multiple catch classes – Nested Try Statements – throw – throws – finally – User defined Exception – Applets – Initialization and Termination – HTML APPLET Tag – Applet Interface – Database connection – Associating JDBC/ODBC Bridge with the Database – Statement Objects.</p> <p>SERVLET and XML Life Cycle Servlet – A Simple Servlet – the javax.servlet package – HttpServlet Request Interface – HttpServlet Response Interface – HttpServlet class. Why use XML – Design of XML document –Nesting Elements – Processing Instructions – Attributes – Creating a Document Type Definition(DTD) –CSS – XML Schema – Types of Elements – Attributes – Create an XML Schema – Examples</p> <p>AWT and SWING AWT-Windows Fundamentals – Working with Frame windows – AWT Controls – Layout Manager , SWING – Icons and Labels – Text Fields – Buttons – Combo Boxes – Tabbed Panes – Scroll Panes – Tables.</p> <p>JAVA SERVER PAGES Introduction – JSP Tags – Request String – User Sessions – Cookies – Implicit Objects – Java Scripting.</p> <p>ENTERPRISE JAVA BEAN Introduction – EJB classes – EJB Interfaces – Deployment description – Session Java Bean – Entity Java Bean – Message-Driven Bean – JAR File.</p> <p style="text-align: right;">Total hours to be taught :45</p> | | | | | | | | | |
| Reference(s) : | | | | | | | | | |
| 1 | Herbert Schildt “Java Complete Reference” Tata McGraw Hill fifth edition. | | | | | | | | |
| 2 | Jim Keogh “ J2EE The Complete Reference” Tata McGraw Hill. | | | | | | | | |
| 3 | John Zukowski “Mastering JAVA 2” BPB Publications. | | | | | | | | |
| 4 | H.M.Deitel and P.J.Deitel “Java How to program “ Sixth edition. | | | | | | | | |

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| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ES | Total |
| 40 PIT 103 | ADVANCED DATA STRUCTURES AND ALGORITHMS | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| Objective(s) | To Understand the concepts data structures, through abstract data structures including skip lists, sorted lists, stacks, queues, Tournament tree, Red-Black tree and implementations including the use of linked lists, arrays, binary search trees, M-way search trees, hash tables and adjacency matrices. Algorithm analysis and design including greedy, divide-and-conquer and backtracking algorithms and dynamic programming; shortest path, spanning tree and NP-hard and complete problems to study different algorithms techniques available to solve problems. | | | | | | | |
| <p>INTRODUCTION Skip Lists and hashing:- Dictionaries, The ADT, Linear list representation, skip list representation, hash table representation, an application- text compression. Binary trees and other trees – trees, binary trees, properties of binary trees, representation of binary trees, common binary tree operations, binary tree traversal, ADT Binary tree, the class Linked Binary Tree, Applications. Priority Queues- definitions and applications, ADT, linear lists, heaps, leftist trees, applications.</p> <p>TREES Tournament trees- winner trees and applications, ADT WinnerTree, Winner tree implementation, loser trees, applications. Binary search trees- definitions, ADT, operations and implementations, binary search trees with duplicates, indexed binary search trees, applications. Balanced search trees- AVL trees, Red-Black trees, Splay trees, B-trees.</p> <p>MULTIWAY TREES AND GRAPH Family of B-trees – B*-trees, B+-trees, prefix B+-trees, Bit-trees, R-trees, 2-4 trees, sets and maps in java, Tries.Graphs – definitions, applications and more definitions, properties, ADT graph, representation of unweighted graph, representation of weighted graph, class implementations, graph search methods, applications.</p> <p>ALGORITHM ANALYSIS Performance analysis- space complexity, time complexity. Asymptotic notation – introduction, big Oh notation, Omega notation and theta notation. Asymptotic mathematics, complexity analysis examples. Practical complexities. Performance measurement – choosing instance size, developing the test data, setting up the experiment, example. The Greedy method – optimization problem, greedy method, applications. Divide and Conquer – method, applications, solving recurrence equations, lower bounds on complexity.</p> <p>ALGORITHM DESIGN METHODS Dynamic programming, - the method, applications. Backtracking – method, applications. Branch and bound method and applications. NP-hard and NP-complete problems – concepts, Cook’s theorem, NP-hard graph problems, NP-hard scheduling problems</p> <p style="text-align: right;">Total hours to be taught:45</p> | | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1 | Sartaj Sahni, “ Data structures, algorithms and applications in Java”, University Press, 2nd edition ,2005. | | | | | | | |
| 2 | Adam Drozdek, “Data structures and algorithms in Java”, Brooks/Cole, Thomson Learning, Vikas Publishing House, 2001. | | | | | | | |
| 3 | Ellis Horowitz, Sataj Sahni, Sanguthevar Rajasekaran, “ Fundamentals of Computer Algorithms”, Galgotia Publisher, 2002. | | | | | | | |

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| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ES | Total |
| 40 PIT 104 | HIGH SPEED NETWORKS | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| Objective(s) | To highlight the features of different technologies involved in High Speed Networking and their performance. | | | | | | | |
| <p>INTRODUCTION Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL, High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel – Wireless LANs: applications, requirements – Architecture of 802.11</p> <p>INTERNET ROUTING PROTOCOLS Internet Routing Principles, Distance Vector routing: RIP, Link State Routing: OSPF, Path-Vector Protocols: BGP and IDRP, Multicast Routing: Requirements for Multicasting-Internet Group Management Protocol (IGMP)- Multicast Extensions to open shortest path First (MOSPF)- Routing Characteristics</p> <p>CONGESTION AND TRAFFIC MANAGEMENT Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control. TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management .</p> <p>INTEGRATED AND DIFFERENTIATED SERVICES Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services-QOS Parameters</p> <p>PROTOCOLS FOR QOS SUPPORT RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.</p> <p style="text-align: right;">Total hours to be taught : 45</p> | | | | | | | | |
| Text book (s) : | | | | | | | | |
| 1 | William Stallings, "High Speed Networks And Internet", Pearson Education, Second Edition, 2010. | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1 | Warland, Pravin Varaiya, "High performance communication networks", Second Edition, Jean Harcourt Asia Pvt. Ltd., , 2001. | | | | | | | |
| 2 | Irvan Pepelnjk, Jim Guichard, Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003. | | | | | | | |
| 3 | Abhijit S. Pandya, Ercan Sea, "ATM Technology for Broad Band Telecommunication Networks", CRC Press, New York, 2004. | | | | | | | |

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| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ES | Total |
| 40 PIT 105 | INFORMATION SECURITY AND CYBER LAWS | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| <p>INTRODUCTION History, What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.</p> <p>SECURITY INVESTIGATION Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues.</p> <p>SECURITY ANALYSIS AND LOGICAL DESIGN Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk, Blueprint for Security, Information Security Policy, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity</p> <p>PHYSICAL DESIGN AND IMPLEMENTATION Security Technology, IDS, Honey Pots, Honey Nets, and Padded Cell Systems, Scanning and Analysis Tools, Access Control Devices, Implementing Information Security, Project Management for Information Security, Technical Topics of Implementation, Nontechnical Aspects of Implementation.</p> <p>INFORMATION SECURITY AND CYBER CRIMES LAWS Information security & Law, IPR, Patent Law, Legal Issues in Data Mining, Blinding Security into Software Life Cycle, Introduction to Cyber Crime, Types of Cyber Crimes, Cyber Law, Need of Cyber Laws and Cyber Security, Implementation and Scope of Cyber Laws in India,</p> <p style="text-align: right;">Total hours to be taught :45</p> | | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1 | Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Thomson (Cengage) Indian 3 rd Edition 2007. | | | | | | | |
| 2 | Saurabh Sharma, "Information Security and Cyber Laws", Vikas Publishing House Pvt Ltd, First Edition 2011. | | | | | | | |
| 3 | Matt Bishop, "Computer Security Art and Science", Pearson/PHI, 2005. | | | | | | | |
| 4 | Stuart Mc Clure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGraw -Hill, 2003. | | | | | | | |
| 5 | Micki Krause, Harold F. Tipton, "Handbook of Information Security Management", Vol 1-3 CRC PressLLC, 2004. | | | | | | | |

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| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ES | Total |
| 40 PIT 106 | ADVANCED DATABASE TECHNOLOGY | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| Objective(s) | To learn the fundamentals of Relational databases and its operations, various SQL operations, and to conceptualize and depict a database system design using ER diagram, make a study of Normal forms and to have a practical knowledge about web servlets and JSP applications, know the fundamental concepts of transaction processing- concurrency control techniques and recovery procedure, to have an introductory knowledge about Distributed, Centralized and Parallel database system and also to enrich knowledge in the emerging trends of database system along with the programming aspects. | | | | | | | |
| <p>RELATIONAL DATABASES Structure of Relational Databases- Database Schema- Keys-Schema diagrams- Relational query languages- Relational Operations- Introduction to SQL- Overview of SQL query- SQL data definition- Basic structure of SQL queries- Additional Basic operations- Set operations- Null Values- Aggregate functions- Nested subqueries- Intermediate SQL- Relational Query Languages- Relational algebra- The Tuple Relational Calculus - The Domain Relational Calculus.</p> <p>DATABASE DESIGN Database design and the E-R Model-Relational database design- Normalization (1-5NF)- Application Design and Development- Application Programs and user interfaces- Web Fundamentals- Servlets and JSP- Application Architecture- Rapid Application development.</p> <p>TRANSACTION MANAGEMENT Transactions- Transaction concepts- Simple Transaction Model- Storage structure- Transaction Atomicity and Durability- Transaction Isolation- Serializability- Concurrency Control- Lock-Based protocols- Timestamp-Based protocols- Validation-Based protocols- Recovery System- Failure Classification- Storage- Recovery and Atomicity- Recovery Algorithm.</p> <p>SYSTEM ARCHITECTURE Database System Architecture- Centralized and Client-Server Architectures- Server System Architectures- Parallel Databases- Introduction-I/O parallelism- Interquery Parallelism- Intraquery Parallelism- Interoperation Parallelism- Intraoperation Parallelism- Distributed Databases- Homogeneous and Heterogeneous databases- Distributed Data Storage- Distributed Transactions- Commit protocols.</p> <p>ADVANCED TOPICS Advanced Application Development- Spatial and temporal Data and Mobility- Time in databases-Spatial and Geographic Data- Multimedia databases- Mobility and Personal Databases-Case Studies- PostgreSQL.</p> <p style="text-align: right;">Total hours to be taught : 45</p> | | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1 | Abraham Silberschatz, Henry F. Korth and S. Sudarshan - "Database System Concepts", Sixth Edition, McGraw-Hill, 2011. | | | | | | | |
| 2 | Ramez Elmasri and Shamkant B. Navathe, "Fundamentals of Database Systems", Sixth Edition, Pearson Education, 2011. | | | | | | | |
| 3 | Raghu Ramakrishnan, "Database Management System", Third Edition, Tata McGraw-Hill, 2003. | | | | | | | |

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| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | | |
| | | L | T | P | C | CA | ES | Total | |
| 40 PIT 1P1 | ADVANCED DATA STRUCTURES AND INTERNET PROGRAMMING LABORATORY | 0 | 0 | 3 | 2 | 50 | 50 | 100 | |
| Objective(s) | To demonstrate the major algorithms and data structures. To design and develop Java applications using applets, Servlet, RMI and JSP. | | | | | | | | |
| <ol style="list-style-type: none"> 1. Min/Max Heaps (Insertion, Delete min/Delete Max) 2. Binary Search Trees (Insertion, Deletion and Search) 3. AVL Trees (Insertion, Deletion and Search) 4. B-Trees (Insertion, Deletion and Search) 5. Finding Spanning Trees 6. Finding connected components of a graph 7. Depth-first and Breadth-first searches 8. Exception Handling 9. Creating an Applet. 10. Programs using Java Servlet 11. Remote Method Invocation (RMI) 12. Programs using JSP | | | | | | | | | |
| Total hours to be taught : 45 | | | | | | | | | |

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| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | | |
| | | L | T | P | C | CA | ES | Total | |
| 40 PIT 1P2 | NETWORK and SIMULATION LABORATORY | 0 | 0 | 3 | 2 | 50 | 50 | 100 | |
| Objective(s) | To Imparting the practical network knowledge to the students and also make them to carry out the networking problems. | | | | | | | | |
| <p>LIST OF EXPERIMENTS</p> <ol style="list-style-type: none"> 1. Design of Wireless LAN 2. Implementation of distance vector routing protocol(RIP) 3. Implementation of link state routing Protocol(OSPF) 4. Implementation of Multicast routing(IGMP) 5. Congestion control in TCP 6. Node configuration 7. Simulating energy model 8. Different queuing mechanisms to nodes <p style="text-align: right;">Total hours to be taught :45</p> | | | | | | | | | |

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| Semester II | | | | | | | | |
| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ES | Total |
| 40 PIT 201 | OBJECT ORIENTED SOFTWARE ENGINEERING | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| Objective(s) | To provide information about wider engineering issues that form the background to develop complex, evolving (software-intensive) systems, object-oriented analysis, familiarize UML concepts, various domain applications, implement and test the software in object oriented approach, issues in managing the software projects. | | | | | | | |
| <p>INTRODUCTION System Concepts – Software Engineering Concepts – Development Activities – Managing Software Development –Modeling with UML – Project Organization and Communication</p> <p>REQUIREMENT ELICITATION AND ANALYSIS Requirements Elicitation Concepts – Requirements Elicitation Activities – Managing Requirements Elicitation– Analysis Concepts – Analysis Activities – Managing Analysis</p> <p>SYSTEM DESIGN Decomposing the system – Overview of System Design – System Design Concepts – System Design Activities: Objects to Subsystems – System Design: Addressing Design Goals-Design Activities</p> <p>OBJECT DESIGN, IMPLEMENTATION AND TESTING Object Design Overview – Reuse Concepts –Reuse Activities – Managing Reuse – Interfaces Specification Concepts – Managing Object Design – Mapping Models to Code: Overview – Mapping Concepts – Mapping Activities –Managing Implementation – Testing</p> <p>MANAGING CHANGE Rationale Management Overview – Rationale Concepts – Rationale Activities: From Issues to Decisions – Managing Rationale – Configuration Management Overview – Configuration Management Concepts – Configuration Management Activities – Managing Configuration Management – Project Management Overview – Project Management Activities – Standard for Developing Life Cycle Process (IEEE 1074) –Software Life Cycle Models</p> <p style="text-align: right;">Total hours to be taught :45</p> | | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1 | Bernd Bruegge, Alan H Dutoit, “Object-Oriented Software Engineering”, Pearson Education,2011. | | | | | | | |
| 2 | Jacobson, Ivar & Christerson, Magnus & Jonsson, Patrik & Overgaard, Gunnar “Object Oriented Software Engineering”, Pearson Education, Delhi, 2007. | | | | | | | |
| 3 | Craig Larman, “Applying UML and Patterns”, 3 rd edition, Pearson Education, 2005. | | | | | | | |

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| | | L | T | P | C | CA | ES | Total |
| 40 PIT 202 | ADVANCED OPERATING SYSTEMS | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| Objective(s) | To recollect the fundamentals of operating systems, gain knowledge on distributed operating systems concepts and to insight on to the distributed resource management components, know the components and management aspects of real time operating systems. | | | | | | | |
| <p>OPERATING SYSTEM BASICS Overview – Synchronization Mechanisms – Process and Threads- Process Scheduling –Deadlocks: Detection – Prevention- Recovery – Models of Resources – Virtual Memory: Demand paging - Page Replacement.</p> <p>DISTRIBUTED OPERATING SYSTEM Issues in Distributed Operating System – Architecture – Communication Primitives – Lamport’s Logical clocks – Causal Ordering of Messages – Distributed Mutual Exclusion Algorithms – Centralized and Distributed Deadlock Detection Algorithms – Agreement Protocols.</p> <p>DISTRIBUTED RESOURCE MANAGEMENT Distributed File System – Design Issues - Distributed Shared Memory – Algorithms for Implementing Distributed Shared memory–Issues in Load Distributing – Scheduling Algorithms – Two-Phase Commit Protocol – Nonblocking Commit Protocol – Security and Protection.</p> <p>REAL TIME OPERATING SYSTEM (RTOS) Basic Model of Real Time Systems, RTOS Task scheduling models, Interrupt Latency and Response of the tasks as performance Metrics - Inter Process Communication And Synchronisation – Shared data problem – Use of Semaphore(s) – Priority Inversion Problem and Deadlock Situations – Inter Process Communications using Signals – Semaphore Flag or mutex as Resource key – Message Queues – Mailboxes – Pipes – Virtual (Logical) Sockets – Remote Procedure Calls (RPCs).</p> <p>CASE STUDIES Linux System: Design Principles - Kernel Modules - Process Management Scheduling – Memory Management– Inter process Communication. Windows XP: Design Principles - System Components - Process and Thread Management – Memory Management - File System. RTOS: Communication between orchestra robots.</p> <p style="text-align: right;">Total hours to be taught :45</p> | | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1 | Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, Sixth Edition, John Wiley & Sons (ASIA) Pvt. Ltd, Reprint 2011. | | | | | | | |
| 2 | Mukesh Singhal, Niranjana G Shivaratri, “Advanced Concepts in Operating Systems –Distributed Database and Multiprocessor Operating Systems”, Tata McGraw-Hill, 2001. | | | | | | | |
| 3 | Rajkamal, Embedded Systems Architecture, “Programming and Design”, Tata McGraw-Hill, Second edition,2008. | | | | | | | |
| 4 | H M Deital, P J Deital and D R Choffnes, “Operating Systems”, Pearson Education, 2004. | | | | | | | |
| 5 | Pradeep K.Sinha, “Distributed OS concepts and Design”, IEEE computer Society Press, PHI 1998. | | | | | | | |

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| Department | Information Technology | Programme Code & Name | | | PIT : Information Technology | | | | |
| Semester II | | | | | | | | | |
| Course Code | Course Name | Hours / Week | | Credit | | Maximum Marks | | | |
| | | L | T | P | C | CA | ES | Total | |
| 40 PIT 203 | WIRELESS MOBILE NETWORKING | 3 | 0 | 0 | 3 | 50 | 50 | 100 | |
| Objective(s) | To develop advanced network building skills and to study performance issues in advanced wireless and mobile networks. | | | | | | | | |
| <p>INTRODUCTION Fundamentals of wireless and mobile systems – Radio propagation mechanism – Characters of Wireless channels – Modulation and Multiple access techniques - Wireless LANS PANS - WANS and MANS – 1G,2G,3G – WATM – Mobile IP - Ad hoc Wireless Networks.</p> <p>ADHOC MAC PROTOCOLS AND ROUTING PROTOCOLS Issues in designing MAC Protocol and design goals – Classification – Contention based protocols – CATA, HRMAP, FPRP – Contention based protocols with scheduling mechanism – Issues of routing protocols – Classification – WRP, CSGR, TORA, LAR, ABR, ZRP, OLSR, HSRP, FSR, PAR.</p> <p>TRANSPORT LAYER AND SECURITY PROTOCOLS Issues in designing a transport layer protocol for ad hoc networks – Goals – Classification – TCP over ad hoc networks – Security issues in ad hoc networks – Security requirements – Attacks – Key management – Secure routing in ad hoc networks.</p> <p>QoS AND ENERGY MANAGEMENT Issues and challenges in providing the QoS in wireless networks – Classification of QoS solutions – MAC layer solutions – Network layer solutions – QoS frame work for wireless networks – Need for energy management – Energy management schemes – Battery management - Transmission power management – System power management.</p> <p>WIRELESS SENSOR NETWORKS Introduction – Application – Comparison with Adhoc Networks – Issues in designing sensor networks – Sensor network scenarios – Optimisation goals – Gateway concepts – Sensor network architecture – Data dissemination – Data gathering – MAC protocols – STEM, S-MAC, LEACH, SMACS – Location discovery</p> <p style="text-align: right;">Total hours to be taught : 45</p> | | | | | | | | | |
| Reference(s) : | | | | | | | | | |
| 1 | C. Siva Ram Murthy, B.S. Manoj, "Ad Hoc Wireless Networks – Architecture and Protocols", Pearson Education, 2006. | | | | | | | | |
| 2 | Holger Karl & Andreas Willig, " Protocols and Architectures for Wireless sensor Networks", John Wiley, 2006. | | | | | | | | |
| 3 | Karch Pahlavan, Prashant Krishnamoorthy, "Principles of Wireless Network – A unified Approach," Pearson Education, 2002. | | | | | | | | |

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| Department | Information Technology | Programme Code &Name | | | PIT : Information Technology | | | | |
| Semester II | | | | | | | | | |
| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | | |
| | | L | T | P | C | CA | ES | Total | |
| 40 PIT 204 | DATA MINING TECHNIQUES | 3 | 0 | 0 | 3 | 50 | 50 | 100 | |
| Objective(s) | To serve as an introductory course to under graduate students to learn the fundamental concepts and modern techniques for data mining, focus on the key tasks of data mining, including data preparation and of data warehousing with special emphasis on architecture and design, understand the concepts of Pattern mining, classification and evaluation, learn cluster analysis techniques, understand Applications of Data mining and cover both basic and advanced techniques for uncovering interesting data patterns hidden in large data sets. | | | | | | | | |
| <p>INTRODUCTION Introduction- Why Data Mining?, Data Mining as the Evolution of IT, Kinds of data & pattern, Technologies, Applications, Issues, Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Measuring Data Similarity and Dissimilarity.</p> <p>DATA PREPROCESSING AND DATA WAREHOUSING Data Preprocessing: Overview, Data Cleaning, Data Integration, Data Reduction, Transformation, Data Discretization, Data Warehouse: Basic Concepts, Data Warehouse Modeling, Data Warehouse Design and Usage, Data Warehouse Implementation.</p> <p>PATTERN MINING AND CLASSIFICATION Basic Concepts, Frequent Itemset Mining Methods, Pattern Evaluation Methods, Pattern Mining: A Road Map, Pattern Mining in Multilevel, Multidimensional Space. Classification: Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Bayesian Belief Networks, Classification by Backpropagation, Support Vector Machines, k-Nearest-Neighbor Classifiers.</p> <p>CLUSTERING Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density Based Methods-DBSCAN, OPTICS, Grid Based Methods- STING, CLIQUE, Evaluation of Clustering, Outlier Analysis, Outlier Detection Methods.</p> <p>ADVANCED TECHNIQUES AND TRENDS Data Mining Trends, Web Mining, Spatial Mining, Multimedia Data mining, Text mining, Mining the WWW, Data Mining Trends: Data Mining Applications, Data Mining and Society, Data Mining Trends.</p> <p style="text-align: right;">Total hours to be taught :45</p> | | | | | | | | | |
| Text book (s) : | | | | | | | | | |
| 1 | Jiawei Han, Micheline Kamber, Jian Pei, "Data Mining: Concepts and Techniques", 3rd Edition, Morgan Kaufmann Publishers, 2012. | | | | | | | | |
| Reference (s) : | | | | | | | | | |
| 1 | J. Han and M. Kamber. Data Mining: Concepts and Techniques, 2nd Ed. Morgan Kaufman. 2006. | | | | | | | | |
| 2 | David Hand, Heikki Manila, Padhraic Symth, "Principles of Data Mining", PHI 2012. | | | | | | | | |
| 3 | Margaret H.Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, 2006. | | | | | | | | |
| 4 | Alex Berson, Stephen J.Smith, "Data Warehousing, Data Mining & OLAP", McGraw-Hill Edition, 2007. | | | | | | | | |

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| Department | Information Technology | Programme Code &Name | | | PIT : Information Technology | | | |
| Semester II | | | | | | | | |
| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ES | Total |
| 40 PIT 2P1 | DATA MINING LABORATORY | 0 | 0 | 3 | 2 | 50 | 50 | 100 |
| Objective(s) | To design algorithms and abilities to synthesize, integrate, analyze and compare the features of the data mining algorithm. Use the tools for analyzing large amounts of data. | | | | | | | |
| <ol style="list-style-type: none"> 1. Implementation of K-means algorithm. 2. Implementation of Self Organizing Map algorithm. 3. Implementation of DB-SCAN algorithm. 4. Implementation of Decision tree algorithm. 5. Implementation Apriori algorithm. 6. Implementation of Bayesian classification algorithm. 7. Implementation of FP-growth algorithm. 8. Study of WEKA. 9. Study of Rapid Miner. | | | | | | | | |
| Total hours to be taught : 45 | | | | | | | | |

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| Semester II | | | | | | | | | |
| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | | |
| | | L | T | P | C | CA | ES | Total | |
| 40 PIT 2P2 | TECHNICAL REPORT PREPARATION AND PRESENTATION | 0 | 0 | 2 | 0 | 100 | 00 | 100 | |
| Objective(s) | To expose the students to refer, read and review the research articles in referred journals and conference proceedings, to Improve the technical report writing and presentation skills of the students. | | | | | | | | |
| Methodology | <ul style="list-style-type: none"> • Each student is allotted to a faculty of the department by the HOD. • By mutual discussions, the faculty guide will assign a topic in the general / subject area to the student. • The students have to refer the Journals and Conference proceedings and collect the published literature. • The student is expected to collect atleast 20 such Research Papers published in the last 5 years. • Using OHP/Power Point, the student has to make presentation for 15-20 minutes followed by 10 minutes discussion. • The student has make two presentations, one at the middle and the other near the end of the semester. • The student has to write a Technical Report for about 30-50 pages (Title page, One page Abstract, Review of Research paper under various subheadings, Concluding Remarks and List of References). The technical report has to be submitted to the HOD one week before the final presentation, after the approval of the faculty guide. | | | | | | | | |
| Execution | Week | Activity | | | | | | | |
| | I | Allotment of Faculty Guide by the HoD | | | | | | | |
| | II | Finalizing the topic with the approval of Faculty Guide | | | | | | | |
| | III-IV | Collection of Technical papers | | | | | | | |
| | V-VI | Mid semester presentation | | | | | | | |
| | VII-VIII | Report writing | | | | | | | |
| | IX | Report submission | | | | | | | |
| | X-XI | Final presentation | | | | | | | |
| Evaluation | <ul style="list-style-type: none"> ❖ 100% by Continuous Assessment ❖ 2 Hrs/week | | | | | | | | |
| | Component | | | | | Weightage | | | |
| | Mid semester presentation | | | | | 25% | | | |
| | Final presentation (Internal) | | | | | 25% | | | |
| | End Semester Examination Report | | | | | 30% | | | |
| | Presentation | | | | | 20% | | | |
| Total | | | | | 100% | | | | |

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| Department | Information Technology | Programme Code & Name | | | PIT : Information Technology | | | |
| Elective I | | | | | | | | |
| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ES | Total |
| 40 PIT E11 | ONTOLOGY AND SEMANTIC WEB | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| Objective(s) | To study about Ontology, to study languages for semantic web, to learn taxonomy for Ontology, to study Ontology tools and applications | | | | | | | |
| <p>INTRODUCTION Significance of Ontology – constructing ontologies manually – Reusing ontologies –semiautomatic ontology acquisition – ontology mapping- On-To-Knowledge Semantic Web architecture.</p> <p>FOUNDATIONS OF OUTSANTING ONTOLOGIES Main components of ontology – Types – Ontological commitments – Ontological categories – Knowledge representation ontologies – Top Level Ontologies – Linguistic ontologies – Domain ontologies.</p> <p>METHODOLOGIES AND METHODS FOR BUILDING ONTOLOGY Ontology development process – methodology evolution – development methods and methodologies – learning methods.</p> <p>ONTOLOGY LANGUAGES Selection of ontology language – traditional ontology – ontolingua and KIF – LOOM – OKBC – OCML – Flogic</p> <p>ONTOLOGY MARKUP LANGUAGES AND TOOLS Ontology markup languages – SHOE – XOL – RDF(S) – OIL – DAML+OIL – OWL – Ontology development tools and tools suites.</p> <p style="text-align: right;">Total hours to be taught : 45</p> | | | | | | | | |
| Text Book(s): | | | | | | | | |
| 1 | Asuncion Gomez-Perez, Oscar Corcho, Mariano Fernandez-Lopez “Ontological Engineering: with examples from the areas of Knowledge Management, e-Commerce and the Semantic Web” Springer, 2010. | | | | | | | |
| 2 | Grigorous Antoniou and Van Hermelen - “A Semantic Web Primer”-The MIT Press –2004. | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1 | Alexander Maedche, “Ontology Learning for the Semantic Web”, Springer; 1 st edition, 2002. | | | | | | | |
| 2 | John Davies, Dieter Fensel, Frank Van Harmelen, “Towards the Semantic Web: Ontology – Driven Knowledge Management”, John Wiley & Sons Ltd., 2003. | | | | | | | |
| 3 | John Davies (Editor), Rudi Studer (Co-Editor), Paul Warren (Co-Editor) “Semantic Web Technologies: Trends and Research in Ontology-based Systems” Wiley Publications, July 2006. | | | | | | | |
| 4 | Steffen Staab (Editor), Rudi Studer, “Handbook on Ontologies (International Handbooks on Information Systems)”, Springer 1 st edition, 2004. | | | | | | | |

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| Elective I | | | | | | | | |
| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | | C | CA | ES |
| 40 PIT E12 | BIOINFORMATICS | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| Objective(s) | To know the Central Dogma, to study database and networks, to understand data visualization, to study data mining and pattern matching. | | | | | | | |
| <p>INTRODUCTION The Central Dogma – Killer Application – Parallel Universes – Watson’s Definition – Top Down Vs Bottom Up Approach – Information Flow – Conversance – Communications.</p> <p>DATABASE AND NETWORKS Definition – Data Management – Data Life Cycle – Database Technology – Interfaces – Implementation – Networks: Communication Models – Transmission Technology – Protocols – Bandwidth – Topology – Contents – Security – Ownership – Implementation.</p> <p>SEARCH ENGINES AND DATA VISUALIZATION Search Process – Technologies – Searching And Information Theory – Computational Methods – Knowledge Management – Sequence Visualizations – Structure Visualizations – User Interfaces – Animation Vs Simulation</p> <p>STATISTICS, DATA MINING AND PATTERN MATCHING Statistical Concepts – Micro Arrays – Imperfect Data – Basics – Quantifying – Randomness – Data Analysis – Tools Selection – Alignment – Clustering – Classification – Data Mining Methods – Technology – Infrastructure Pattern Recognition – Discovery – Machine Learning – Text Mining – Pattern Matching Fundamentals – Dot Matrix Analysis – Substitution Matrix – Dynamic Programming – Word Method – Bayesian Method – Multiple Sequence Alignment Tools.</p> <p>MODELING SIMULATION AND COLLABORATION Drug Discovery Fundamentals – Protein Structure – System Biology Tools – Collaboration And Communication – Standards – Issues – Case Study.</p> <p style="text-align: right;">Total hours to be taught :45</p> | | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1 | Bryan Bergeron, “Bio Informatics Computing”, Prentice Hall, 2003. | | | | | | | |
| 2 | T.K. Affward, D.J. Parry Smith, “Introduction to Bio Informatics”, Pearson Education, 2001. | | | | | | | |
| 3 | Pierre Baldi, Soren Brunak, “Bio Informatics – The Machine Learning Approach”, 2nd Edition, First East West Press, 2003. | | | | | | | |

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| Department | Information Technology | Programme Code & Name | | | PIT : Information Technology | | | |
| Elective I | | | | | | | | |
| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ES | Total |
| 40 PIT E13 | SOFT COMPUTING | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| Objective(s) | To understand the Neural Networks and learning rules, to study feedback networks, to understand unsupervised learning networks, to learn fuzzy sets and genetic algorithms. | | | | | | | |
| <p>FEED FORWARD NETWORKS AND SUPERVISED LEARNING Fundamentals – Biological Neural Network – Artificial neuron – Activation function – Learning rules – Perceptron Networks – Adaline – Madaline – Back propagation Networks – Learning factors – Linear Separability.</p> <p>SINGLE LAYER FEEDBACK NETWORKS Hopfield Network - Discrete Hopfield networks – Associative memories – Recurrent auto association memory – Bi-directional Associative memory – Temporal associative memory – Boltzman machine.</p> <p>UNSUPERVISED LEARNING NETWORKS Hamming networks – Self-Organizing feature maps – Adaptive Resonance Theory network – Instar – Outstar model – Counter propagation network–Radial basis function networks.</p> <p>FUZZY LOGIC Crisp set – Vagueness – Uncertainty and Imprecision – Fuzziness Basic definitions – Basic set theoretic operations for fuzzy sets – Types – Operations – Properties – Crisp versus fuzzy relation – Fuzzy relation – Cardinality operations, Properties – Fuzzy Cartesian product and composition – Non interactive fuzzy sets – Tolerance and Equivalence Relations – Fuzzy ordering relations – Composition of fuzzy relations - Lambda cuts for fuzzy sets and relations – Definition – Methods</p> <p>GENETIC ALGORITHMS Introduction – Terminologies – Genetic operators – Selection, Cross-over and mutation –insertion and deletion–fitness function – creation of offspring- simple genetic algorithm – Applications.</p> <p style="text-align: right;">Total hours to be taught : 45</p> | | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1 | Simon Haykins, "Neural Networks: A Comprehensive Foundation" Pearson Education India / Prentice Hall of India, 2003. | | | | | | | |
| 2 | Laurene V.Fausett, "Fundamentals of Neural Networks: Architectures, Algorithms and Applications" Pearson Education India, 2004. | | | | | | | |
| 3 | Timothy J Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill International Edition, 2010. | | | | | | | |
| 4 | Zimmermann H.J., "Fuzzy Set Theory and its Applications", Allied Publishers, 1996. | | | | | | | |
| 5 | David E.Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Pearson Education Asia Pvt. Ltd., , 2000. | | | | | | | |
| 6 | Sivanandam S N, Sumathi S and Deepa S N, " Neural Networks using MATLAB", Tata McGraw Hill, 2005. | | | | | | | |
| 7 | Rajasekaran.S and Vijayalakshmi Pai.G.A, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2011. | | | | | | | |

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| Elective I | | | | | | | | | |
| Course Code | Course Name | Hours/Week | | | Credit | Maximum Marks | | | |
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| 40 PIT E14 | BIG DATA ANALYTICS | 3 | 0 | 0 | 3 | 50 | 50 | 100 | |
| Objective(s) | To explore the fundamental concepts of big data analytics. To learn to analyze the big data using intelligent techniques, understand the various search methods and visualization techniques, learn to use various techniques for mining data stream, and understand the applications using Map Reduce Concepts. | | | | | | | | |
| INTRODUCTION TO BIG DATA | | | | | | | | | |
| Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error. | | | | | | | | | |
| DATA ANALYSIS | | | | | | | | | |
| Regression Modeling - Multivariate Analysis – Bayesian Methods – Bayesian Paradigm - Bayesian Modeling - Inference and Bayesian Networks - Support Vector and Kernel Methods - Analysis of Time Series: Linear Systems Analysis - Nonlinear Dynamics - Rule Induction - Fuzzy Logic: Extracting Fuzzy Models from Data - Fuzzy Decision Trees. | | | | | | | | | |
| SEARCH METHODS AND VISUALIZATION | | | | | | | | | |
| Search by simulated Annealing – Stochastic, Adaptive search by Evaluation – Evaluation Strategies – Genetic Algorithm – Genetic Programming – Visualization – Classification of Visual Data Analysis Techniques – Data Types – Visualization Techniques – Interaction techniques – Specific Visual data analysis Techniques. | | | | | | | | | |
| MINING DATA STREAMS | | | | | | | | | |
| Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions. | | | | | | | | | |
| FRAMEWORKS | | | | | | | | | |
| Map Reduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed File Systems – Case Study. | | | | | | | | | |
| Total hours to be taught : 45 | | | | | | | | | |
| Reference(s): | | | | | | | | | |
| 1 | Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007. | | | | | | | | |
| 2 | Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012. | | | | | | | | |
| 3 | Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012. | | | | | | | | |
| 4 | Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007 | | | | | | | | |
| 5 | Pete Warden, "Big Data Glossary", O'Reilly, 2011. | | | | | | | | |
| 6 | Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008. | | | | | | | | |
| 7 | Da Ruan, Guoqing Chen, Etienne E.Kerre, Geert Wets, Intelligent Data Mining, Springer,2007 | | | | | | | | |
| 8 | Michael Minelli (Author), Michele Chambers (Author), Ambiga Dhiraj (Author) , "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses",Wiley Publications,2013. | | | | | | | | |
| 9 | Zikopoulos, Paul, Chris Eaton, "Understanding Big Data: Analytics for Enterprise Class Hadoop and streaming Data". Tata McGraw Hill Publications.2011. | | | | | | | | |

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| Department | Information Technology | Programme Code &Name | | | PIT : Information Technology | | | | |
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| Course Code | Course Name | Hours/Week | | | Credit | Maximum Marks | | | |
| | | L | T | P | C | CA | ES | Total | |
| 40 PIT E15 | XML AND WEB SERVICES | 3 | 0 | 0 | 3 | 50 | 50 | 100 | |
| Objective(s) | The basic aim of this subject is to provide students with insight into XML Web Services, various key technologies for web services, protocol architecture of XML services and also explains how the web services can be developed using XML and also describes various security issues in the XML document. | | | | | | | | |
| <p>INTRODUCTION Role of XML – XML and the Web – XML Language Basics – SOAP – Web Services – .NET and J2EE – Revolutions of XML – XML in Practice.</p> <p>XML TECHNOLOGY XML – Namespaces – Structuring With Schemas – Presentation Technologies – Transformation - XML Infrastructure Technologies.</p> <p>SOAP Overview of SOAP – HTTP – XML-RPC – SOAP – Message Paths – SOAP with Attachments.</p> <p>WEB SERVICES Overview – Web Service Technologies – UDDI – WSDL – ebXML – SOAP, Web services, and E-Commerce – .NET And J2EE IBM – BEA – HP – ORACLE.</p> <p>XML SECURITY AND XML INPRACTICE Security Overview – Canonicalization – XML Security Frame Work – XML Encryption – XML Digital Signature – XKMS Structure – Guidelines for Signing XML Documents – Back to the Future.</p> <p style="text-align: right;">Total hours to be taught : 45</p> | | | | | | | | | |
| Text book (s) : | | | | | | | | | |
| 1 | Frank. P. Coyle, "XML, Web Services And The Data Revolution", Pearson Education, 2002. | | | | | | | | |
| Reference(s): | | | | | | | | | |
| 1 | Ramesh Nagappan, Robert Skoczylas and Rima Patel Sriganesh, "Developing Java Web Services", Wiley Publishing Inc., 2004. | | | | | | | | |
| 2 | Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services", Pearson Education, 2004. | | | | | | | | |
| 3 | McGovern, et al., "Java Web Services Architecture", Morgan Kaufmann Publishers, 2005. | | | | | | | | |

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| Department | Information Technology | Programme code & Name | | | PIT : Information Technology | | | | |
| Elective I | | | | | | | | | |
| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | | |
| | | L | T | P | C | CA | ES | Total | |
| 40 PIT E16 | DIGITAL IMAGE PROCESSING | 3 | 0 | 0 | 3 | 50 | 50 | 100 | |
| Objective(s) | To study the image fundamentals and mathematical transforms necessary for image processing. To understand the various mathematical concepts applied to image enhancement. To learn the procedures for restoration of image. To deal with techniques performed for image compression. To become skilled at the image segmentation and representation techniques. | | | | | | | | |
| <p>DIGITAL IMAGE FUNDAMENTALS AND TRANSFORMS Elements of visual perception – Image sampling and quantization – Basic relationship between pixels – Basic geometric transformations-Introduction to Fourier Transform and DFT – Separable Image Transforms -Walsh – Hadamard – Discrete Cosine Transform, Haar, Slant – Karhunen – Loeve transforms.</p> <p>IMAGE ENHANCEMENT TECHNIQUES Spatial Domain methods: Basic grey level transformation – Histogram equalization – Image subtraction – Image averaging –Spatial filtering: Smoothing, sharpening filters – Laplacian filters – Frequency domain filters: Smoothing – Sharpening filters – Homomorphic filtering.</p> <p>IMAGE RESTORATION Model of Image Degradation/restoration process – Noise models – Inverse filtering – Least mean square filtering – Constrained least mean square filtering –Geometric mean filter – Blind image restoration.</p> <p>IMAGE COMPRESSION Fundamentals– Lossless compression: Variable length coding – LZW coding – Bit plane coding–Predictive coding–Lossy Compression: Transform coding – Wavelet coding – Image compression standards: Binary Image–Compression standards– Continuous Tone Still Image Compression Standards–Video Compression standards.</p> <p>IMAGE SEGMENTATION AND REPRESENTATION Edge detection – Thresholding - Region Based segmentation – Boundary representation: chain codes- Polygonal approximation – Boundary segments – Boundary descriptors – Regional descriptors.</p> <p style="text-align: right;">Total hours to be taught : 45</p> | | | | | | | | | |
| Text book : | | | | | | | | | |
| 1 | Rafael C Gonzalez and Richard E Woods, “Digital Image Processing”, third edition, Pearson Education, 2007. | | | | | | | | |
| Reference (s) : | | | | | | | | | |
| 1 | William K Pratt,” Digital Image Processing”, John Wiley & Sons, New york, 2004. | | | | | | | | |
| 2 | Anil K.Jain,”Fundamentals of Digital Image Processing”, Prentice Hall, Newdelhi, 1999. | | | | | | | | |
| 3 | Chanda Dutta Magundar,” Digital Image Processing and Applications”, Prentice Hall of India, 2000. | | | | | | | | |

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|--|--|-----------------------|---|---|------------------------------|---------------|----|-------|
| Department | Information Technology | Programme Code & Name | | | PIT : Information Technology | | | |
| Elective I | | | | | | | | |
| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ES | Total |
| 40 PIT E17 | USER INTERFACE DESIGN | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| Objective(s) | To study the concept of menus, windows, interfaces, to study about business functions, study the testing methods, to study the characteristics and components of windows, to study the various controls for the windows, to study about various problems in windows design with color, text, graphics. | | | | | | | |
| <p>INTRODUCTION Introduction-Importance-Human-Computer interface-characteristics of graphics interface-Direct manipulation graphical system - web user interface-popularity-characteristic & principles</p> <p>DESIGN PROCESS User interface design process- obstacles-usability-human characteristics in design - Human interaction speed-business functions-requirement analysis-Direct-Indirect methods-basic business functions-Design standards-system timings - Human consideration in screen design</p> <p>SYSTEM MENUS AND NAVIGATION SCHEMES structures of menus - functions of menus-contents of menu-formatting -phrasing the menu - selecting menu choice-navigating menus-graphical menus</p> <p>CONTROLS Windows: Characteristics-components-presentation styles-types-managements-organizations-operations-web systems-device-based controls: characteristics-Screen -based controls: operate control - text boxes-selection control-combination control-custom control-presentation control.</p> <p>WINDOWS LAYOUT AND TEST Text for web pages - effective feedback-guidance & assistance-Internationalization-accesssibility-Icons-Image-Multimedia -coloring Windows layout-test :prototypes - kinds of tests – retest</p> <p style="text-align: right;">Total hours to be taught : 45</p> | | | | | | | | |
| Text book : | | | | | | | | |
| 1 | Wilbent. O. Galitz ,“The Essential Guide to User Interface Design”, Second Edition, John Wiley& Sons, Reprint 2007. | | | | | | | |
| Reference (s) : | | | | | | | | |
| 1 | Ben Sheiderman, “Design the User Interface”, Pearson Education, 1998. | | | | | | | |
| 2 | Alan Cooper, “The Essential of User Interface Design”, Wiley – Dream Tech Ltd., 2002. | | | | | | | |

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| Department | Information Technology | Programme Code & Name | | | PIT : Information Technology | | | |
| Elective II | | | | | | | | |
| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ES | Total |
| 40 PIT E21 | PRINCIPLES OF DISTRIBUTED SYSTEMS | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| Objective(s) | T0 study the concepts of distributed DBMS architecture and query processing, explore the current issues in distributed systems | | | | | | | |
| <p>INTRODUCTION Introduction - Distributed Data Processing - Promises of Distributed Databases - Complicating Factors - Problem Areas – Characterization of Distributed Systems – Examples of distributed systems – Resource sharing and the web – Challenges – System Models – Fundamental models – Interaction Model ,Failure Model ,Security model.</p> <p>DISTRIBUTED DBMS ARCHITECTURE AND DESIGN Distributed DBMS architecture – Client/Server Systems, Peer-to-Peer Distributed Systems, MDBS Architecture, Distributed Database Design - Alternative Design Strategies - Distributed Design issues – Fragmentation - Allocation - Semantic Data Controls-Data Security.</p> <p>QUERY PROCESSING Query Processing Problem – Objectives - Characteristics of Query Processors - languages, Type of Optimization, Optimization timing, Statistics, Decision Sites, Exploitation of network Topologies and replicated fragments, use of semi joins - Layers of Query Processing – Distributed Query Optimization Algorithms – Distributed INGRES Algorithm, R* Algorithm, SDD-1 Algorithm.</p> <p>DISTRIBUTED DBMS RELIABILITY AND PARALLEL DATABASE SYSTEM Reliability Concepts and Measures – Failures and Fault Tolerance in Distributed Systems – Failures in Distributed DBMS – Local Reliability Protocol - Distributed Reliability Protocol-Components-Two Phase Commit Protocol - Variations of 2pc. Database Server - Parallel architecture - Database Interoperability - Database Integration - Query Processing - Transaction Management.</p> <p>CURRENT ISSUES Data Delivery Alternatives-Data Warehousing- World Wide Web-Architecture and Protocols, Database Access, Semi structured Data, Architecture for Information Integration –Research Projects and Open Issues - Push based Techniques – Mobile Databases – Directory Management, Caching, Broadcast Data, Query Processing and Optimization, Transaction Management</p> <p style="text-align: right;">Total hours to be taught : 45</p> | | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1 | M.Tamer Ozsu, Patrick Valduriez, S.Sridar “Principles of Distributed Database Systems”, Pearson Education, 2 nd edition 2007. | | | | | | | |
| 2 | George Couloris, Jean Dollimore, Tim Kindberg “Distributed Systems”, Pearson Education, 4 th edition 2005. | | | | | | | |

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| Department | Information Technology | Programme code & Name | | | PIT : Information Technology | | | | |
| Elective II | | | | | | | | | |
| Course Code | Course Name | Hours/Week | | | Credit | Maximum Marks | | | |
| | | L | T | P | C | CA | ES | Total | |
| 40 PIT E22 | SERVICE ORIENTED ARCHITECTURE | 3 | 0 | 0 | 3 | 50 | 50 | 100 | |
| Objective(s) | This subject tells about evolution, key components, architecture, analysis, design of SOA. This subject tells about how to design web pages and how to provide security in web services. | | | | | | | | |
| <p>INTRODUCTION Software Architecture – Types of IT Architecture – SOA – Evolution – Key components – perspective of SOA – Enterprise-wide SOA – Architecture – Enterprise Applications – Solution Architecture for enterprise application – Software platforms for enterprise Applications – Patterns for SOA – SOA programming models</p> <p>SERVICE-ORIENTED ANALYSIS AND DESIGN Service-oriented Analysis and Design – Design of Activity, Data, Client and business process services – Technologies of SOA – SOAP – WSDL – JAX – WS – XML WS for .NET – Service integration with ESB – Scenario – Business case for SOA – stakeholder objectives – benefits of SPA – Cost Savings</p> <p>SOA IMPLEMENTATION AND GOVERNANCE SOA implementation and Governance – strategy – SOA development – SOA governance – trends in SOA – event-driven architecture – software as a service – SOA technologies – proof-of-concept – process orchestration – SOA best practices</p> <p>SECURITY AND DATA MANAGEMENT Meta data management – XML security – XML signature – XML Encryption – SAML – XACML – XKMS – WS-Security – Security in web service framework - advanced messaging</p> <p>TRANSACTION PROCESSING Transaction processing – paradigm – protocols and coordination – transaction specifications – SOA in mobile – research issues</p> <p style="text-align: right;">Total hours to be taught : 45</p> | | | | | | | | | |
| Reference(s): | | | | | | | | | |
| 1 | Shankar Kambhampaly, “Service –Oriented Architecture for Enterprise Applications”, Wiley India Pvt Ltd, 2008. | | | | | | | | |
| 2 | Eric Newcomer, Greg Lomow, “Understanding SOA with Web Services”, Pearson Education. | | | | | | | | |
| 3 | Mark O’ Neill, et al. , “Web Services Security”, Tata McGraw-Hill Edition, 2003. | | | | | | | | |

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| Department | Information Technology | Programme Code & Name | | | PIT : Information Technology | | | |
| Elective II | | | | | | | | |
| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ES | Total |
| 40 PIT E23 | INFORMATION RETRIEVAL TECHNIQUES | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| Objective(s) | To study the Basic retrieval techniques of information ; to study dynamic approaches for retrieval; to study the clustering and pattern matching methods; to study web search techniques catering retrieval process. | | | | | | | |
| <p>INTRODUCTION Basic Concepts – Retrieval Process – Modeling – Classic Information Retrieval- Algebraic and Probabilistic Models – Retrieval Performance Evaluation</p> <p>QUERY LANGUAGES AND OPERATIONS Languages – Key Word based Querying – Pattern Matching – Structural Queries – Query Operations – User Relevance Feedback – Local and Global Analysis – Text and Multimedia languages</p> <p>TEXT OPERATIONS, INDEXING AND SEARCHING Document Preprocessing – Clustering – Text Compression - Indexing and Searching – Inverted files – Boolean Queries – Sequential searching – Pattern matching – User Interface and Visualization – Human Computer Interaction.</p> <p>MULTIMEDIA MODELS, INDEXING AND SEARCHING Data Models – Query Languages – Spatial Access Methods – Generic Multimedia Indexing Approach – One Dimensional Time Series – Two Dimensional Color Images – Feature Extraction</p> <p>SEARCHING THE WEB AND LIBRARIES Searching the Web – Challenges – Characterizing the Web – Search Engines – Browsing – Meta-searchers – Online IR systems – Digital Libraries – Architectural Issues – Document Models, Representations and Access</p> <p style="text-align: right;">Total hours to be taught : 45</p> | | | | | | | | |
| Text book (s) : | | | | | | | | |
| 1 | Ricardo Baeza-Yate, Berthier Ribeiro-Neto, "Modern Information Retrieval", Pearson Education Asia, 2 nd edition, 2005. | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1 | G.G. Chowdhury, "Introduction to Modern Information Retrieval", Neal-Schuman Publishers; 2 nd edition, 2003. | | | | | | | |
| 2 | Daniel Jurafsky and James H. Martin, "Speech and Language Processing", Pearson Education, 2000. | | | | | | | |
| 3 | David A. Grossman, Ophir Frieder, "Information Retrieval: Algorithms, and Heuristics", Academic Press, 2000. | | | | | | | |
| 4 | Charles T. Meadow, Bert R. Boyce, Donald H. Kraft, "Text Information Retrieval Systems", Academic Press, 2000. | | | | | | | |
| 5 | Christopher D. Manning, Prabhakar Raghavan, Hinrich Schutze, "Introduction to Information Retrieval", Cambridge University Press, 2009. | | | | | | | |

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| Department | Information Technology | Programme Code & Name | | | PIT : Information Technology | | | | |
| Elective II | | | | | | | | | |
| Course Code | Course Name | Hours / Week | | | Credit | | | Maximum Marks | |
| | | L | T | P | C | CA | ES | Total | |
| 40 PIT E24 | MOBILE AND PERVASIVE COMPUTING | 3 | 0 | 0 | 3 | 50 | 50 | 100 | |
| Objective(s) | To study the emerging technology in mobile adaptive computing. It also explains about the protocols and context aware mobile services and pervasive computing. | | | | | | | | |
| <p>INTRODUCTION TO MOBILE ADAPTIVE COMPUTING Mobile Adaptive Computing – Mobile computing – Adaptability – Mechanisms for adaptation – How to develop or incorporate adaptations in applications- Support for building adaptive mobile applications- Mobility Management- location management principles and techniques- Location management case studies.</p> <p>MIDDLEWARE TECHNOLOGY Introduction to mobile middleware – Middleware for application development: adaptation – mobile agents. Service discovery middleware: Finding needed services – common ground- services – more on discovery and advertisement protocols – garbage collection – eventing – security – interoperability.</p> <p>INTRODUCTION TO PERVASIVE COMPUTING Technologies- Past, present, future- Application examples- Device technology- Device connectivity.</p> <p>WEB APPLICATION CONCEPTS Web application concepts- Voice technology- Personal digital assistants.</p> <p>ARCHITECTURES Server side programming in java – pervasive web application architecture – Example application.</p> <p style="text-align: right;">Total hours to be taught : 45</p> | | | | | | | | | |
| Reference(s) : | | | | | | | | | |
| 1 | Frank Adelstein, Sandeep K.S.Gupta, Golden G. Richard III, Loren Schwiebert, "Fundamentals of Mobile and Pervasive Computing" Tata McGraw Hill 2009. | | | | | | | | |
| 2 | Jochen Burkhardt, Dr. Horst Henn, Stefan Hepper, Klaus Rintdorff, Thomas Schack, "Pervasive Computing Technology and Architecture of Mobile Internet Applications" Pearson Education 2009. | | | | | | | | |
| 3 | Seng Loke, Context-Aware Computing Pervasive Systems, Auerbach Pub., New York, 2007. | | | | | | | | |
| 4 | Uwe Hansmann etl , Pervasive Computing, Springer, New York,2001. | | | | | | | | |

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| Department | Information Technology | Programme Code & Name | | | PIT : Information Technology | | | |
| Elective II | | | | | | | | |
| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | |
| | | L | T | P | C | CA | ES | Total |
| 40 PIT E25 | COMPILER DESIGN | 3 | 0 | 0 | 3 | 50 | 50 | 100 |
| Objective(s) | To learn the phases of compilers, design and implement a lexical analyzer, study about syntax analysis and understand the design and implement a parser, know about intermediate code generation, understand, design code generation schemes, understand optimization of codes and runtime environment. | | | | | | | |
| <p>INTRODUCTION TO COMPILERS Compilers – Analysis of the source program – Phases of a compiler – Cousins of the Compiler – Grouping of Phases – Compiler construction tools - Lexical Analysis - Role of Lexical Analyzer – Input Buffering – Specification of Tokens, Finite Automata, Regular Expression to a NFA.</p> <p>SYNTAX ANALYSIS Role of the parser –Writing Grammars –Context-Free Grammars – Top Down parsing - Recursive Descent Parsing - Predictive Parsing – Bottom-up parsing - Shift Reduce Parsing – Operator Precedent Parsing - LR Parsers - SLR Parser - Canonical LR Parser - LALR Parser.</p> <p>INTERMEDIATE CODE GENERATION Intermediate languages – Declarations – Assignment Statements – Boolean Expressions – Case Statements – Back patching – Procedure calls.</p> <p>CODE GENERATION Issues in the design of code generator – The target machine – Runtime Storage management – Basic Blocks and Flow Graphs – Next-use Information – A simple Code generator – DAG representation of Basic Blocks – Peephole Optimization.</p> <p>CODE OPTIMIZATION AND RUN TIME ENVIRONMENTS Introduction– Principal Sources of Optimization – Optimization of basic Blocks – Introduction to Global Data Flow Analysis – Runtime Environments – Source Language issues – Storage Organization – Storage Allocation strategies – Access to non-local names – Parameter Passing.</p> <p style="text-align: right;">Total hours to be taught : 45</p> | | | | | | | | |
| Text book : | | | | | | | | |
| 1 | Alfred Aho, Ravi Sethi, Jeffrey D Ullman, "Compilers Principles, Techniques and Tools", Pearson Education Asia, 2003. | | | | | | | |
| Reference (s) : | | | | | | | | |
| 1 | Allen I. Holub "Compiler Design in C", Prentice Hall of India, 2003. | | | | | | | |
| 2 | C. N. Fischer and R. J. LeBlanc, "Crafting a compiler with C", Benjamin Cummings, 2003. | | | | | | | |
| 3 | J.P. Bennet, "Introduction to Compiler Techniques", Second Edition, Tata McGraw-Hill, 2003. | | | | | | | |
| 4 | Henk Alblas and Albert Nymeyer, "Practice and Principles of Compiler Building with C", PHI, 2001. | | | | | | | |
| 5 | Kenneth C. Loudon, "Compiler Construction: Principles and Practice", Thompson Learning, 2003. | | | | | | | |

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| Department | Information Technology | Programme Code &Name | | | PIT : Information Technology | | | | |
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| Course Code | Course Name | Hours / Week | | | Credit | Maximum Marks | | | |
| | | L | T | P | C | CA | ES | Total | |
| 40 PIT E26 | ADHOC AND SENSOR NETWORKS | 3 | 0 | 0 | 3 | 50 | 50 | 100 | |
| Objective(s) | To Understand the Concept of Ad-Hoc wireless Network, know the Ad-Hoc Network Routing & TCP, understand the concepts of wireless sensor Networks. | | | | | | | | |
| <p>AD-HOC MAC Introduction – Issues in Ad-Hoc wireless Networks. MAC Protocols – Issues, Classification of MAC protocols, Multi channel MAC & Power control MAC protocol</p> <p>AD-HOC NETWORK ROUTING & TCP Issues – classification of routing protocols – Hierarchical and power aware. Multicast routing – Classifications, Tree based, Mesh based, Ad Hoc Transport layer issues. TCP over Ad Hoc – Feedback based, TCP with explicit link, TCP-Bus, Ad Hoc TCP, and Split TCP.</p> <p>WSN – MAC Introduction – Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols – self-organizing, Hybrid TDMA/FDMA and CSMA based MAC</p> <p>OVERVIEW OF WIRELESS SENSOR NETWORKS Challenges for wireless sensor Networks – Characteristics requirements – required mechanisms, Difference between mobile ad-hoc and sensor networks, Applications of sensor networks – Enabling Technologies for wireless sensor Networks.</p> <p>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</p> <p style="text-align: right;">Total hours to be taught : 45</p> | | | | | | | | | |
| Text book (s) : | | | | | | | | | |
| 1 | C.Siva Ram Murthy and B.Smanoj, “Ad Hoc Wireless Networks – Architectures and Protocols”, Pearson education,2004. | | | | | | | | |
| 2 | Holger Karl & Andreas Willig, “ Protocols and Architectures for Wireless sensor Networks”, John Wiley, 2005. | | | | | | | | |
| Reference (s) : | | | | | | | | | |
| 1 | Feng Zhao & Leonidas J.Guibas, “Wireless Sensor Networks – An Information Processing Approach”, Elsevier, 2007. | | | | | | | | |
| 2 | C.K. Toh, “Ad hoc Mobile Wireless Networks”, Pearson Education, 2002. | | | | | | | | |

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| Department | Information Technology | Programme Code & Name | | | PIT : Information Technology | | | | |
| Elective II | | | | | | | | | |
| Course Code | Course Name | Hours/Week | | | Credit | Maximum Marks | | | |
| | | L | T | P | C | CA | ES | Total | |
| 40 PIT E27 | SOFTWARE TESTING METHODOLOGIES | 3 | 0 | 0 | 3 | 50 | 50 | 100 | |
| Objective(s) | To explain the basics of software testing, study the different phases of software testing process, incorporate specialized testing responsibilities. | | | | | | | | |
| <p>INTRODUCTION Assessing capabilities, staff competency and user satisfaction – Creating an environment supportive of software testing – Building the software testing process – Selecting and installing software testing tools – Building software tester competency.</p> <p>TESTING PROCESS - I Overview of software testing process – Organizing for testing – Developing the test plan – Verification testing.</p> <p>TESTING PROCESS - II Validation testing – Analyzing and reporting test results – Acceptance and operational testing – Post implementation analysis.</p> <p>SPECIALIZED TESTING – I Software development methodologies – Testing client/server systems – Rapid application development testing – Testing internal controls – Testing COTS and contracted software.</p> <p>SPECIALIZED TESTING - II Testing in a multiplatform environment – Testing software system security – Testing a data warehouse – Testing web-based systems.</p> <p style="text-align: right;">Total hours to be taught : 45</p> | | | | | | | | | |
| Text book (s) : | | | | | | | | | |
| 1 | William E.Perry, "Effective Methods for Software Testing", Third Edition, Wiley India (P) Ltd., 2007. | | | | | | | | |
| Reference(s): | | | | | | | | | |
| 1 | Boris Beizer, "Software Testing Techniques", Second Edition, Dreamtech Press, 2009. | | | | | | | | |
| 2 | Ilene Burnstein, "Practical Software Testing", Springer International Edition, Chennai, 2003. | | | | | | | | |
| 3 | Elfriede Dustin, "Effective Software Testing", Pearson Education, New Delhi, 2003. | | | | | | | | |
| 4 | Renu Rajani and Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw-Hill, New Delhi, 2003. | | | | | | | | |
| 5 | Edward Kit, "Software Testing in the Real World – Improving the Process", Pearson Education, New Delhi, 1995. | | | | | | | | |

| K.S. RANGASAMY COLLEGE OF TECHNOLOGY - AUTONOMOUS | | | | | | | | |
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| 40PIT301- CLOUD COMPUTING | | | | | | | | |
| IT | | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | | C | CA | ES |
| III | 3 | 0 | 0 | 45 | 3 | 50 | 50 | 100 |
| Objective(s) | <ul style="list-style-type: none"> To analyze the cloud computing and its deployment models. To emphasize virtualized data centers and cloud systems for research. To apply cloud programming in different platforms for solving real world problems. | | | | | | | |
| <p>DISTRIBUTED SYSTEM MODELS AND ENABLING TECHNOLOGIES Scalable Computing over the Internet - Technologies for Network-Based Systems - System Models for Distributed and Cloud Computing - Software Environments for Distributed Systems and Clouds - Performance, Security, and Energy Efficiency</p> <p>FUNDAMENTALS OF CLOUD COMPUTING Understanding Cloud Computing – Origins and Influences – Basic Concepts and Terminology-Goals and Benefits – Risks and Challenges- Fundamentals Concepts-Roles and Boundaries-Cloud Characteristics-Cloud Deliver models-Cloud deployment Models</p> <p>VIRTUAL MACHINES AND VIRTUALIZATION OF CLUSTERS AND DATA CENTERS Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures/Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation</p> <p>CLOUD PLATFORM ARCHITECTURE OVER VIRTUALIZED DATA CENTERS Cloud Computing and Service Models – Data - Center Design and Interconnection Networks - Architectural Design of Compute and Storage Clouds - Public Cloud platforms: GAE,AWS, and Azure Inter - Cloud Resource Management - Cloud Security and Trust Management</p> <p>CLOUD PROGRAMMING AND SOFTWARE ENVIRONMENTS Features of Cloud and Grid Platforms - Parallel and Distributed Programming Paradigms –MapReduce, Twister, IterativeMapReduce, Hadoop, Dryad, ProgrammingSupport of Google APP Engine - Programming on Amazon AWS and Microsoft Azure - Emerging Cloud Software Environments</p> | | | | | | | | |
| Text book(s): | | | | | | | | |
| 1. | Kai Hwang, Geoffrey C Fox, Jack J.Dongarra, “Distributed and Cloud Computing – From Parallel Processing to the Internet of Things”,Morgan Kaufmann, 2012. | | | | | | | |
| 2. | Thomas Erl, Zaigham Mahmood, and Ricardo Puttini “Cloud Computing Concepts, Technology & Architecture “ Pearson, 2014. | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1. | Michael Miller ,“Cloud Computing “ , Pearson , 2014. | | | | | | | |
| 2. | Barrie sosinsky, “Cloud Computing”,Wiley, 2014. | | | | | | | |

| K.S.RANGASAMY COLLEGE OF TECHNOLOGY - AUTONOMOUS REGULATION | | | | | | | |
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| 40PIT3P1 - PROJECT WORK - PHASE I | | | | | | | |
| IT | | | | | | | |
| Semester | Hours / Week | | | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES |
| III | 0 | 0 | 12 | 05 | 100 | 00 | 100 |
| Objective(s) | Imparting the practical knowledge to the students and also to make them to carry out the technical procedures in their project work, providing an exposure to the students to refer, read and review the research articles, journals and conference proceedings relevant to their project work and placing this as their beginning stage for their final presentation. | | | | | | |
| Methodology | <ul style="list-style-type: none"> • Three reviews have to be conducted by the committee of minimum of three members one of which should be the guide • Problem should be selected • Students have to collect about 20 papers related to their work • Reports has to be prepared by the students as per the format in Annexure – 1 • Preliminary implementation can be done if possible • Internal evaluation has to be done for 100 Marks | | | | | | |

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| 40PIT4P1- PROJECT WORK - PHASE II | | | | | | | |
| IT | | | | | | | |
| Semester | Hours / Week | | | Credit | Maximum Marks | | |
| | L | T | P | | C | CA | ES |
| IV | 0 | 0 | 40 | 15 | 50 | 50 | 100 |
| Objective(s) | Enabling and strengthening the students to carry out the project on their own and to implement their innovative ideas to forefront the risk issues and to retrieve the hazards by adopting suitable assessment methodologies and stating it to global. | | | | | | |
| Methodology | <ul style="list-style-type: none"> • Three reviews have to be conducted by the committee of minimum of three members one of which should be the guide • Each review has to be evaluated for 100 Marks • Attendance is compulsory for all reviews. If a student fails to attend review for some valid reason, one or more chance may be given • They should publish the paper preferably in the journals / conference • Final review will be done by the committee that consists of minimum of three members one of which should be the guide (If possible include one external expert examiner within the college) • The Report should be submitted by the students around at the end of May. | | | | | | |

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| 40PITE31- ENTERPRISE RESOURCE PLANNING | | | | | | | | |
| IT | | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | | C | CA | ES |
| III | 3 | 0 | 0 | 45 | 3 | 50 | 50 | 100 |
| Objective(s) | <ul style="list-style-type: none"> To know the basics of ERP, understand the key implementation issues To know the business modules, to be aware of some popular and appreciate the current and future trends in ERP. | | | | | | | |
| <p>INTRODUCTION ERP: An Overview, Enterprise – An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, OLAP, SCM</p> <p>ERP IMPLEMENTATION ERP Implementation Lifecycle, Implementation Methodology, Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring</p> <p>THE BUSINESS MODULES Business modules in an ERP Package, Finance, Manufacturing, Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution</p> <p>THE ERP MARKET ERP Market Place, SAP AG, Peoplesoft, Baan, JD Edwards, Oracle, QAD, SSA</p> <p>ERP – PRESENT AND FUTURE Turbo Charge the ERP System, EIA, ERP and e-Commerce, ERP and Internet, Future Directions</p> | | | | | | | | |
| Text book(s): | | | | | | | | |
| 1. | Alexis Leon, "ERP Demystified", Tata McGraw Hill, New Delhi, 2000. | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1. | Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning", Thompson Course Technology, USA, 2001. | | | | | | | |
| 2. | Vinod Kumar Garg and Venkitakrishnan N K, "Enterprise Resource Planning – Concepts and Practice", PHI, New Delhi, 2003. | | | | | | | |

| K.S. RANGASAMY COLLEGE OF TECHNOLOGY - AUTONOMOUS | | | | | | | | |
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| 40PITE32 - NETWORK ROUTING ALGORITHM | | | | | | | | |
| IT | | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | | C | CA | ES |
| III | 3 | 0 | 0 | 45 | 3 | 50 | 50 | 100 |
| Objective(s) | <ul style="list-style-type: none"> To apply the different routing methods. To analyze the high speed and mobile networks To understand the basic routing concepts of MANET. | | | | | | | |
| <p>INTRODUCTION ISO OSI Layer Architecture, TCP/IP Layer Architecture, Functions of Network layer, General classification of routing, Routing in telephone networks, Dynamic Non Hierarchical Routing (DNHR), Trunk Status Map Routing (TSMR), Real-Time Network Routing (RTNR), Distance vector routing, Link state routing, Hierarchical routing.</p> <p>INTERNET ROUTING Interior protocol: Routing Information Protocol (RIP), Open Shortest Path First (OSPF), Bellman Ford Distance Vector Routing. Exterior Routing Protocols: Exterior Gateway Protocol (EGP) and Border Gateway Protocol (BGP). Multicast Routing: Pros and cons of Multicast and Multiple Unicast Routing, Distance Vector Multicast Routing Protocol (DVMRP), Multicast Open Shortest Path First (MOSPF), MBONE, Core Based Tree Routing.</p> <p>ROUTING IN OPTICAL WDM NETWORKS Classification of RWA algorithms, RWA algorithms, fairness and admission control, Distributed Control Protocols, Permanent routing and Wavelength requirements, Wavelength rerouting- Benefits and Issues, Light path migration, Rerouting Schemes, Algorithms- AG, MWPG.</p> <p>MOBILE - IP NETWORKS Macro-mobility protocols, Micro-mobility protocol: Tunnel based: Hierarchical Mobile IP, Intra domain Mobility Management, Routing based: Cellular IP, Handoff Wireless Access Internet Infrastructure (HAWAII).</p> <p>MOBILE AD –HOC NETWORKS Internet-based mobile ad-hoc networking communication strategies, Routing algorithms – Proactive routing: Destination Sequenced Distance Vector Routing (DSDV), Reactive routing: Dynamic Source Routing (DSR), Ad hoc On-Demand Distance Vector Routing (AODV), Hybrid Routing: Zone Based Routing (ZRP).</p> | | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1. | Deepankar Medhi, Karthikeyan Ramasamy "Network Routing: Algorithms, Protocols", Elsevier Inc, San Francisco CA 94111, 2007. | | | | | | | |
| 2. | Eric Bouillet, Georgios Ellinas, Jean-François Labourdette, Ramu Ramamurthy "Path Routing in Mesh Optical Networks" John Wiley & Sons, Ltd. ISBN: 978-0-470-01565-0, 2007. | | | | | | | |
| 3. | William Stallings, 'High speed networks and Internets Performance and Quality of Service', 2 nd edition, Pearson Education Asia. Reprint India, 2002. | | | | | | | |
| 4. | M. Steen Strub, 'Routing in Communication network, Prentice –Hall International, New York, 1995. | | | | | | | |
| 5. | S. Keshav, 'An engineering approach to computer networking' Addison Wesley, 1999. | | | | | | | |
| 6. | William Stallings, 'High speed Networks TCP/IP and ATM Design Principles, Prentice- Hall, New York 1995. | | | | | | | |
| 7. | C.E Perkins, 'Ad Hoc Networking', Addison – Wesley, 2001. | | | | | | | |
| 8. | Ian F. Akyildiz, Jiang Xie and Shantidev Mohanty, " A Survey of mobility Management in Next generation all IP- Based Wireless Systems", IEEE Wireless Communications Aug.2004, pp 16-27. | | | | | | | |
| 9. | C.SivaRamaMurthy and Mohan Gurusamy, "WDM Optical Networks – Concepts, Design and Algorithms", Prentice Hall of India Pvt. Ltd, New Delhi ,2002. | | | | | | | |

| K.S. RANGASAMY COLLEGE OF TECHNOLOGY - AUTONOMOUS | | | | | | | | |
|---|--|---|---|-----------|--------|---------------|----|-----|
| 40PITE33- MULTICORE ARCHITECTURE | | | | | | | | |
| IT | | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | | C | CA | ES |
| III | 3 | 0 | 0 | 45 | 3 | 50 | 50 | 100 |
| Objective(s) | <ul style="list-style-type: none"> To understand the concept of Multicore Architecture, To know the memory organization and Protocols, to understand the concepts of PowerPC Architecture. | | | | | | | |
| <p>INTRODUCTION TO MULTICORE ARCHITECTURE Fundamentals of SuperScalar Processor Design, Introduction to Multicore Architecture – Chip Multiprocessing, homogeneous Vs heterogeneous design - SMP – Multicore Vs Multithreading.</p> <p>MEMORY ORGANIZATION Shared memory architectures– synchronization – Memory organization – Cache Memory – Cache Coherency Protocols - Design of Levels of Caches.</p> <p>PROGRAMMING MODEL Multicore programming Model – Shared memory model, message passing model, transaction model – OpenMP and MPI Programming.</p> <p>PowerPC ARCHITECTURE PowerPC architecture – RISC design, PowerPC ISA, PowerPC Memory Management Power 5 Multicore architecture design, Power 6 Architecture.</p> <p>ADVANCED CONCEPTS Cell Broad band engine architecture, PPE (Power Processor Element), SPE (Synergistic processing element), Cell Software Development Kit, Programming for Multicore architecture.</p> | | | | | | | | |
| Text book(s): | | | | | | | | |
| 1. | Hennessey &Pateterson, “Computer Architecture A Quantitative Approach”, Harcourt Asia, Morgan Kaufmann, 1999. | | | | | | | |
| 2. | Joseph JaJa,” Introduction to Parallel Algorithms”, Addison-Wesley, 1992. | | | | | | | |
| 3. | IBM Journals for Power 5, Power 6 and Cell Broadband engine architecture. | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1. | Kai Hwang, “Advanced Computer Architecture: Parallelism, Scalability and Programmability” McGraw-Hill, 1993. | | | | | | | |
| 2. | Richard Y. Kain, “Advanced Computer Architecture: A System Design Approach”, PHI, 1999. | | | | | | | |
| 3. | Rohit Chandra, Ramesh Menon, Leo Dagum, and David Kohr, Parallel Programming in OpenMP, Morgan Kaufmann, 2000. | | | | | | | |

| K.S. RANGASAMY COLLEGE OF TECHNOLOGY - AUTONOMOUS | | | | | | | | |
|--|---|---|---|-----------|--------|---------------|----|-----|
| 40PITE34 - NATURAL LANGUAGE PROCESSING | | | | | | | | |
| IT | | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | | C | CA | ES |
| III | 3 | 0 | 0 | 45 | 3 | 50 | 50 | 100 |
| Objective(s) | <ul style="list-style-type: none"> To analyze the basic concepts of Natural Language Processing. To analyze and apply information retrieval and text mining techniques for information processing. To apply the Natural Language Processing techniques in real world problems. | | | | | | | |
| <p>INTRODUCTION Natural Language Processing – Linguistic Background- Spoken language input and output Technologies – Written language Input - Mathematical Methods - Statistical Modeling and Classification Finite State methods Grammar for Natural Language Processing – Parsing – Semantic and Logic Form – Ambiguity Resolution – Semantic Interpretation.</p> <p>INFORMATION RETRIEVAL Information Retrieval architecture - Indexing- Storage – Compression Techniques – Retrieval Approaches – Evaluation - Search engines- commercial search engine features- comparison- performance measures – Document Processing - NLP based Information Retrieval – Information Extraction</p> <p>TEXT MINING Categorization – Extraction based Categorization- Clustering- Hierarchical Clustering- Document Classification and routing- finding and organizing answers from Text search – use of categories and clusters for organizing retrieval results – Text Categorization and efficient Summarization using Lexical Chains – Pattern Extraction</p> <p>GENERIC ISSUES Multilingualism – Multilingual Information Retrieval and Speech processing - Multimodality – Text and Images – Modality Integration - Transmission and Storage – Speech coding- Evaluation of systems – Human Factors and user Acceptability.</p> <p>APPLICATIONS Machine Translation – Transfer Metaphor - Interlingua and Statistical Approaches - Discourse Processing – Dialog and Conversational Agents – Natural Language Generation – Surface Realization and Discourse Planning</p> | | | | | | | | |
| Reference(s): | | | | | | | | |
| 1. | Daniel Jurafsky and James H. martin, “ Speech and Language Processing” , 2000 | | | | | | | |
| 2. | Ron Cole, J.Mariani, et.al “Survey of the State of the Art in Human Language Technology”, Cambridge University Press, 1997. | | | | | | | |
| 3. | Michael W. Berry “ Survey of Text Mining: Clustering, Classification and Retrieval”, Springer Verlag, 2003 | | | | | | | |
| 4. | Christopher D.Manning and Hinrich Schutze, “Foundations of Statistical Natural Language Processing “, MIT Press, 1999. | | | | | | | |

| K.S. RANGASAMY COLLEGE OF TECHNOLOGY – AUTONOMOUS | | | | | | | | |
|---|---|---|---|-----------|--------|---------------|----|-----|
| 40PITE35- WEB DATA MINING | | | | | | | | |
| IT | | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | | C | CA | ES |
| III | 3 | 0 | 0 | 45 | 3 | 50 | 50 | 100 |
| Objective(s) | <ul style="list-style-type: none"> To analyze the concepts, tasks, methods, and techniques of data mining. To analyze the issues in web mining, To apply the techniques in solving data mining problems. | | | | | | | |
| <p>INTRODUCTION What is Data Mining - Relational Databases - Data Warehouses - Transactional Databases - Advanced Database Systems - Data Mining Functionalities - Interestingness of a pattern Classification of Data Mining Systems - Major issues in Data Mining</p> <p>DATA MINING AND KNOWLEDGE DISCOVERY The KDD process and methodology - Data preparation for knowledge discovery - Overview of data mining techniques - Market basket analysis - Classification and prediction – Clustering - Memory-based reasoning - Evaluation and Interpretation.</p> <p>WEB USAGE MINING PROCESS AND TECHNIQUES Data collection and sources of data- Data preparation for usage mining - Mining navigational patterns - Integrating e-commerce data - Leveraging site content and structure - User tracking and profiling - E-Metrics: measuring success in e-commerce Privacy issues.</p> <p>CLASSIFICATION AND PREDICTION Concepts and Issues regarding Classification and Prediction – Classification by Decision Tree Induction – Bayesian Classification - Classification by Back-propagation - Classification Based on Concepts from Association Rule Mining.</p> <p>WEB MINING APPLICATIONS AND OTHER TOPICS Data integration for e-commerce - Web personalization and recommender systems - Web content and structure mining - Web data warehousing - Review of tools, applications, and systems.</p> | | | | | | | | |
| Text book(s): | | | | | | | | |
| 1. | Michael Berry and Gordon Linoff “Data Mining Techniques for Marketing, Sales, and Customer Relationship Management”, Second Edition, John Wiley, 2004. | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1. | Ralph Kimball and Richard Merz, “The Data Web house Toolkit”, John Wiley, 2000. | | | | | | | |
| 2. | Gordon Linoff and Michael Berry, “Mining the Web: Transforming Customer Data into Customer Value”, John Wiley & Sons, 2001. | | | | | | | |

| K.S. RANGASAMY COLLEGE OF TECHNOLOGY – AUTONOMOUS | | | | | | | | |
|--|--|---|---|-----------|--------|---------------|----|-----|
| 40PITE36 - INFORMATION STORAGE MANAGEMENT | | | | | | | | |
| IT | | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | | C | CA | ES |
| III | 3 | 0 | 0 | 45 | 3 | 50 | 50 | 100 |
| Objective(s) | <ul style="list-style-type: none"> • To analyze the challenges and solutions available for information storage. • To understand various storage systems architectures and networked storage. • To build solutions of monitoring, managing and securing the information. | | | | | | | |
| <p>INTRODUCTION TO STORAGE TECHNOLOGY Data – Types – Structures – Information – Storage – Evolution – Data Center – Key challenges – Information Lifecycle – Storage System Environment – Host – Physical Components – Disk Drive – Performance – Laws – Logical Components.</p> <p>DATA PROTECTION AND INTELLIGENT STORAGE SYSTEMS ARCHITECTURE RAID – Implementation - Array components – Levels – Impact on Disk – Performance – Intelligent Storage System – Components – Intelligent Storage Array – EMC CLARiiON Storage Array – CX4 Architecture.</p> <p>NETWORKED STORAGE Direct – Attached Storage – Types – Benefits and Limitations – Interfaces – Parallel SCSI – Storage Area Networks – Evolution – Components – FC Connectivity – Ports – Architecture – Zoning – Topologies – NAS – Benefits – File I/O – Components – Implementations – File Sharing – Protocols – IP SAN – iSCSI – FCIP – CAS – Archives – Types – Architecture – Object Storage and Retrieval – Storage Virtualization – Forms – Challenges – Types.</p> <p>INFORMATION AVAILABILITY, MONITORING AND MANAGING Information Availability – BC Terminology – Planning Lifecycle – Failure Analysis – Business Impact Analysis – BC Technology Solutions – Backup Considerations – Granularity – Methods – Process – Topologies – Technologies – Restoring – Local Replication – Uses – Data Consistency – Technologies – Restore and Restart – Remote Replication – Modes – Technologies – Network Infrastructure.</p> <p>STORAGE SECURITY AND MANAGEMENT Storage Security Framework – Risk –Triad – Domains – Security Implementations in Storage Networking – Monitoring Storage – Infrastructure Storage Management Activities – Challenges – Ideal Solution.</p> | | | | | | | | |
| Reference(s): | | | | | | | | |
| 1. | EMC Corporation, “Information Storage and Management”, Wiley, India, 2010. | | | | | | | |
| 2. | Richard Barker, Paul Massiglia, “Storage Area Network Essentials”, Wiley, India, 2010. | | | | | | | |
| 3. | Marc Farley, “Building Storage Networks”, Tata McGraw Hill, Osborne, 2001. | | | | | | | |

| K.S. RANGASAMY COLLEGE OF TECHNOLOGY - AUTONOMOUS | | | | | | | | |
|---|---|---|---|-----------|--------|---------------|----|-----|
| 40 PIT E37-OPEN SOURCE ARCHITECTURE | | | | | | | | |
| IT | | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | | C | CA | ES |
| III | 3 | 0 | 0 | 45 | 3 | 50 | 50 | 100 |
| Objective(s) | <ul style="list-style-type: none"> To address issues in Open Source Technologies and adapt Open Source Technologies and Practices. | | | | | | | |
| <p>OVERVIEW OF OPEN SOURCE SOFTWARE Overview of Open Source Software: The Open Source Definition, Examples of OSD-compliant licenses, Examples of Open Source Software Products, The Open Source Software Development Process, A history of Open Source Software: The Berkeley Software Distribution, TeX, The Free Software Foundation, Linux, Apache, Mozilla, Open Source Software Open Source: The Good, the Bad and the Ugly.</p> <p>OPEN SOURCE SOFTWARE QUALIFICATION AND TRANSFORMATION Qualification: Defining Open Source Software, Categorizing Defining Open Source Software, Specific Characteristics of Open Source Software, Transformation: The OSS development process, Taboos and norms in OSS development, The OSS development life cycle, Deriving a framework for analyzing OSS: Zachman's framework for IS architecture, CATWOE and Soft systems method, Deriving the analytical framework for OSS.</p> <p>OSS ENVIRONMENT Environment: The "where?" of OSS, the "when?" of OSS, World View: A framework for classifying OSS motivations, Technological micro-level and macro-level(individual) motivation, Economic micro-level and macro-level(individual) motivation, Socio-political micro-level and macro-level(individual) motivation</p> <p>APPLICATION ARCHITECTURE AND HOW OPEN SOURCE SOFTWARE IS DEVELOPED Application Architecture: Types of Systems, Tiered Design, Managing Performance and scalability, Interoperability, Development Platform Choices, Open Source Software Development: Methodology, Languages Used to Develop Open Source Products, Cross-Platform Code, Managing System Implementation: Implementation Roles, Open Source Impact on Team Issues, Implementation Process, Implementation Principles, Key Documents, Migration, Interacting with the Open Source Community.</p> <p>OPEN SOURCE SERVER APPLICATIONS Open Source Server Applications: Infrastructure Services, Web Servers, Database Servers, Mail Servers, Systems Management, Open Source Desktop Applications: Introduction, Graphical desktops, Web Browsers, The Office Suite, Mail and Calendar Clients, Personal Software, Cost of OSS: Total cost of Ownership, Types of Costs Licensing: Types of Licenses, Licenses in Use, Mixing Open and Closed Code, Dual Licensing.</p> | | | | | | | | |
| Text book(s): | | | | | | | | |
| 1. | Joseph Feller, Brian Fitzgerald, Eric S. Raymond, "Understanding Open Source Software Development", Addison-Wesley Professional, 1st edition (December 31, 2001). | | | | | | | |
| 2. | Paul Kavanagh, "Open Source Software: Implementation and Management", Digital Press, (July 26, 2004). | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1. | Steven Weber, "The Success of Open Source", Harvard University Press, (April 30, 2004). | | | | | | | |
| 2. | Bernard Golden, "Succeeding with Open Source", Addison-Wesley Professional, (August 10, 2004). | | | | | | | |

K.S. RANGASAMY COLLEGE OF TECHNOLOGY - AUTONOMOUS

40 PIT E38 - CYBER SECURITY AND FORENSICS

IT

| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
|----------|--------------|---|---|-----------|--------|---------------|----|-----|
| | L | T | P | | | C | CA | ES |
| III | 3 | 0 | 0 | 45 | 3 | 50 | 50 | 100 |

| | |
|---------------------|--|
| Objective(s) | To know about security standards and how to secure the system. To explore various security policies and employee responsibilities. To understand the significance of information security. |
|---------------------|--|

INTRODUCTION

Cybercrime and information security – classification of cybercrimes – cybercrime and the India ITA2000 – A global perspective on cybercrimes - cyber stalking – cyber café and cybercrimes – botnets – attack vector.

CYBERCRIME: MOBILE AND WIRELESS DEVICES

Trend mobility - authentication service security - Attacks on mobile phones - mobile phone security Implications for organizations - Organizational measurement for Handling mobile - Security policies and measures in mobile computing era.

TOOLS AND METHODS USED IN CYBERCRIME

Proxy servers and Anonymizers – Phishing - Password cracking - Key loggers and Spy wares - Virus and worms - Trojan horse and Backdoors – Steganography – DOS and DDOS Attacks - SQL Injection - Buffer overflow - Attacks on wireless network.

CYBERCRIMES AND CYBER SECURITY: THE LEGAL PERSPECTIVES

Indian IT Act - Understanding computer forensic -Historical background of cyber forensic - Forensic analysis of e-mail - Digital forensic life cycle - Network forensic- Setting up a computer forensic Laboratory - Relevance of the OSI 7 Layer model to computer Forensic - Computer forensic from compliance perspectives.

FORENSIC OF HAND – HELD DEVICES

Understanding cell phone working characteristics - Hand - Held devices and digital forensic - Toolkits for Hand - Held device - Forensic of I- pod and digital music devices – Techno legal Challenges with evidence from hand-held Devices - Cost of cybercrimes and IPR issues – incident handling: an essential component of cyber security.

Reference(s) :

| | |
|----|---|
| 1. | Nina Godbole, SunitBelapure “Cyber security understanding cyber crimes, computer forensics and legal perspectives” Wiley publication, 2014. |
| 2. | Harish Chander, “Cyber laws & IT protection”, PHI learning pvt.ltd, 2012. |
| 3. | MS.M.K.Geetha&Ms.SwapneRaman ,”Cyber Crimes and Fraud Management,” Macmillan, 2012. |
| 4. | Pankaj Agarwal, “Information Security & Cyber Laws”, (Acme Learning), Excel, 2013. |

| K.S. RANGASAMY COLLEGE OF TECHNOLOGY - AUTONOMOUS | | | | | | | | |
|--|---|---|---|-----------|--------|---------------|----|-----|
| 40PITE41 - C# AND .NET | | | | | | | | |
| IT | | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | | C | CA | ES |
| III | 3 | 0 | 0 | 45 | 3 | 50 | 50 | 100 |
| Objective(s) | <ul style="list-style-type: none"> To develop program in C# both in basic and advanced levels. To understand the concepts of the .NET framework as a whole and the technologies that constitutes the framework. To build sample applications and ready for large-scale projects. | | | | | | | |
| <p>INTRODUCTION TO C# Introducing C#, Understanding .NET, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, and Enumerations.</p> <p>OBJECT ORIENTED ASPECTS OF C# Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions.</p> <p>APPLICATION DEVELOPMENT ON .NET Building Windows Applications, Accessing Data with ADO.NET.</p> <p>WEB BASED APPLICATION DEVELOPMENT ON .NET Programming Web Applications with Web Forms, Programming Web Services.</p> <p>THE CLR AND THE .NET FRAMEWORK Assemblies, Versioning, Attributes, Reflection, Marshaling, Remoting, Threads.</p> | | | | | | | | |
| Text book(s): | | | | | | | | |
| 1 | E. Balagurusamy, "Programming in C#", Second Edition, Tata McGraw-Hill, 2009. | | | | | | | |
| 2 | J. Liberty, "Programming C#", Fourth Edition, O'Reilly, 2007. | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1. | Kogent Learning Solutions Inc, ".NET 4.5 Programming", Reprint Edition, DreamTech Press, 2014. | | | | | | | |
| 2. | Herbert Schildt, "The Complete Reference: C# 2.0", Second Edition, Tata McGraw-Hill, 2005. | | | | | | | |
| 3. | Robinson et al, "Professional C#", Third Edition, WroxPress, 2004. | | | | | | | |
| 4. | Andrew Troelsen, "Pro C# 2005 and the .NET 2.0 Platform", Third Edition, Apress, 2005. | | | | | | | |
| 5. | David Chappell, "Understanding .NET 2/E", Second Edition, Pearson Education, 2006. | | | | | | | |

| K.S. RANGASAMY COLLEGE OF TECHNOLOGY - AUTONOMOUS | | | | | | | | |
|---|---|---|---|-----------|--------|---------------|----|-----|
| 40PITE42- HADOOP FUNDAMENTALS | | | | | | | | |
| IT | | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | | C | CA | ES |
| III | 3 | 0 | 0 | 45 | 3 | 50 | 50 | 100 |
| Objective(s) | <ul style="list-style-type: none"> • To understand the Hadoop ecosystem • To download and Install Hadoop • To run MapReduce job. • To understand the techniques for moving log files into HDFS and Hive. • To design and implement testing techniques to write bulletproof MapReduce code. | | | | | | | |
| <p>HADOOP FUNDAMENTALS AND DATA LOGISTICS Introduction: Core Hadoop Components-Hadoop Ecosystem—Running Hadoop. Data Logistics: Key elements for data ingress and egress-Moving data into Hadoop - Moving data out of Hadoop.</p> <p>DATA SERIALIZATION AND BIG DATA MAPREDUCE PATTERNS Data Serialization: Inputs and Outputs in MapReduce-Processing Common Serialization Formats-Big Data Serialization Formats. Big Data Patterns: Applying Map Reduce patterns to Big data– Joining-Sorting-Sampling.</p> <p>BIG DATA PATTERNS AND RHADOOP Streamlining HDFS for big data-Utilizing data structures and algorithms:-Integrating R and Hadoop for Statistics-Predictive analysis with Mahout: Using Recommenders to make product suggestions-Clustering with k-means</p> <p>HIVE AND PIG Hacking with Hive: Hive Fundamentals-Data Analytics with Hive. Programming pipelines with Pig: Fundamentals- Using Pig to find malicious actors in log data-Optimizing user work flows with Pig.</p> <p>TESTING AND DEBUGGING Introduction to Crunch-Crunch log parsing and basic analytics-joins-cascading. Testing and Debugging: Testing-Debugging user space problems-Flume-Sqoop-Elephant bird-Python/Perl/ Ruby with Thrift.</p> | | | | | | | | |
| Text book(s): | | | | | | | | |
| 1. | Alex Holmes “Hadoop In Practice” DreamTech Press, 2014. | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1. | Tom White, “Hadoop: The Definitive Guide”, O’reilly publications, Jun 2012 | | | | | | | |
| 2. | Chuck Lam, “Hadoop in Action”, Manning, DreamTech Press, Jan 2011. | | | | | | | |

| K.S. RANGASAMY COLLEGE OF TECHNOLOGY - AUTONOMOUS | | | | | | | | |
|--|--|---|---|-----------|--------|---------------|----|-----|
| 40PITE43 - INFORMATION SYSTEM DESIGN | | | | | | | | |
| IT | | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | | C | CA | ES |
| III | 3 | 0 | 0 | 45 | 3 | 50 | 50 | 100 |
| Objective(s) | <ul style="list-style-type: none"> To understand information system management To identify organizational situations that can be supported by computerized management information systems (MIS) To provide hands-on experience on designing and implementing an automated system. | | | | | | | |
| <p>AN INTRODUCTION TO INFORMATION SYSTEMS Information Concepts, Information Systems in Organizations, Hardware: Input, Processing, and Output Devices - Software: Systems and Application Software - Database Systems, Data Centers, and Business Intelligence - Telecommunications and Networks - The Internet, Web, Intranets, and Extranets</p> <p>BUSINESS INFORMATION SYSTEMS Electronic and Mobile Commerce - Enterprise Systems - Information and Decision Support Systems - Knowledge Management and Specialized Information Systems.</p> <p>SYSTEMS DEVELOPMENT - 1(SRS) Systems Development: Investigation and Analysis - An Overview of Systems Development, Systems Development Life Cycles, Factors Affecting Systems Development Success, Systems Investigation, Systems Analysis.</p> <p>SYSTEMS DEVELOPMENT - 2 Systems Development: Design, Implementation, Maintenance, and Review - Systems Design, Systems Implementation - Systems Operation and Maintenance.</p> <p>INFORMATION SYSTEMS IN BUSINESS AND SOCIETY The Personal and Social Impact of Computers , Computer Waste and Mistakes, Preventing Computer-Related Waste and Mistakes, Computer Crime, Privacy Issues, The Work Environment.</p> | | | | | | | | |
| Text book(s): | | | | | | | | |
| 1. | George W. Reynolds, Ralph M. Stair, "Principles of Information Systems", Cengage Learning, 11 th edition, 2014. | | | | | | | |
| 2. | James A.O' Brien, "Introduction to Information Systems",Tata McGraw Hill publications, 12 th Edition ,2010. | | | | | | | |
| 3. | Ram Bansal 'Vigyacharya', "Information Systems Analysis and Design A Modern Approach to Systems Development", New Age International publications, 1 st Edition, 2000 and Reprint on 2008. | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1 | StevenAlter,"InformationSystems–AManagementPerspective",Pearson Education, 2001. | | | | | | | |
| 2 | S.A Kelkar, "Information Systems", PHI Learning Private Limited, 2009. | | | | | | | |
| 3 | Robert G. Murdick, Joel E. Ross andJamesR. Claggett, "Information Systems for Modern Management",PHI,1994. | | | | | | | |

| K.S. RANGASAMY COLLEGE OF TECHNOLOGY - AUTONOMOUS | | | | | | | | |
|--|---|---|---|-----------|--------|---------------|----|-----|
| 40PITE44 - RESEARCH METHODOLOGY - ENGINEERING AND MANAGEMENT STUDIES | | | | | | | | |
| IT | | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | | C | CA | ES |
| III | 3 | 0 | 0 | 45 | 3 | 50 | 50 | 100 |
| Objective(s) | <ul style="list-style-type: none"> To familiarize dimensions and methods of research. To make an informed choice from the large number of alternative methods and experimental designs available. To familiarize the nature of research and scientific writing | | | | | | | |
| <p>RESEARCH METHODOLOGY Research methodology – definition, mathematical tools for analysis, Types of research, exploratory research, conclusive research, modeling research, algorithmic research, Research process- steps. Data collection methods- Primary data – observation method, personal interview, telephonic interview, mail survey, questionnaire design. Secondary data- internal sources of data, external sources of data.</p> <p>SCALES AND MEASUREMENTS Scales – measurement, Types of scale – Thurstone’s Case V scale model, Osgood’s Semantic Differential scale, Likert scale, Q- sort scale. Sampling methods- Probability sampling methods – simple random sampling with replacement, simple random sampling without replacement, stratified sampling, cluster sampling. Non-probability sampling method – convenience sampling, judgment sampling, quota sampling.</p> <p>HYPOTHESES TESTING Hypotheses testing – Testing of hypotheses concerning means (one mean and difference between two means - one tailed and two tailed tests), Concerning variance – one tailed Chi-square test.</p> <p>SAMPLE TESTS Nonparametric tests- One sample tests – one sample sign test, Kolmogorov-Smirnov test, run test for randomness, Two sample tests – Two sample sign test, Mann-Whitney U test, K-sample test – Kruskal Wallis test (H-Test)</p> <p>ANALYSIS AND REPORT Introduction to Discriminant analysis, Factor analysis, cluster analysis, multidimensional scaling, conjoint analysis. Report writing- Types of report, guidelines to review report, typing instructions, oral presentation</p> | | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1. | Kothari, C.R., “Research Methodology –Methods and techniques”, New Age Publications, New Delhi, 2009. | | | | | | | |
| 2. | Panneerselvam, R., “Research Methodology”, Prentice-Hall of India, New Delhi, 2004. | | | | | | | |

| K.S. RANGASAMY COLLEGE OF TECHNOLOGY - AUTONOMOUS | | | | | | | | |
|---|---|---|---|-----------|--------|---------------|----|-----|
| 40PITE45 - FUZZY LOGIC AND NEURAL NETWORKS | | | | | | | | |
| IT | | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | | C | CA | ES |
| III | 3 | 0 | 0 | 45 | 3 | 50 | 50 | 100 |
| Objective(s) | <ul style="list-style-type: none"> To cater the knowledge of Neural Networks and Fuzzy Logic and use these information for controlling real time systems. To develop real time systems. | | | | | | | |
| <p>INTRODUCTION TO NEURAL NETWORKS Introduction-Architecture of Neural Networks – Characteristics of Neural Networks - Neural network learning rules - Back propagation Networks - Architecture of Back propagation networks - Perceptrons-Single layer Perceptron – Multilayer Perceptrons- Back propagation for feed forward networks</p> | | | | | | | | |
| <p>UNSUPERVISED NETWORKS Unsupervised Learning – Competitive Learning Networks – Kohonen self organising networks – Learning Vector Quantization – Hebbian Learning – Hopfield Network –Content Addressable Nature – Binary Hopfield Network – Continuous Hopfield Network</p> | | | | | | | | |
| <p>ASSOCIATIVE MEMEORIES AND ART Bidirectional Associative Memory – Principle Component Analysis-Auto correlators-Heterocorrelators-- Exponential Bidirectional Associative memory (BAM) – Adaptive Resonance Theory-Simplified ART Architecture- ART1</p> | | | | | | | | |
| <p>FUZZY LOGIC Fuzzy sets - Fuzzy Rules: Extension Principle, fuzzy measures - fuzzy relations - fuzzy functions-Fuzzy Reasoning.</p> | | | | | | | | |
| <p>FUZZY SYSTEMS AND APPLICATIONS Representation of fuzzy knowledge - Fuzzy inference systems- Mamdani Model – Sugeno Model – Tsukamoto Model – Fuzzy Applications</p> | | | | | | | | |
| Text book(s): | | | | | | | | |
| 1. | Jang J S R Sun C T and Mizutani E, “Neuro Fuzzy and Soft computing”, Pearson Education, (Singapore), 2004. | | | | | | | |
| 2. | S Rajasekaran and G A VijayalakshmiPai, “Neural networks Fuzzy logics andGenetic algorithms”, Prentice Hall of India, 2004. | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1. | DerongLiu , “Advances in Neural Networks--ISNN 2007 “, Springer, 2007. | | | | | | | |
| 2. | Timothy J Ross, “Fuzzy Logic Engineering Applications”, John Wiley and Sons, 2004. | | | | | | | |
| 3. | James A. Anderson, “An Introduction to Neural Networks”, Prentice Hall, 2002. | | | | | | | |

| K.S. RANGASAMY COLLEGE OF TECHNOLOGY - AUTONOMOUS | | | | | | | | |
|--|---|---|---|-----------|--------|---------------|----|-----|
| 40PITE46 - ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM | | | | | | | | |
| IT | | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | | C | CA | ES |
| III | 3 | 0 | 0 | 45 | 3 | 50 | 50 | 100 |
| Objective(s) | <ul style="list-style-type: none"> • To analyze the reasoning and decision making in uncertain world. • To construct plans and methods for generating knowledge. • To apply the concepts of expert systems in real world problems. | | | | | | | |
| <p>INTRODUCTION TO AI AND AI PROGRAMMING LANGUAGE What is Artificial Intelligence? – importance - AI and related fields- Knowledge Based System – Knowledge representation- Organization- Manipulation- LISP Introduction- Manipulation functions- Functions, predicate and conditionals- I/O and local variable- Iterations and recursion- Property List and Array- PROLOG introduction</p> <p>KNOWLEDGE REPRESENTATION Formalized symbolic logics- Truth maintenance system- default reasoning and closed world assumption- Fuzzy Logic and Natural language computations- probabilistic reasoning – introduction- Bayesian probabilistic interference- heuristic reasoning methods- Object Oriented representations.</p> <p>KNOWLEDGE ORGANIZATION AND MANIPULATION Introduction to Search and control strategies- Uniformed or blind search- Informed search – Introduction to matching Techniques- Structures- Measures- Patterns in matching- Partial Matching- Fuzzy matching algorithm- RETE matching algorithm- indexing & retrieval technique- Memory organization systems</p> <p>PERCEPTION, COMMUNICATION AND EXPERT SYSTEM Introduction to Natural language processing- linguistics, grammars and languages- parsing techniques- semantic analysis and representation structures- natural language generation- natural language systems-- Expert system Architectures- Rule based system Architectures, Nonproduction system Architectures- Uncertainty in Expert System- Knowledge system building tools</p> <p>KNOWLEDGE ACQUISITION Learning and their types- General learning model- performance measures- Machine Learning- Learning automata- Genetic algorithm- intelligent editors- Learning by Induction- degeneralization and specialization- Inductive bias- Analogical reasoning and learning- explanation based learning</p> | | | | | | | | |
| Text book(s): | | | | | | | | |
| 1. | Dan W. Patterson, "Introduction to Artificial Intelligence and Expert system", Prentice Hall of India, Delhi, Second Edition, 1990. | | | | | | | |
| 2. | Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", McGraw Hill, 2008. | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1. | Janakiraman, K.Sarukesi, "Foundations of Artificial Intelligence and Expert Systems", Macmillan Series in Computer Science, 2009. | | | | | | | |
| 2. | Stuart Russel and Peter Norvig, "Artificial Intelligence A Modern Approach", Second Edition, Pearson Education, 2003 / PHI. | | | | | | | |
| 3. | Deepak Khemani "Artificial Intelligence", Tata McGraw Hill Education, 2013. | | | | | | | |
| 4. | http://nptel.ac.in | | | | | | | |

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|---|---|---|---|-----------|--------|---------------|----|-----|
| 40PITE47 - ADVANCED COMPUTER ARCHITECTURE | | | | | | | | |
| IT | | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | | C | CA | ES |
| III | 3 | 0 | 0 | 45 | 3 | 50 | 50 | 100 |
| Objective(s) | <ul style="list-style-type: none"> To analyze the ISA design, instruction pipelining and performance related issues, To apply ILP with dynamic approaches and software approaches To analyze the different multiprocessor architectures and related issues, Memory and I/O systems and their performance issues. | | | | | | | |
| <p>INTRODUCTION Fundamentals of Computer Design – Measuring and reporting performance – Quantitative principles of computer design. Instruction set principles – Classifying ISA – Design issues. Pipelining – Basic concepts – Hazards – Implementation – Multicycle operations.</p> <p>INSTRUCTION LEVEL PARALLELISM WITH DYNAMIC APPROACHES Concepts – Dynamic Scheduling – Dynamic hardware prediction – Multiple issue – Hardware based speculation – Limitations of ILP.</p> <p>INSTRUCTION LEVEL PARALLELISM WITH SOFTWARE APPROACHES Compiler techniques for exposing ILP – Static branch prediction – VLIW – Advanced compiler support – Hardware support for exposing more parallelism – Hardware versus software speculation mechanisms</p> <p>MEMORY AND I/O Cache performance – Reducing cache miss penalty and miss rate – Reducing hit time – Main memory and performance – Memory technology. Types of storage devices – Buses – RAID – Reliability, availability and dependability – I/O performance measures – Designing an I/O system.</p> <p>MULTIPROCESSORS AND THREAD LEVEL PARALLELISM Symmetric and distributed shared memory architectures – Performance issues – Synchronization – Models of memory consistency – Multithreading.</p> | | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1. | John L. Hennessey and David A. Patterson, "Computer Architecture: A Quantitative Approach", Morgan Kaufmann, Third Edition ,2003. | | | | | | | |
| 2. | D.Sima, T.Fountain and P.Kacsuk, "Advanced Computer Architectures: A Design Space Approach", Addison Wesley, 2000. | | | | | | | |
| 3. | Kai Hwang and Zhi.Weii Xu, "Scalable Parallel Computing", Tata McGraw-Hill, New Delhi, 2003. | | | | | | | |

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|--|---|---|---|-----------|--------|---------------|----|-----|
| 40PITE48 - GAME THEORY | | | | | | | | |
| IT | | | | | | | | |
| Semester | Hours / Week | | | Total hrs | Credit | Maximum Marks | | |
| | L | T | P | | | C | CA | ES |
| III | 3 | 0 | 0 | 45 | 3 | 50 | 50 | 100 |
| Objective(s) | <ul style="list-style-type: none"> To know various algorithms in game theory. To deploy solutions for sequential games. | | | | | | | |
| <p>MATRIX TWO-PERSON GAMES Basics – The von Neumann Minimax Theorem – mixed strategies – solving 2×2 games graphically – graphical solution of $2 \times m$ and $n \times 2$ games.</p> <p>SOLUTION METHODS FOR MATRIX GAMES Solution of some special games – invertible matrix games – symmetric games – matrix games and linear programming – linear programming and the simplex method.</p> <p>TWO-PERSON NONZERO SUM GAMES Two –person nonzero sum games – basics – 2×2 bimatrix games – interior mixed nash points by calculus – nonlinear programming method for nonzero sum two person games.</p> <p>N-PERSON NONZERO SUM GAMES N –person nonzero sum games with a continuum of strategies – basics – economics applications of nash equilibria – duels – auctions.</p> <p>COOPERATIVE GAMES Cooperative games – coalitions and characteristics functions – The Nucleolus – The shapely value – bargaining.</p> | | | | | | | | |
| Reference(s) : | | | | | | | | |
| 1. | E.N.Barron “Game Theory an introduction” Wiley publication, 2014. | | | | | | | |
| 2. | Tirole, “Game Theory”, MIT press, 2005. | | | | | | | |
| 3. | Osborne, “An Introduction to Game Theory”, Oxford Press, 2006. | | | | | | | |
| 4. | E. N. Barron, “Game Theory: An Introduction”, Wiley India Pvt Ltd, 2009. | | | | | | | |