

## NATIONAL COLLEGE (AUTONOMOUS), TIRUCHIRAPALLI – 1

### M.Sc., Computer Science – Course Structure under CBCS

(Applicable to the candidates admitted from the academic year 2013-2014 onwards)

Sem	Course	Course Title	Instru. Hours/ week	Credit	Exam Hours	Marks			Total	
						Int.	Ext n.	O		
I	Core Course I	Mathematical Foundations for Computer Science	6	5	3	25	75	-	100	
	Core Course II	Object Oriented Analysis & Design	6	5	3	25	75	-	100	
	Core Course III	Advanced JAVA PROGRAMMING	6	5	3	25	75	-	100	
	Core Course IV	Programming in java Lab	6	5	3	25	70	5	100	
	Elective Course I	Distributed Operating System	6	4	3	25	75	-	100	
	<b>Total</b>		<b>30</b>	<b>24</b>					<b>500</b>	
II	Core Course V	Principles Of Micro –Computer Architecture	6	5	3	25	75	-	100	
	Core Course VI	Data Structure and Algorithm	6	5	3	25	75	-	100	
	Core Course VII	Advanced Database Systems	6	5	3	25	75	-	100	
	Core Course VIII	Data structure Lab	6	5	3	25	70	5	100	
	Elective Course II	Mobile Communications	6	4	3	25	75	-	100	
		<b>Total</b>		<b>30</b>	<b>24</b>	<b>15</b>				<b>500</b>
III	Core Course IX	Principles of Compiler Design	6	5	3	25	75	-	100	
	Core Course X	.NetFrameworks	6	5	3	25	75	-	100	
	Core Course XI	.NetFrameworks Lab	6	5	3	25	70	5	100	
	Elective Course III	Digital Image Processing	6	4	3	25	75	-	100	
	Elective Course IV	Multimedia Systems and design	6	4	3	25	75	-	100	
		<b>Total</b>		<b>30</b>	<b>23</b>					<b>500</b>
IV	Core Course XII	Data Mining And Data Warehousing	6	5	3	25	75	-	100	
	Core Course XIII	Computer Networks	6	5	3	25	75	-	100	
	Elective Course V	Software Quality Assurance and Testing	6	4	3	25	75	-	100	
	Project Work		12	5	3	25	75		100	
		<b>Total</b>		<b>30</b>	<b>19</b>					<b>400</b>
		<b>Grand Total</b>		<b>120</b>	<b>90</b>					<b>1900</b>

**Elective – I**

- 1. Distributed Operating System
- 2. Digital Asset Management
- 3. Network security

**Elective – II**

- 1. Mobile Communications.
- 2. Grid Computing.
- 3. Real time Operating System

**Elective – III**

- 1. Digital Image Processing.
- 2. Pattern Recognition.
- 3. Parallel processing

**Elective IV**

- 1. Multimedia Systems and design
- 2. Real Time and Embedded System.
- 3. Genetic Algorithm.

**Elective V**

- 1. Software Quality Assurance And Testing.
- 2. Artificial Neural Network.
- 3. Robotics

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**MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE – P13CS1**

**Semester : I**

**Core Course: I**

**Instruction Hours/Week: 6**

**Credit: 5**

**AIM**

To impart the mathematical concepts and numerical methods required to Computer Science.

**UNIT I**

**RECURSION AND RECURRENCE RELATION:** The many faces of recursion - Sequences - Recurrence relation - Some common recurrence relation - Generating functions.

**UNIT II**

**CODING THEORY:** Introduction - Cryptography - Caesar Cypher Coding - Matrix encoding

- Scrambled codes - Hamming metric - Hamming Distance - Error Detecting Capability of an encoding.

### UNIT III

**MATHEMATICAL LOGIC:** Propositions - evaluation - precedence rules -Tautologies - reasoning using equivalence transformation - laws of equivalence - substitution rules - a natural deduction system - Deductive proofs - inference rules - proofs and sub proofs.

### UNIT IV

**RELIABILITY THEORY:** Definition - Failure data analysis - MTTF and MTBF, Hazard Rate and Failure density. Hazard Models - Constant and Linearly increasing Hazard - Weibull's Model. System reliability.

### UNIT V

**NUMERICAL METHODS:** Polynomial Equations: Birge-Vieta, Graeffe's root squaring methods – Integration: Gauss Lagrange – Gauss Chebyshev – Gauss Laguerre and Gauss Hermite Methods.

### BOOKS FOR STUDY

1. Alan Doerr, Kenneth, Levasseur, "Applied Discrete Structure for Computer Science", Galgotia Pub., New Delhi, 1995, (Chapters : 8.1 - 8.5) (For UNIT-I).
2. James L. Fisher, "Application Oriented Algebra", Dun Donnelly Pub., 1977. (Chapter 9.1 to 9.5 only) (For UNIT-II ).
3. David Gries, "The Science of Programming", Narosa Pub. House, New Delhi, 1993. (Chapters 1,2,3.1 to 3.3) (For UNIT – III).
4. Srinath, L.S, "Reliability Engineering", East-West Press, 1975. (Chapters 2,3,4,6.1 to 6.9) (For UNIT – IV). M.K. Jain, S.R.K. Iyengar, R.K.Jain, "Numerical Methods for Scientific and Engineering Computation", 3rd Ed., New Age Pub., New Delhi, 1992, Chapters: 2.8.5.8 (For UNIT-V)

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### OBJECT ORIENTED ANALYSIS & DESIGN – P13CS2

**Semester : I**

**Core Course: II**

**Instruction Hours/Week: 6**

**Credit: 5**

### UNIT-I

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

**UNIT-II**

Various object oriented methodologies – Introduction to UML .

**UNIT-III**

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

**UNIT-IV**

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

**UNIT-V**

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

**TEXT BOOK:**

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

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**ADVANCED JAVA PROGRAMMING – P13CS3**

**Semester : I**

**Core Course: III**

**Instruction Hours/Week: 6**

**Credit: 5**

**Unit I**

JDBC Overview - Connection Class - MetaData Function - SQLException - SQL Warning - Statement - ResultSet - Other JDBC Classes.

**Unit II**

InetAddress - TCP/ IP client sockets - TCP/ IP server sockets - URL - URL Connection - Datagrams - Client/ Server application using RMI.

**Unit III**

Bean Development Kit - Jar Files - Introspection - Design Pattern for properties, events and methods - Constrained Properties - Persistence – Customizers

**Unit IV**

Life Cycle of Servlet - Generic Servlet - HTTP Servlet - Reading Initialization Parameters - Reading Servlet Parameters - Cookies - Session Tracking

**Unit V**

JApplet - Button - Combo - Trees - Tables - Panes - AWT Classes - working with Graphics, Color and Font

### Text Books

1. Patrick Naughton & Herbert Schildt, "The Complete Reference: Java 2", Tata McGraw Hill, 1999. (Chapter - 18, 21, 24, 25, 26, 27)
2. Joseph Weber, "Using Java 2 Platform", Prentice Hall of India, 2000. (Chapter - 39, 40)

### References

1. Deitel & Deitel, "Java How to Program", Prentice Hall, 5th Edition ,2002
2. Peter Hagggar, "Practical Java: Programming Language Guide", Addison-Wesley Pub Co, 1st Edition, 2000
3. Bruce Eckel, "Thinking in Java", Pearson Education Asia, 2nd Edition, 2000

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### JAVA PROGRAMMING LAB – P13CS4

**Semester : I**

**Core Course: IV**

**Instruction Hours/Week: 6**

**Credit: 5**

1. Assume that a bank maintains 2 kinds of account for its customers, one called savings account and the other current account, The savings account provides compound interest and withdraw facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account falls below this level a service charge is imposed.

Create a class Account that stores customers name, account number and type of account. From this derive the classes curr-acct and sav-acct to make them more specific to their requirements. Introduce the necessary methods in order to achieve the following tasks:

- a. Accept deposit form a customer and update the balance.
- b. Display any deposit interest
- c. Compute and deposit interest.
- d. Permit withdrawal and update the balance.
- e. Check for the minimum balance, impose penalty, if necessary and update the balance. Use constructors and methods to initialize the class members.

2. Write a program that accepts a shopping list of five items from the command line and stores them in a vector and accomplish the following:

- a. To delete an item in the list.
- b. To add an item at a specified location in the list.
- c. To add an item at the end of the list.
- d. To print the contents of the vector.

3. Implementation of the concept of multiple inheritance using interfaces and design a package to contain the class students and another package to contain the interfaces sports.
4. Develop a simple real-life application program to illustrate the use of multithreads.
5. Create a try block that is likely to generate three types of exception and then incorporate necessary catch blocks to catch and handle them appropriately.
6. Write a Java applet, which will create the layout below :

FORMAT Enter your Name :

Enter your Age : Select City : \*Delhi \*Madras Select S/W : \*Oracle \*Visual Basic \*Java OK

CANCEL Handle the following simple validations. The name entered should be less than 25 characters wide. Age entered should be done as the user exits the fields as well as when OK button is pressed. Hint use the Boolean action (Event evt, object arg).

7. Write an Applet program to create Animation.

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### **ELECTIVE COURSE I : 1. DISTRIBUTED OPERATING SYSTEMS - P13CS5E**

**Semester : I**

**Elective Course: I**

**Instruction Hours/Week: 6**

**Credit: 4**

#### **Unit I**

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

#### **Unit II**

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

#### **Unit III**

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

**Unit IV**

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

**Unit V**

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

**Text Book** Distributed Operating Systems – Concepts and Design, Pradeep K Sinha, PHI, 2003

**References:** Distributed Operating Systems 1e, Andrew S Tanenbaum, PHI.

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**ELECTIVE COURSE I : 2. NETWORK SECURITY - P13CS5E**

**Semester : I**

**Elective Course: I**

**Instruction Hours/Week: 6**

**Credit: 4**

**Unit I**

Overview-Symmetric Ciphers: Classical Encryption Techniques

**Unit II**

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

**Unit III**

Network Security Practices: Authentication applications-Electronic Mail Security

**Unit IV**

Network Security Practices: IP Security-Web Security

**Unit V**

System Security: Intruders-Malicious Software-Firewalls

**Text Book(s)**

1. William Stallings, Cryptography and Network Security-Principles and Practices, Prentice-Hall, Third edition, 2003 **References** 1. Johannes A. Buchaman , Introduction to cryptography, Springer-Verlag.

2. Atul kahate , Cryptography and Network Security, TMH.

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**ELECTIVE COURSE I : 3. DIGITAL ASSET MANAGEMENT- P13CS5E**

**Semester : I**

**Elective Course: I**

**Instruction Hours/Week: 6**

**Credit: 4**

**Unit I :**

Creating Digital Content - Digital Primer, Any Content – Anywhere, Anytime, Digital Content Consumer, Tools And The Trade, Digital Recording, CGI And Digital Content Creation, Digital Audio, Rich Media, Streaming Media, Digital Interactive Television, Digital Cinema.

**Unit II :**

Compressing And Indexing - Document Databases, Compression, Indexes, Text Compression, Indexing Techniques, Image Compression, Mixed Text And Images.

**Unit III :**

Content Management - Systems For Managing Content, The Enterprise Content Management System (CMS), Major Parts Of A CMS, Need For A CMS, Roots Of Content Management, Branches Of Content Management.

**Unit IV :**

Design Of CMS - The Wheel Of CMS, Working With Metadata, Cataloging Audiences, Designing Publications, Designing Content Components, Accounting For Authors, Accounting For Acquisition Sources.

**Unit V :**

Building CMS - Content Markup Languages, XML And Content Management, Processing Content.

**Textbook:**

1. John Rice And Brian Mckerman (Editors), Peter Bergman, "Creating Digital Content", Mcgraw-Hill, USA, 2001[Unit 1]
2. Ian H Witten, Alistair Moffat, Timothy C Bell, "Managing Gigabytes", Academic Press, USA, 1999 [Unit 2]
3. Bob Boiko, "Content Management Bible", John Wiley & Sons, USA, 2001 [Units 3,4,5]

**Reference book:**

- 1 .Abdreas Ulrich Mauthe And Peter Thomas, "Professional Content Management Systems – Handling Digital Media Assets", John Wiley & Sons, USA, 2004
2. Dave Addey, James Ellis, Phil Suh, David Thiemecke, "Content Management Systems (Tool Of The Trade)", Apress, USA, 2003.

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**PRINCIPLES OF MICRO-COMPUTER ARCHITECTURE – P13CS6**

**Semester : II**

**Core Course: V**

**Instruction Hours/Week: 6**

**Credit: 5**

**Objectives:** To Learn the Concepts of 8086Architecture,Logical Instructions,IO Programming and interface, the Pentium and Pro Microprocessor

**UNIT-I**

8086 Architecture: CPU Architecture-Machine Language Instructions-The 8088 Assembler Language Programming: Assembler Instruction Format-Data Transfer Instructions-Arithmetic Instructions-Branch Instructions-Loop Instructions-NOP and HLT instructions-Flag Manipulation Instructions.



## **UNIT-II**

Logical Instruction-Shift and Rotate Instructions-Byte and String Manipulation:String Instructions-REP Prefix. Modular Programming:Linking And Relocation- Stacks-Procedures- Interrupts And Interrupt Routines-Macros.

## **UNIT-III**

I/O PROGRAMMING(I/O Instructions Only) Fundamental I/O considerations- Programmed I/O-Interrupt I/O- Block Transfer and DMA basic. System Bus Structure: Basic 8086/8088 Configurations-Interrupt Priority Management

## **UNIT-IV**

I/O INTERFACES: 8251A Programmable Communication Interface- 8255A Programmable Peripheral Interface-Programmable Timers And –Event Counters.Intel’s 8254 Programmable Interval Timer – DMA Controllers.

## **UNIT-V**

THE PENTIUM AND PRO MICROPROCESSORS : Introduction to the Pentium Microprocessors- Pentium Memory Management-New Pentium Instructions-Introduction to the Pentium Pro Processor- Special Pentium Profeatures- The Pentium II,Pentium III and Pentium 4 Microprocessors: Introduction to the Pentium II Microprocessor- Pentium II software Changes- The Pentium III- The Pentium 4.

## **TEXT BOOK:**

- 1.YU-Cheng Liu and Glenn A.Gibson, “Microcomputer system: The 8086/8088 family”, 2001, Prentice- Hall of India, Second edition.
2. Barry B.Brey, “The Intel Microprocessors”, 2002,sixth Edition, Prentice Hall of India Pvt. Limited.UNITS- I,II,III,IV : Chapters 2: (2.1.2.3,2.5),3(3.1-3.9),4(4.1-4.5),5(5.1-5.2) Chapters 6(6.1-6.4),8(8.1-8.3),9(9.1.4,9.2.1,9.3.1,9.5) UNIT V Chapters 18: (18.1,18.3-18.6) Chapters 19: (19.1-19.4)

## **REFERENCES BOOK:**

1. V.Korneev,A.Kiselec, “MordernMicroprocessors”,2005,Dreamtech,Press,New Delhi,Third Edison.
2. Badri Ram, “Advanced Micro Processors and Interfacing” 2003, Tata McGraw-Hill Publishing cmp Ltd., New Delhi.
3. CharlesM.Gilmore, “Microprocessors Principles and Application”,2005/2003 Tata McGraw, Second Edition.
4. S.P.Chowdhry Sunetre Chowdhry, “Micro Processor and Peripherals”, 2004, Scitech Publication (India) Pvt.Ltd.

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## DATA STRUCTURES AND ALGORITHMS – P13CS7

Semester : II

Core Course: VI

Instruction Hours/Week: 6

Credit: 5

**Objectives:** To give a detailed knowledge on Data structures and to give an exposure in the development of algorithms related to data structures.

**UNIT I: Elementary data structures:** **Stack:** Definition – Operations (PUSH & POP) – Application (Conversion of Infix Expression to Postfix & Evaluation of PostfixExpression)  
**Queue:** Definition - Operations (Insertion & Deletion) **Linked List:** Concepts –Single linked List: Operation (Insertion & Deletion) – CircularLinked List - Definition and Double linked List: Operation (Insertion & Deletion) –Application (Polynomial Addition)

**UNIT II: Trees :** Binary trees – Threaded Binary tree – Binary Search Trees – AVL Search Tree – m-way search tree – B Trees – Heap Sort – Huffman’s Algorithm – General Trees.

**UNIT III: Graphs :** Introduction, Terminology, Representation, Traversing and Application (Topological Sorting) **Sorting:** Selection Sort, Bubble Sort , Merge Sorting , Quick Sort (Partition-ExchangeSort) and Radix Sort , **Searching:** Hash-Table Methods

### UNIT IV:

**Algorithm** – Algorithm Specification – Performance Analysis **Divide – And Conquer :** The General Method – Binary Search – Finding Maximum and Minimum. **The Greedy Method :** The General Method –Minimum Cost Spanning Trees – Single Source Shortest Paths (Dijkstra’s Algorithm)

### UNIT V:

**Dynamic Programming :** The General Method – Multistage Graphs – All Pairs Shortest Paths – Single Source Shortest Paths **Backtracking :** The General Method – The 8 Queens Problem – sum of subsets.

### Text Book

1. Jean-Paul Tremblay and Paul G. Sorenson “An Introduction To Data Structures With Applications “ , Tata McGraw-Hill , Second Edition

**UNIT I :** Chapters 3 (3-4 to 3-7 and 4.2.1 to 4.2.3 and 4-3.1 )

**UNIT III :** Chapters 5 (5-4.1 to 5.4.6 and 5.5.3)

6 (6.1.1 to 6.1.7) , 6.2.4

2. Seymour Lipschutz “ Data Structures” (Schaum’s Outlines)

**UNIT II** : Chapters 7

3. Ellis Horowitz , Satraj Sahni and Sanguthevar Rajasekaran “Computer Algorithms “ , Galgotia , 1999

**UNIT IV** : Chapters 1 (1.2 to 1.3), 3 (3.1 to 3.3) and 4( 4.5 and 4.8)

**UNIT V** : Chapters 5 (5.1 to 5.4) and 7 (7.1 to 7.3)

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### **ADVANCED DATA BASE SYSTEM – P13CS8**

**Semester** : II

**Core Course: VII**

**Instruction Hours/Week: 6**

**Credit: 5**

#### **Objectives**

To impart knowledge about relational database and distributed database.

#### **Unit I**

Introduction: Database System Applications-Database Systems versus File Systems- Views of Data-Data Models-Database Languages-Database Users and Administrators. ER Model: Basic Concepts-Constraints-Keys-ER Diagram-Weak Entity Sets.

#### **Unit II**

Relational Model: Structure-Relational Algebra-Tuple Relational Calculus- Domain Relational Calculus. Relational Databases: SQL- Basic Structure-Set Operations- Aggregate Functions- Nested Subqueries - Views-Modification of Database-Joined Relations- Data definition language - Query by Example.

#### **Unit III**

Relational Database Design: Pitfalls in Relational Database Design. Functional Dependencies: Basic definitions- Trivial and nontrivial dependencies-Closure of a set of dependencies- Nonloss decomposition-First, Second and third Normal Forms- Boyce/Codd normal form- Multivalued dependencies and fourth normal form-Join Dependencies.

#### **Unit IV**

Transactions: Concepts – State – Concurrent Executions - Serializability- Testing for Serializability. Concurrency Control: Lock-Based Protocols-Timestamp Based Protocols- Validation Based Protocols. Recovery System: Failure Classification-Storage Structure- Recovery and Atomicity-Log Based Recovery.

## Unit V

Database System Architectures: Centralized and C/S Architectures-Server System Architectures-Distributed Systems. Distributed Database: Homogeneous and Heterogeneous Database-Distributed Data Storage-Distributed Transactions-Commit Protocols –Concurrency Control in Distributed Database-Distributed Query Processing- Heterogeneous Distributed System.

### Books for study :

Silberschatz, Korth, Suderson, "DATABASE SYSTEM CONCEPTS" 4THedition McGraw-Hill International Edition.

**Unit II** - C.J Date, "An Introduction to DATABASE SYSTEM" Connolly & Begg 7<sup>th</sup> Edition Pearson Education Asia.

### Reference:

- 1.Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Data Base Systems", Addison Wesley, Third Edition, 2000
2. "Connolly & Begg , "Database System" Pearson Education

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## DATA STRUCTURES Lab – P13CS9P

**Semester : II**

**Core Course: VIII**

**Instruction Hours/Week: 6**

**Credit: 5**

### Using C++

1. Create a class Array
2. Create a class Stack
3. Convert Infix to Postfix and evaluate Postfix using Stack class
4. Create classes Queue and Circular Queue

### 5. Sorting

- a) Bubble Sort
- b) Heap Sort

### 6. Searching

- a) Linear Search
- b) Binary Search

7. Operations on Linked List
8. Operations on Doubly Linked List
9. Operations on Binary tree and Traversals

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**ELECTIVE II : 1. MOBILE COMMUNICATIONS – P13CS10E**

**Semester : II**

**Elective Course: II**

**Instruction Hours/Week: 6**

**Credit: 4**

**Objectives:** To learn the concepts of Mobile, Telecommunications System, Wireless LAN and WAP

**Unit I**

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

**Unit-II:**

**Telecommunications system:** Telecommunications system-**GSM:** Mobile Services-

**Architecture:** RSS, NSS, OSS-Radio interface-Protocols-Localizing and Calling-Handover-Security.**UMTS & IMT-2000:** UMTS architecture-**Radio interface:** UTRA-FDD(W-CDMA), UTRA-TDD(TD-CDMA)-Handover.**Satellite System:** Applications-Basics: GEO, LEO, MEO-Routing-Handover.

**Unit-III:**

**Wireless LAN:** Advantages, Disadvantages-IEEE802.11-Architecture-Protocol Architecture-**Physical**

**Layer:** Frequency hopping spread spectrum(FHSS), DSSS, Infra red-**MAC layer:** Basic using CSMA/CA, RTS/CTS extension, MAC frames –MAC management: Synchronization, Power management, Roving.**Hiper LAN:** Hiper Lan1-WATM-Handover-QOS-Access Scenarios-BRAN.

**Bluetooth:** Architecture-Radio layer-Baseband layer-LMP-L2CAP-Security.

**Unit-IV:**

**Mobile Network Layer:** Mobile IP-Goals-terminology-IP packet delivery-Agent discovery-Registration-**Tunneling and encapsulation:** IP-in-IP-minimal-Generic routing encapsulation.

**Reverse tunneling-IPV6-DHCP-Mobile ad-hoc network:** Routing-DSDV-Dynamic source routing-

**Overview of ad-hoc routing protocols:** Flat ad-hoc routing-Hierarchical ad-hoc routing-Geographic positions-Assisted adhoc routing.

**Unit-V:**

**Wireless Application Protocol:** Architecture-WDP-WTP: WTP class 0-WTP class 1-class 2-WSP-WML: WMLScript-WTA-PUSH Architecture: gateway PAP-OTA Protocol-Services.

**Text Book(s)**

1. Jochen Schiller, "Mobile Communication", Pearson Education, Delhi, 2000.

**References**

1. "The Wireless Application Protocol: Writing Applications for the Mobile Internet", Sandeep Singhal, et al.

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**ELECTIVE II : 2. GRID COMPUTING – P13CS10E**

**Semester : II**

**Elective Course: II**

**Instruction Hours/Week: 6**

**Credit: 4**

**Unit I**

Introduction: Grid Computing & Key Issues – Applications – Other Approaches – Grid Computing Standards – Pragmatic Course of Investigation.

**Unit II**

Grid Benefits & Status of Technology: Motivations – History of Computing, Communications and Grid Computing – Grid Computing Prime Time – Suppliers and Vendors – Economic Value – Challenges.

**Unit III**

Components of Grid Computing Systems and Architectures: Basic Constituent Elements-A Functional View – A Physical View – Service View.

**Unit IV**

Grid Computing Standards-OGSI: Standardization – Architectural Constructs – Practical View – OGSA/OGSI Service Elements and Layered Model – More Detailed View.

**Unit V**

Standards Supporting Grid Computing-OGSA: Functionality Requirements – OGSA Service Taxonomy – Service Relationships – OGSA Services – Security Considerations.

**Text Book(s)**

1. A Networking Approach to Grid Computing, Daniel Minoli, Wiley Publication

**References**

1. Grid Computing – A Practical Guide to Technology and Applications, Ahmar Abbas, Charles River Media Publication.

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**ELECTIVE II : 3. REAL TIME OPERATING SYSTEMS (RTOS)- P13CS10E**

**Semester : II**

**Elective Course: II**

**Instruction Hours/Week: 6**

**Credit: 4**

**Unit I**

Introduction, Real-time Versus Conventional Software, Computer Hardware for Monitoring and Control, Software Engineering Issues. Process and State-based Systems model, Periodic and Sporadic Process, Cyclic Executives, CE definitions and Properties, Foreground-Background

Organizations, Standard OS and Concurrency – Architectures, Systems Objects and Object-Oriented Structures, Abstract Data Types, General Object Classes

### **Unit II**

Requirements and Design Specifications: Classification of Notations, Data Flow Diagrams, Tabular Languages, State Machine, Communicating Real Time State Machine- Basic features, Timing and clocks, Semantics Tools and Extensions, State charts - Concepts and Graphical Syntax, Semantics and Tools. Declarative Specifications: Regular Expressions and Extensions, Traditional Logics - Propositional Logic, Predicates, Temporal logic, Real time Logic

### **Unit III**

Deterministic Scheduling : Assumptions and Candidate Algorithms, Basic RM and EDF. Results, Process Interactions-Priority Inversion and Inheritance Execution Time Prediction: Measurement of Software by software, Program Analysis with Timing Schema, Schema Concepts, Basic Blocks, Statements and Control, Schema. Practice, Prediction by optimisation, System Interference and Architectural Complexities

### **Unit IV**

Timer Application, Properties of Real and ideal clocks, Clock Servers – Lamport’s Logical clocks, Monotonic Clock service, A software Clock server, Clock Synchronization- Centralized Synchronization, Distributed Synchronization. Programming Languages: Real Time Language Features, Ada-Core Language, Annex Mechanism for Real Time Programming, Ada and Software Fault Tolerance, Java and Real-time Extensions, CSP and Occam

### **Unit V**

Operating Systems: Real Time Functions and Services, OS Architectures-Real Time UNIX and POSIX, Issues in Task management- Processes and Threads, Scheduling, Synchronization and communication

### **Text book:**

1. Real – Time Systems and software by Alan C. Shaw ; John Wiley & Sons Inc,2002

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## **PRINCIPLES OF COMPILER DESIGN – P13CS11**

**Semester : III**

**Core Course: IX**

**Instruction Hours/Week: 6**

**Credit: 5**

### **Objectives:**

To understand the various phases of a compiler and to develop skills in designing a compiler.

### **Unit I :**

Compiler - Phases of Compiler – Compiler writing tools – Lexical Analysis – Role of Lexical analyzer – Finite Automata – Regular Expression – From a Regular expression to an NFA , NFA to DFA – Design of Lexical Analyzer.

## Unit II

Syntax Analyzer – CFG – Role of the Parser – CFG – Top Down Parsing – Recursive descent parsing, predictive Parsers – Bottom up Parsing – Shift reduce, operator precedence parsers, LR Parsers.

## Unit III

Syntax directed definition :- Construction of Syntax trees – Intermediate code generation – Intermediate Languages – Syntax trees, post fix form, Three address code – Boolean expressions – Back Patching.

## Unit IV

Symbol table – contents of Symbol table – Data Structures for Symbol table – Runtime storage Administration – Implementation of Stack allocation scheme block structured Languages – Storage allocation in Fortran.

## Unit V

Code Optimization and code generation – principles sources of optimization – loop optimization – Dag Representation of Basic blocks.

Code generation – problems in code generation – a simple code generator – Register allocation and Assignment – Peephole optimization.

### Text Book:

1. Compilers Principles ,Techniques and Tools, Alfred V.Aho, Ravi Sethi, Jeffrey D.Ullman.

Chapters: 1.1,1.3,1.6,3.1,3.6,3.7,3.9.

4.1,4.2,4.4 – 4.6,5.1,5.2,7.5,8.1,8.4,8.6.

2. Principles of Compiler Design, Alfred V.Aho and Jeffrey D.Ullman.

Chapters: 9.1,9.2,10.1,10.2,10.3,12.1,12.2,12.3,15.2,15.4,15.5,15.7

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## .NET Frame Work – P13CS12

**Semester : III**

**Instruction Hours/Week: 6**

**Core Course: X**

**Credit: 5**

### Objectives

On successful completion of the course the students should have:

- Understood the trends and principles of .Net framework
- Gained problem solving skills using C#.

Contents

### UNIT I

Introduction to .NET frame work - . NET objects – ASP .NET - .NET Web services – Windows forms Introduction to C# - Understanding c# in .NET - Overview of C# - Literals,variables and



data types **VB .NET: Elements:** Variables and constants – data types declaration. Operators – types – precedence. Expressions.

**UNIT II**

ASP .NET - Operators, Expressions, Branching and looping operations – Methods, Arrays, Strings Structures and Enumerations – Classes and Objects – Inheritance and Polymorphism, Multiple Inheritances

**UNIT III**

**Features of ADO.NET.** Architecture of ADO.NET-ADO.NET providers-Connection-Command-Data Adapter-Dataset.**Accessing Data with ADO.NET:** Connecting to Data source,Accessing Data set and data Reader-Create an ADO.NET application-Using stored procedures, crystal report .

**UNIT: IV**

**VB .NET: Elements:** Variables and constants – data types declaration. Operators – types – precedence. Expressions. Program flow – Decision statements – if.. then, if..then..else, select..case – Loop statements – while..end while,do..loop,for..next,for..each..next.

**UNIT: V**

**Types:** Value data types – Structures, Enumerations. Reference data types – Single – dimensional – Multi-dimensional arrays – jagged arrays – dynamic arrays. **Windows programming** – creating windows Forms – windows controls.**Menus and Dialog Boxes:**Creating menus-Menu items-context menu-Using dialog boxes- showDialog()method.

**Text Book:**

- 1.Edwin Dayananand&J.Joselin, DOT NET Programming,N.V.Publications
2. E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, 2002
3. David S. Platt, "Introducing Microsoft .NET", Microsoft Press, SAARC Edition, 2001
4. Microsoft, "C# Language Specifications", Microsoft Press, 2001

**Reference Book:**

1. Mark Michaelis, "Essential C# 3.0: For .NET Framework 3.5, 2/e, Pearson Education
2. Shibi Parikkar, "C# with .Net Frame Work", Firewall Media.

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**.NET LAB – P13CS13P**

**Semester : III**

**Core Course: XI**

**Instruction Hours/Week: 6**

**Credit: 5**

1. Design ASP.Net web form using Html Server Control to enter job seeker’s details.
2. Create an ASP.Net web form using web control to enter E-Mail registration form.
3. Apply appropriate validation techniques in E-Mail registration form using validation controls.

4. Write an ASP.Net application to retrieve from data and display it the client browser in a table format.
  5. Create a web application using ADO.Net that uses which performs basic data manipulations:
    - (i) Insertion (ii) Updating (iii) Deletion (iv) Selection

Hint: Operations using Ms-Access and SQL-Server
  6. Create an application using Data grid control to access information's from table in SQL server.
  7. Create an application using Data list control to access information's from table in SQL server and display the result in neat format.
- Case Studies (Must include basic database operations such as insertion, deletion, modification, Selection and searching)
8. Job Search Portal using Crystal report.
  9. College portal.
  10. Company portal.

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**ELECTIVE – III :1. DIGITAL IMAGE PROCESSING – P13CS14E**

**Semester : III**

**Elective Course: III**

**Instruction Hours/Week: 6**

**Credit: 4**

**Unit I :**

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

**Unit II :**

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

**Unit III :**

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

**Unit IV :**

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

**Unit V :**

IMAGE DATA COMPRESSION AND IMAGE RECONSTRUCTION FROM PROJECTIONS  
Image data rates, pixel coding, predictive techniques transform coding and vector DPCM, Block truncation coding, wavelet transform coding of images, color image coding. Random transform, back projection operator, inverse random transform, back projection algorithm, fan beam and algebraic restoration techniques.

**Book for study :**

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

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**ELECTIVE –III 2. PATTERN RECOGNITION – P13CS14E**

**Semester : III**

**Elective Course: III**

**Instruction Hours/Week: 6**

**Credit: 4**

**Unit I :** Introduction and Bayesian Decision Theory-Introduction to pattern recognition, Systems, design cycles, learning and adaptation, Bayesian decision theory, minimum error-rate classification, classifiers, discriminant functions and decision surfaces.

**Unit II:** Maximum – Likelihood and Bayesian parameter estimation - Maximum – Likelihood estimation, Bayesian estimation, Bayesian parameter estimation, Gaussian case and general theory, problems of identifiability, Hidden Markov models.

**Unit III :** Nonparameter Techniques - Density estimation, Parzen windows, K<sub>n</sub> – Nearest neighbour, estimation, The nearest neighbour, metric and nearest – neighbour, classification, fuzzy classification, approximation by series expansions.

**Unit IV :** Linear Discriminant functions - Linear discriminant functions and decision surfaces, generalized linear discriminant functions, The two category uncorrelated case, minimizing the perception criterion function, relaxation procedures, nonreversible behaviour, Minimum squared-error procedures, The Ho – Kashyap Procedures, support vector machines, multicategory generalization.

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

**Text / Reference Books:**

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

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**Elective – III : 3. PARALLEL PROCESSING – P13CS14E**

**Semester : III**

**Elective Course: III**

**Instruction Hours/Week: 6**

**Credit: 4**

**Unit:I**

Introduction to Parallel Computing – Motivating Parallelism – Scope of Parallel Computing – parallel programming platforms : Implicit parallelism trend in microprocessor architecture – Limitations of memory system performances – Dichotomy of parallel platforms – Physical organization of platforms Communication cost in parallel machines – Routing mechanism for interconnection networks.

**Unit:II**

Principles of parallel algorithm Design – Preliminaries – Decomposition techniques – Characteristics of task and interactions – Mapping techniques for load balancing

**Unit:III**

Methods for containing interaction overhead – Parallel Algorithm models – one –to – All Broadcast and All – to – One Reduction – All – to – All Broadcast and Reduction

**Unit:IV**

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

**Unit :V**

Sorting – Issues in sorting on parallel computers – Sorting Networks – Bubble sort and its variables – Quicksort – Bucket and sample sort – Others sorting algorithms

**Text Book:**

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

**References**

1. Introduction to Parallel Processing Algorithms and Architecture, Bchrooz Parhami, Plenum Series, 2002

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**ELECTIVE COURSE – IV 1.MULTIMEDIA SYSTEMS AND DESIGN – P13CS15E**

**Semester : III**

**Elective Course: IV**

**Instruction Hours/Week: 6**

**Credit: 4**

**Objectives:**

To provide a sound knowledge in various concepts of Multimedia and its applications.

**Unit I**

Introduction – Definition – Multimedia Hardware – Multimedia Software – Multimedia Networking – Multimedia Applications – Multimedia Environments – Multimedia Computer Components – Multimedia Standards – Multimedia PC.

**Unit II**

Multimedia Information Systems : Limitations in workstation Operating Systems . Middleware System services Architecture: Goals of Multimedia System Services – Multimedia System Services Architecture Text : Elements of Text – Using Text in Multimedia Applications – Graphics : Element of Graphics – Images and color – Graphics file and Application formats – Obtaining Images for Multimedia use – Using Graphics on multimedia applications.

**Unit III**

Digital Audio Representation and Processing : Uses of Audio in Computer applications – Digital Representations of sound – Transmission of Digital Sound – Digital Audio Signal Processing, Video Technology : Raster Scanning Principles – Sensors for TV Cameras – Color fundamentals – Color Video – Digital Video and Image Compression: Evaluating Compression System – Video Compression techniques – JPEG Image compression standard – MPEG motion Video compression standard.

**Unit IV**

Multimedia Communications Systems : Applications Network Services – Network Protocols. Multimedia Conferencing : Teleconferencing systems – Requirements for Multimedia Communications – Multimedia Conferencing Architectures.

## **Unit V**

Multimedia and Internet : Internet – Client/Server technology – Communications protocol – Internet addressing – Internet functions – HTML and Web Authoring.

Multimedia Development Team : Team approach – Assembling multimedia Production Team – Multimedia Development Process : Multimedia Project – Structured Multimedia Development – Casting multimedia Project.

### **Books for Study :**

1. For Unit I : Tay Vaughan , "Multimedia making it work " , 4th Edition Tata McGraw – Hill Edition , 2000
2. For Units II, III, IV : John F. Koegel Buferd, "Multimedia Systems", Published by Addison Wesley Longman. 3rd Edition year 2000.
3. For Unit V: David Hillman, "Multimedia Technology and Applications " ,Galgotia Publications Pvt. Ltd.,Year 1998.

### **Reference :**

**Fred T.Hofstetter, "Multimedia Literacy", McGraw Hill, 1995.**

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## **ELECTIVE – IV : 2. REAL TIME AND EMBEDDED SYSTEM – P13CS15E**

**Semester : III**

**Elective Course: IV**

**Instruction Hours/Week: 6**

**Credit: 4**

### **Unit I**

INTRODUCTION: Introduction to Embedded systems – Processor and memory organization- Devices and buses for Device Networks – Device drivers and Interrupt servicing mechanism.

### **Unit II**

RTOS : RTOS – Programming tools – Case studies- Hardware- software Co0design in an Embedded system

### **Unit III**

REAL TIME SYSTEMS : Basic Real time concepts – Computer hardware – Language issues – Software life Cycle

### **Unit IV**

REAL TIME SPECIFICATIONS: Design techniques – Real-time kernels – Intertask communication and synchronization – Real –time memory management

### **Unit V**

MULTIPROCESSING SYSTEMS : Multiprocessing Systems - Hardware/Software integration- Real time Applications

### Text Book(s)

1. Raj Kamal, 'Embedded Systems Architecture, Programming and Design', Tata Mc-Graw-Hill,2003
2. Phillip A.Laplante, "Real –Time Systems Design and Analysis, An Engineer's Handbook", Prentice-Hall of India,2002

### References

1. R.J.A.Buhr, D.L.Bailey, "An Introduction to Real Time Systems: Design to networking with C/C++", Prentice- Hall, International, 1999.
2. Grehan Moore and Cyliax, "Real Time Programming: A guide to 32 Bit Embedded Development Reading: Addison- Wisley-Longman", 1998.
3. Haeth, Steve, "Embedded systems Design", Newnes,1997.

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### ELECTIVE –IV :3. GENETIC ALGORITHM – P13CS15E

**Semester : III**

**Elective Course: IV**

**Instruction Hours/Week: 6**

**Credit: 4**

#### Unit I :

Basics of biological evolution - Darwin, DNA, etc. Basics of Gas – selection, recombination and mutation - Choices of algorithm:  $(\mu, \lambda)$  -  $(\mu + \lambda)$ , steady-state, CHC, etc. Linkage and epistasis. The standard test functions. Fitness and objective functions: scaling, windowing etc. Representational issues: binary, integer and real-valued encodings; permutation-based encodings. Operator issues: different types of crossover and mutation, of selection and replacement. Inversion and other operators.

#### Unit II :

Constraint satisfaction: penalty-function and other methods; repair and write-back; feasibility issues. Experimental issues: design and analysis of sets of experiments by t-tests, F-tests, bootstrap tests etc. Some theory: the schema theorem and its flaws; selection takeover times; optimal mutation rates; other approaches to providing a theoretical basis for studying GA issues. Rival methods: hill-climbing, simulated annealing, population-based incremental learning, tabu search, etc. Hybrid/memetic algorithms.

#### Unit III :

Multiple-solutions methods: crowding, niching; island and cellular models. Multi-objective methods: Pareto optimisation; dominance selection; VEGA; COMOGA.

#### Unit IV :

Genetic programming: functions and terminals, S-expressions; parsimony; fitness issues; ADFs. Evolving rules and rule-sets. SAMUEL and related methods. Classifier systems:

the Pittsburgh and Michigan approaches. Credit allocation: bucket-brigade and profit-sharing. Hierarchic classifier systems.

### Unit V :

Genetic planning: evolving plans, evolving heuristics, evolving planners, optimising plans. Ant Colony Optimization: Basic method for the TSP, local search, application to bin packing. Applications: engineering optimisation; scheduling and timetabling; data-mining; neural net design; etc. Some further ideas: co-evolution; evolvable hardware; multi-level Gas; polyploid GAs.

### Text/References Books:

- 1.M. Mitchell: An Introduction to Genetic Algorithms. MIT Press, 1996.
- 2.W. Banzhaf, P. Nordin, R. E. Keller, F. D. Francone: Genetic Programming: An Introduction. Morgan Kaufmann, 1998.
- 3.E. Bonabeau, M. Dorigo, G. Theraulez: Swarm Intelligence: From Natural to Artificial Systems. Oxford University Press, 1999

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## DATA MINING AND DATA WAREHOUSING – P13CS16

**Semester : IV**

**Core Course: XII**

**Instruction Hours/Week: 6**

**Credit: 5**

**Objective:** In this course students shall learn the mathematical & algorithmic details of various data association techniques to discover patterns in underlying data (namely mining data).He also learn how to consolidate huge volume of data in one place efficiently.

### Unit I

**DATA MINING AND DATA PREPROCESSING:** Data Mining – Motivation – Definition – Data mining on kind of data – Functionalities – Classification – Data Mining Task Primitives – Major issues in Data Mining – Data Preprocessing – Definition – Data Clearing – Integration and Transformation – Data Reduction.

### Unit II

**DATA WAREHOUSING:** Introduction – Multidimensional Data Model – Data Warehouse Architecture – Data Warehouse Implementation – From data warehousing to Data Mining – On Line Analytical Processing – On Line Analytical Mining.

### Unit-III:

Mining Frequent patterns:The Apriori algorithm-Generating Association Rules from Frequent Itemsets:Efficiency of Apriori-Mining various kinds of Association Rules:Mining Multilevel



Association Rules-Mining Multidimensional Association Rules from Relational Databases and Datawarehouse.

Classification and Prediction:Decision Tree Induction-Bayesian-Rules Based classification-Classification by back propogation-Other classification methods.

**Unit-IV:**

Cluster Analysis:Types of Data in Cluster analysis:(a)Interval-(b)Scaled variables-(c)Binary-(d)Categorical-(e)Ordinary-(f)Ratio\_Scaled-(g)Vector objects.Categorization of major method:K-Means-K-Medoids Method-CLARANS.

Hierararchical Methods:Agglomerative and divisive Hierararchical clustering-Birch-ROCK-Chameleon-Grid Based methods:String-Wave Cluster.

**Unit-V:**

Spatial DM-Multimedia DM-Text Mining-Web Mining-DM Application:Finance-Retail Industry-Telecommunication-Biological-Intrusion Detection-Social impacts of DM-Trends in DM.

**Books for Study**

1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", 2nd Ed., Morgan Kaufmann, 2006.

Ch: 1.1 - 1.4, 1.6, 1.7, 1.9, 2.1, 2.3 – 2.5, 3, 5.2.1, 5.2.2, 5.3, 6.1, 6.3 – 6.6, 6.9.1, 6.10, 7.1 – 7.5, 7.7, 7.8, 7.11, 10.2 – 10.5, 11.1, 11.4, 11.5.

**Books for Reference**

1. Margaret H.Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, 2003.

2. Arun K.Pujari, " Data Mining Techniques", University Press, 2001.

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**COMPUTER NETWORKS – P13CS17**

**Semester : IV**

**Core Course: XIII**

**Instruction Hours/Week: 6**

**Credit: 5**

**Objectives:**

To provide the fundamental concept of computer networks, networking technologies, applications and network security.

**UNIT-I**

Introduction – Uses of Computer Networks: Business and Home Applications – Network

Hardware: LAN, WAN, MAN – Network Software: Protocol Hierarchies – Design Issues

for the Layers – Connection Oriented and Connectionless Services – Service Primitives

Reference model: The OSI Reference Model – TCP/IP Reference Model.

**UNIT-II**

The Physical Layer: Guided Transmission Media – Public Switched Network – Structure of Telephone System – Trunks and Multiplexing – witching.  
The Data link Layer: Data link layer Design Issues – Error Detection and Correction – Stop and Wait Protocol – Sliding Window Protocols.

**UNIT-III**

The Network Layer: The Network Layer Design Issues: Store-and-Forward Packet Switching – Implementation of Connection-Oriented Service and Connectionless Service – Routing Algorithms: The Optimality Principle – Shortest Path Routing – Flooding – Distance Vector Routing – Hierarchical Routing – Broadcast Routing – Congestion Control Algorithms: General Principles of Congestion Control – Congestion Prevention Policies – Congestion Control in Virtual-Circuit Subnets and Datagram Subnets – Network Layer in the Internet: IP Protocol – IP addresses.

**UNIT-IV**

The Transport Layer: The Transport Service – Elements of Transport Protocols – Internet Transport Protocols: Introduction to UDP – RPC – TCP: TCP Service Model – TCP Protocol – TCP Segment Header.

**UNIT-V**

The Application Layer: The DNS Name Space – E-mail: Architecture and Services – Message Formats – Network Security: Cryptography – DES – RSA – Firewalls – VPN – E-mail Security: PGP – PEM.

**Text Book:**

Andrew S. Tanenbaum, *Computer Networks*, Fourth Edition, Prentice Hall of India.

**Reference Books:**

1. Behrouz A. Forouzan, "*Data Communications and Networking*", 2nd edition, Tata McGraw-Hill.
2. William Stallings, "*Data and Computer Communication*", Fifth Edition, PHI.

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**ELECTIVE-V 1.SOFTWARE QUALITY ASSURANCE AND TESTING – P13CS18E**

**Semester : IV**

**Elective Course: V**

**Instruction Hours/Week: 6**

**Credit: 4**

**Unit I**

Principles of Testing – Software Development Life Cycle Models

**Unit II**

White Box Testing-Integration Testing-System and acceptance testing.

**Unit III**

Testing Fundamentals -2 & Specialized Testing: Performance Testing-Regression testing- Testing of Object Oriented Systems-Usability and Accessibility Testing.

**Unit IV**

Test Planning, Management, Execution and Reporting.

**Unit V**

Software Test Automation-Test Metrics and Measurements

**Text Book(s)**

- 1. Software Testing -Srinivasan Desikan, Gopaldaswamy Ramesh, Pearson Education 2006.

**References**

- 1. Introducing Software testing-Louis Tamres, Addison Wesley Publications, First Edition.
- 2. Software testing, Ron Patten, SAMS Techmedia, Indian Edition 2001.
- 3. Software Quality-Producing Practical, Consistent Software-Mordechai Ben- Menachem, Gary S Marliss, Thomson Learning, 2003.

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**ELECTIVE – V 2.ARTIFICIAL NEURAL NETWORKS – P13CS18E**

**Semester : IV**

**Elective Course: V**

**Instruction Hours/Week: 6**

**Credit: 4**

**Unit I BASICS OF ARTIFICIAL NEURAL NETWORKS:**

Characteristics of Neural Networks – Historical development of Neural Network principles – Artificial Neural Networks: Terminology – Models of Neuron – Topology – Basic Learning Laws.

**Unit II ACTIVATION AND SYNAPTIC DYNAMICS :**

Introduction – Activation Dynamic Models – Synaptic Dynamic Model – Learning Models – Learning Methods.

**Unit III FUNCTIONAL UNITS OF ANN FOR PATTERN RECOGNITION TASKS :**

Pattern Recognition Problem – Basic Functional Units – Pattern Recognition Tasks by the Functional Units – FEED FORWARD NEURAL NETWORKS: Introduction – Analysis of Pattern Association Networks – Analysis of Pattern classification Networks – Analysis of Pattern Mapping Networks.

**Unit IV FEEDBACK NEURAL NETWORKS :**

Introduction – Analysis of Linear Auto Associative FF Networks – Analysis of Pattern Storage Networks. COMPETITIVE LEARNING NEURAL NETWORKS : Introduction – Components

of a Competitive Learning Network – Analysis of Feed back Layer for Different Output Functions – Analysis of Pattern Clustering Networks – Analysis of Feed Mapping Network.

**Unit V APPLICATIONS OF NEURAL SYSTEMS :**

Applications of Neural Algorithms and Systems character Recognition – Expert Systems Applications – Neural Network Control Applications, Spatio – Temporal Pattern Recognition – Neocognitron and other Applications.

**Text Books:** 1. For Units I to IV : “ARTIFICIAL NEURAL NETWORKS”, B.YEGNANARAYANAN, Eastern Economy edition – Chapter 1, 2. 2. For Unit – V: “INTRODUCTION TO ARTIFICIAL NEURAL SYSTEMS” JACEK M.ZURADA (1994) – Jaico Publishing House.

**Reference Books:** “Introduction to the theory of Neural Computation”, - J.Hertz, A.Krogh., and R.G. Palmer, Addison – Wesley 1991

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**ELECTIVE – V    3.ROBOTICS – P13CS18E**

**Semester        : IV**

**Elective Course: V**

**Instruction Hours/Week: 6**

**Credit: 4**

**Unit I**

Fundamentals of robot Technology: Robot anatomy. Work volume. Drive systems. Control - Systems and dynamic performance - Accuracy and repeatability - Sensors in robotics – Robot reference frames and coordinates and robot kinematics.

**Unit II**

Robot kinematics: Matrix representation - Homogeneous transformations - Forward and inverse kinematics - Robot dynamics - Differential motions of a frame - Jacobian static force analysis.

**Unit III**

Configuration of a robot controller : End effectors - Mechanical and other types of grippers - Tools as end effectors - Robot and effector interface - Gripper selection and design - Introduction to robot languages.

**Unit IV**

Applications for manufacturing - Flexible automation - Robot cell layouts – Machine interference - Other considerations in work cell design - Work cell control – Interlocks – Robot cycle time analysis.

**Unit V**

Simulation of robotic work cells - Typical applications of robots in material transfer, machine loading/unloading; processing operations; assembly and inspection.

**Text Book:**

- 1. "Introduction to Robotics analysis, Systems & Applications" - Saeed B. Niku – Pearson Education Singapore P. Ltd., 2002.
- 2. "Robotic Technology and Flexible Automation" - S.R. Deb, Tata McGraw Hill Publishing Co. Ltd., 2003.
- 3. "Robotics & Control" - R.K. Mittal, I.J. Nagrath - Tata McGraw & Hill, 2005.

**References Book:**

- 1. "Fundamentals of Robotics, analysis & Control" Robert J. Schilling, Prentice Hall of India P.Ltd., 2002.

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**PROJECT WORK - P13CSP19**

**Semester : IV**

**Project**

**Instruction Hours/Week: 12**

**Credit: 5**

**PROJECT WORK**

**(Dissertation 75 marks & Viva Voice – 25 Marks)**

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