

**Solapur University, Solapur**

**M.Sc. (Computer Science)**  
**Part - II**

**Syllabus (Semester – III and IV)**  
**(Effective from June 2016)**

**(Choice Based Credit System)**

**M.Sc. (Computer Science) Part – II**  
**M.Sc. (Computer Science) Part – II Semester-III**

| Paper Code   | Paper No. | Title of the Paper       | Contact hours / week | Distribution of Marks for Examination |            |            | Credits   |
|--------------|-----------|--------------------------|----------------------|---------------------------------------|------------|------------|-----------|
|              |           |                          |                      | Internal                              | University | Total      |           |
| CS-301       | IX        | Web Design Techniques    | 04                   | 30                                    | 70         | 100        | 04        |
| CS-302       | X         | Artificial Intelligence  | 04                   | 30                                    | 70         | 100        | 04        |
| CS-303       | XI        | Mobile Computing         | 04                   | 30                                    | 70         | 100        | 04        |
| CS-304       | XII       | Digital Image Processing | 04                   | 30                                    | 70         | 100        | 04        |
| CS-305       |           | Project – III            | 02                   | 30                                    | 70         | 100        | 04        |
| CS-306       |           | Practical – III          | 12                   | 30                                    | 70         | 100        | 04        |
|              |           | Seminar                  | 02                   | 25                                    | --         | 25         | 01        |
| <b>Total</b> |           |                          | <b>32</b>            | <b>205</b>                            | <b>420</b> | <b>625</b> | <b>25</b> |

**M.Sc. (Computer Science) Part–II Semester-IV**

| Paper Code   | Paper No. | Title of the Paper           | Contact hours/ week | Distribution of Marks for Examination |            |            | Credits   |
|--------------|-----------|------------------------------|---------------------|---------------------------------------|------------|------------|-----------|
|              |           |                              |                     | Internal                              | University | Total      |           |
| CS-401       | XIII      | Distributed Operating System | 04                  | 30                                    | 70         | 100        | 04        |
| CS-402       | XIV       | Data Mining and Warehouse    | 04                  | 30                                    | 70         | 100        | 04        |
| CS-403       | XV        | Soft Computing               | 04                  | 30                                    | 70         | 100        | 04        |
| CS-404       | XVI       | .NET Technology              | 04                  | 30                                    | 70         | 100        | 04        |
| CS-405       |           | Project – IV                 | 02                  | 30                                    | 70         | 100        | 04        |
| CS-406       |           | Practical – IV               | 12                  | 30                                    | 70         | 100        | 04        |
|              |           | Seminar                      | 02                  | 25                                    | --         | 25         | 01        |
| <b>Total</b> |           |                              | <b>32</b>           | <b>205</b>                            | <b>420</b> | <b>625</b> | <b>25</b> |

**CS-301**  
**Paper No. IX**  
**Web Design Techniques**

**Unit – 1:**

Introduction to HTML: World Wide Web, Web Publishing, Physical & logical HTML, Structure of HTML, HTML Text formatting tags, Ordered and unordered List tags, Inserting image, HTML Links: text, image and image mapping, Tables, Frames, HTML Forms: controls (7)

Cascading Style Sheet: Introduction to CSS, Types of style sheets, Text formatting properties, CSS Borders, Margin Properties, Color properties, Use of <div> and <span> tag, Use of classes in CSS with an example (8)

**Unit – 2:**

JavaScript: Concept of script, Types of Scripts, Introduction to Javascript, Variables, identifiers, constants, Operators, Control and looping structure, Array and its predefined functions, Math object and its predefined functions, string object and its predefined functions, date object and its predefined functions, event handling, DOM concept, DOM objects: Window navigator, History object and its methods, Location object with methods, Validations in JavaScript (15)

**Unit – 3:**

jQuery and AJAX: Introduction to jQuery, Syntax Overview, Anatomy of a jQuery Script, Creating first jQuery script, Traversing the DOM, Selecting Elements with jQuery, Refining & Filtering Selections, Selecting Form Elements, Working with Selections - Chaining, Getters & Setters, CSS Styling and Dimensions, Manipulating Elements - Getting and Setting Information about Elements, Moving, Copying, and Removing Elements, Creating New Elements Manipulating Attributes, Utility Methods Events - Connecting Event to Elements, Namespacing Events, Event handling, Triggering Event handlers, Event Delegation Animating effects - animate(), click(), hover(), toggle() Plugins - Create a basic plugin, Finding & Evaluating Plugins, Writing Plugins, Tabs, Panels and Panes examples jQuery UI and Forms AJAX Overview, jQuery's AJAX related methods, Ajax and Forms, Ajax Events (15)

**Unit – 4:**

XML: Concept of XML, features of XML, Writing XML elements, attributes, etc. XML with CSS, XML with DSO, XML Namespace, XML DTD, XML schemas, writing simple sheet using XSLT, SAX Parser, DOM Parser Introduction to SOAP and Examples on XML (9)

Web Server: Concept of Web Server, Obtaining and Installing Apache Http Server on Windows, Editing httpd.conf configuration file, Configuration directives in httpd.conf -

ServerRoot, PidFile, ServerName, Add site to /etc/hosts file, DocumentRoot, ErrorLog,  
Listen, Directory, Files, Location (6)

**Reference Books:**

1. Complete reference HTML, TMH, 4th Ed.
2. HTML, DHTML, JavaScript, Perl & CGI Ivan Bayross, BPB Pub, 3rd Ed.
3. Web enabled commercial application development using HTML, DHTML, JavaScript, PERL CGI, BPB Pub, 3rd Ed.
4. Programming the World Wide Web Robert W. Sebesta, Pearson, 4th Ed.
5. JavaScript Bible, Wiley Pub.
6. Learning jQuery Jonathan Chaffer, Karl Swedberg
7. Professional Ajax, 2nd Edition Wrox Press
8. Apache Server 2.0: The Complete Reference Ryan B. Bloom, TMH Pub.
9. Apache HTTP Server Reference Manual for Apache version 2.2.17 – Apache Software Foundation
10. Internet Technology at work Hofstetter fred, TMH.
11. Beginning XML Wrox Press 12. XML how to program Deitel & Deitel, Pearson Pub.

**Reference Sites:**

1. <http://www.w3schools.com>
2. <http://www.apache.org>

**CS- 302**  
**Paper No. X**  
**Artificial Intelligence**

**Unit – 1:**

What is Artificial Intelligence: The AI Problems, The underlying Assumption, What is an AI Technique? (4)

Problems, Problem Spaces and Search: Defining the problem, as a state space search, production systems, problem characteristics, production system characteristics, Issues in the design of search programs. (4)

Heuristic Search Techniques: Generate-and-Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction Means-Ends Analysis. (7)

**Unit – 2:**

Knowledge Representation Issues: Approaches to Knowledge representation, Issues in Knowledge representation. (5)

Using Predicate Logic: Representing Simple Facts in Logic, Representing Instance and ISA Relationships, Computable Functions and Predicates, Resolution, Natural deduction. (5)

Representing Knowledge Using Rules: Procedural versus Declarative Knowledge, Forward Versus Backward Reasoning, Matching. (5)

**Unit – 3:**

Statistical Reasoning: Probability and Bayes' Theorem, Certainty Factors and Rule-Based Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic. (5)

Weak Slot-and-Filler Structures: Semantic Nets, Frames. (5)

Strong Slot-and-Filler Structures: Conceptual Dependency, Scripts. (5)

**Unit – 4:**

Game Playing: Overview, The Minmax Search Procedure, Adding Alpha-Beta Cutoffs, Additional Refinements, Iterative Deepening. (5)

Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing. (5)

Expert Systems: Representing and Using Domain Knowledge, Expert System Shells, Explanation, Knowledge Acquisition. (5)

**Reference Books:**

1. Artificial Intelligence by Elaine Rich, Kevin Knight, TMH, 2<sup>nd</sup> Edition.
2. Artificial Intelligence: Structures and Strategies for Complex Problem solving by George F Luger, 4<sup>th</sup> Edition, Pearson Education, Asia.
3. Introduction to Artificial Intelligence and Expert Systems by D W Patterson, PHI, 2<sup>nd</sup> Edition.

**CS- 303**  
**Paper No. XI**  
**Mobile Computing**

**Unit – 1:**

Wireless Transmission: Frequencies for radio transmission, Regulations. Signals, Antennas, Signal propagation-Path loss of radio signals, Additional signal propagation effects, Multipath propagation. Multiplexing-Space, Frequency, Time, Code division multiplexing. Modulation- Amplitude, Frequency, Phase Shift Keying, Advanced frequency and phase shift keying, spread spectrum- DSSS, FHSS. Cellular System

(8)

Medium Access Control: CSMA/CD, Hidden and exposed terminals, Near and Far terminals, SDMA, FDMA, TDMA- Fixed TDM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA, Reservation TDMA, MACA, Polling, CDMA.

(7)

**Unit – 2:**

Telecommunication System: GSM – Mobile services, Architecture of a GSM System, Protocol Architecture, Radio Interface, Localization and calling: MTC, MOC, Handover, Security-Authentication, Encryption.

(6)

Wireless LAN: Introduction, Infrared v/s radio transmissions, architecture of an infrastructure based IEEE 802.11 and Ad-hoc networks, Protocol architecture, Physical Layer, Format of an IEEE 802.11 frame using DSS. MAC management - synchronization, power management, roaming. Bluetooth Architecture, simple Bluetooth Pico-net.

(9)

**Unit - 3:**

Mobile Network Layer: Entities & terminology in Mobile IP, IP packet delivery agent discovery, Registration. Dynamic Host Configuration Protocol (DHCP)

(7)

Mobile Transport Layer: Traditional TCP- Congestion control, Slow start, fast retransmit/Fast recovery, implications on mobility. Classical TCP- Indirect TCP, Snooping TCP, Mobile TCP

(8)

**Unit – 4:**

Introduction to ANDROID: Android System Architecture, Creating and Running Android Applications, Types of Android Applications, Building blocks, Application Manifest, Application Life Cycle, Application Priority and Process States, Creating and Using Resources, The Activity Life Cycle, Android GUI architecture, Views, Layouts, Creating simple android GUI based applications with event handling such as Sudoku game and To-do list.

(8)

Using Bluetooth and Managing Networks in ANDROID: Using Bluetooth -Introducing the Bluetooth Service, Controlling the Local Bluetooth Device, Discovering and Bonding with Bluetooth Devices, Managing Bluetooth Connections, Communication with

Bluetooth. Managing Networks - Monitoring and Managing Your Internet Connectivity,  
Managing Active Connections, Managing Your Wi-Fi (7)

**Reference Books:**

1. Mobile communication (2 nd Edition) – John Schiller (Pearson Edition)
2. Wireless LAN: Peter T Davis, Craig R McGuffin (MGH International)
3. Professional Android Development – Reto Meier (Wrox Publication)
4. Hello Android - Ed Burnette (Pragmatic Bookshelf)
5. Android Application Development - Rick Rogers, John Lombardo (O'Reilly Publication)

**CS- 304**  
**Paper No. XII**  
**Digital Image Processing**

**Unit – 1:**

Introduction - Digital image processing, Applications of digital image processing, Fundamental steps in digital image processing, and Components of an image processing system. (5)

Digital image fundamentals - Image sampling and quantization, some basic relationships between pixels, Linear and nonlinear operation (5)

Image enhancement in the spatial domain - Some basic gray level transformations, Histogram processing, Enhancement using arithmetic/logic operations, Basics of spatial filtering, Smoothing spatial filters, Sharpening spatial filters (5)

**Unit – 2:**

Image enhancement in the frequency domain - Introduction to the Fourier transform and the frequency domain, Smoothing frequency-domain filters, Sharpening frequency domain filters, homomorphic filtering (7)

Image restoration - A model of the image degradation/restoration process, Noise models, Restoration in the presence of noise only-spatial filtering, Periodic noise reduction by frequency domain filtering (8)

**Unit – 3:**

Morphological image processing - Preliminaries, Dilation and erosion, Opening and closing, the hit-or-miss transformation, Some basic morphological algorithms (7)

Image segmentation - Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region-based segmentation, Segmentation by morphological watersheds (8)

**Unit – 4:**

Representation and description - Representation, Boundary descriptors, Regional descriptors, Use of principal components for description, Relational descriptors (7)

Object recognition - Patterns and pattern classes, Recognition based on decision-theoretic methods, Structural methods (8)

**Reference books:**

1. Digital image processing by Gonzalez and Woods PHI
2. Image Processing, Analysis and Machine Vision: Milan Sonka, Vaclav Hlavac, Roger Boyle ( Thomson Brooks / Cole Edition).
3. Fundamentals of Digital Image Processing: Anil K. Jain (Prentice Edition Hall of India)



### **CS-305: Project - III**

Project work.

### **CS-306: Practical - III**

The practical course will contain 30 practical assignments covering syllabi of paper no. CS-301, CS-302, CS-303, CS-304.

**CS-401**  
**Paper No. XIII**  
**Distributed Operating Systems**

**Unit – 1:**

Overview of Operating System: Concept, need and requirements of operating system, Processor, Memory, Device and File management, Virtual memory, Pipes, Deadlocks and Protection issues, Comparative study of Various types of operating systems. (6)  
Introduction to Distributed system: Goal, Hardware Concepts, Software concepts, Design issues. (9)

**Unit – 2:**

Communication in distributed system: Layered protocols, client server model, remote procedure call, group communication. (7)  
Synchronization in distributed system: Clock synchronization, mutual exclusion, election algorithms, atomic transaction, deadlocks in distributed systems. (9)

**Unit – 3:**

Processes and processors in distributed systems: Threads, System models, processor allocation, Scheduling in distributed systems. (15)

**Unit – 4:**

Distributed file system: Distributed file system, Design and Implementation trends in distributed file system. (9)  
Case study: Detail and comparative study of MS-windows NT and Novel Netware, Windows programming concepts. (6)

**References books:**

1. A.S. Tanenbaum - "Distributed Operating Systems" (Pearson).
2. P. K. Sinha – Distributed Operating System-Concepts and Design.
3. A.S. Tanenbaum - "Modern Operating Systems" ( HI).
4. Donovan Madnick, Operating System.
5. Peterson, Operating System.
6. Hansen Per Brinch, Operating systems principles.
7. Cowart, Windows NT 4 - Server and Workstation unleashed (Techmedia).
8. Helen Custer - "Inside Windows NT" (Microsoft press).
9. Jeffery Richter - "Advanced Windows NT: The Developer's Guide to the WIN32 application Interface.
10. Peter Norton's maximizing Windows NT server 4 (Techmedia).
11. Peter Norton's complete guide to Windows NT workstation (Techmedia).
12. Charles et old - Programming windows 3.1 (Microsoft ress).
13. Novel Netware Manuals.

**CS-402**  
**Paper No. XIV**  
**Data Mining and Warehouse**

**Unit – 1:**

Introduction - What is Data Warehouse? A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data cube Technology, From Data Warehousing to Data Mining, Data Mining Functionalities, Data Cleaning, Data Integration and Transformation, Data Reduction. (7)

Data Mining Primitives, Languages, and System Architectures - Data Mining Primitives, Presentation and Visualization of discovered patterns, A Data Mining Query Language. (8)

**Unit – 2:**

Mining Association Rules in Large Databases Translation - Association Rule Mining Single-Dimensional Boolean, Association Rules from Transactional Databases, Mining Multilevel Association Rules From Transactional Databases. (15)

**Unit – 3:**

Classification and Predication - Issues regarding Classification and Predication, Classification by Decision tree induction, Bayesian Classification, Classification by Back propagation, Classification Based on the concepts from association rule mining, Other classification methods, Prediction. (15)

**Unit – 4:**

Clustering - What is Cluster Analysis? Types of data in Cluster Analysis, A Categorization of Major Clustering Methods. Partitioning Methods, Hierarchical Methods, Density-Based Methods, Model-Based Clustering Methods: Statistical Approach, Neural Network Approach, Outlier Analysis. (8)

Applications and Trends in Data Mining - Data Mining Applications, Data Mining System Products and Research Prototypes, Additional Themes on Data Mining, Data Mining and Intelligent Query Answering, Trends in Data Mining. (7)

**References:**

1. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Morgan Kauf Mann Publishers.
2. George M. Marakas, “Modern Data Warehousing, Mining and Visualization”, Pearson Education, 2003.
3. W.H.Inmon, “Building the Data Warehouse”, Wiley Dreamtech, Third Edition.

**CS - 403**  
**Paper No. XV**  
**Soft Computing**

**Unit – 1:**

Fundamentals of Neural Networks: Basic concepts, models of artificial neuron, neural network architectures, characteristics, learning methods. (6)

Backpropagation networks: Architecture, backpropagation learning: input, hidden and output layer computation, error calculation, training of neural network, method of steepest descent, effect of learning rate, backpropagation algorithm. (9)

**Unit – 2:**

Crisp Sets: an Overview, Fuzzy Sets: Basic Types, Basic Concepts, Fuzzy Sets Vs Crisp Sets, Additional Properties of alpha cuts, Presentation of fuzzy sets, Extension principle for fuzzy sets. (15)

**Unit – 3:**

Operations on Fuzzy Sets: Types of operations, Fuzzy complements, Fuzzy Intersections, Fuzzy Unions, Crisp and Fuzzy Relation, Binary Fuzzy Relations, Binary Relation on single set, Fuzzy Equivalence Relations, Fuzzy Compatibility Relation. (15)

**Unit – 4:**

Basic concepts, working principle, Genetic representations, Encoding: binary, octal, hexadecimal encoding, permutation encoding, value encoding, tree encoding, Fitness function, Reproduction: Roulette-wheel selection, Tournament selection, Rank selection, Mutation operator, Generational Cycle, applications. (15)

**Reference books:**

1. S. Rajasekaran, G. A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic and Genetic Algorithms, PHI.
2. George J. Klir, Bo Yuan, Fuzzy Sets and Fuzzy Logic Theory and Application.
3. George J. Klir, Tina A. Floger, Fuzzy Sets Uncertainty and Information.
4. John hertz, Krogh and Richard, Introduction to the Theory of Neural Competition, Addison Wesley.
5. Jaeck M. Zurada, Introduction to Artificial Neural Network.
6. Koska, Neural Network and Fuzzy System A Dynamic System PHI Edition.

**CS-404**  
**Paper No. XVI**  
**.NET Technology**

**Unit – 1:**

Mircrosoft.NET framework - Structure, the common language runtime, JIT, CTS, Metadata. (5)

C# - Introduction to C#, Programming structure of C#, editing, compiling & executing C# programs, namespace, comments, using aliases for namespace classes, using command line argument, math functions, scope of variables, boxing & unboxing, file operations, indexes, delegates, events, preprocessor, attributes, (10)

**Unit – 2:**

Advanced concepts in C# - Creating winform applications, COM interoperability, using COM / COM+, reflection, components in C#, Handling databases using ADO.net. (9)

Introduction to ASP.Net - Introduction, difference between ASP & ASP.Net Application, Web Architecture Model, Introduction to Visual Studio for Web Application. (6)

**Unit – 3:**

Application and Page Frameworks - Application Location Options, The ASP.NET Page Life Cycle, The ASP.NET Page Structure Options, ASP.NET Page Directives, ASP.NET Page Events, Dealing with PostBacks, ASP.NET Application Folders, Global.asax (7)

ASP.NET Server Controls and Validation Controls - ASP.Net Server Controls, Understanding Validation, Client-Side versus Server-Side Validation, Turning Off Client-Side Validation. (8)

**Unit – 4:**

Working with Master Pages - Need and basics of Master Pages, Master Page and Content Page, Programmatically Assigning the Master Page, Nesting Master Pages, Master Page Events. (7)

ASP.Net State Management - Application State, Session State, Client & server storing, View state, Cache, Hidden Variable, Session object, Profiles, Overview of HTTP Handler & Modules. (8)

**References books:**

1. Microsoft Visual C#.NET Step-By-Step, Version 2003 by; Sharp, Jagger, Publisher: Microsoft Press (Published: 3/2003)
2. Programming in C# by E. Balagurusamy TMH
3. C# a beginner<sup>TM</sup>s guide by Herbert Schildt TMH
4. Professional ASP.NET 2.0 – Wrox Publication by Bill Evjen, Scott Hanselman, Farhan Muhammed, Sirnivasa Sivakumar, Devin Rader.
5. Microsoft ASP.NET 2.0 Step by Step - Microsoft Press By George Shepherd.

### **CS-405: Project - IV**

Project work.

### **CS-406: Practical - IV**

The practical course will contain 30 practical assignments covering syllabi of paper no. CS-401, CS-402, CS-403, CS-404.