Swami Ramanand Teerth Marathwada University Nanded

(NAAC Re-accredited with 'A' Grade)

School of Technology
Sub Centre, Latur

Syllabus of

M.Sc. Computer Science (2 years)

(Revised CBCS pattern)

Introduced from Academic Year 2015-16

School of Technology, SRTMUN Sub-Centre, Latur

M.Sc. Computer Science

M.Sc. Computer Science (2years) degree builds the student on higher studies in Computer Science and to become competent in the current race and development of new computational technologies. The duration of the study is of four semesters, which is normally completed in two years. The primary goal of this M.Sc. program is to increase the understanding of Communication Technology. What sets it apart from others is its approach and focus on developing and applying computationally intensive techniques to achieve higher goals in life. Major inputs given in the curriculum are from the field of image processing, signal processing, machine learning, genetic algorithm, remote sensing and GIS etc. are parts in this direction.

CBCS pattern and CGPA system

The School newly introduces its M.Sc. Computer Science program as per CBCS (Choice based credit system) pattern, in which choice, is given to the students under open electives and subject electives. The students can choose open electives from the same course or from other course of the same school or from other courses of other schools.

The Evaluation of performances of students for the course under Choice based Credit system (CBCS) is based on CGPA (Cumulative Grade Point Average) formulae. A Cumulative Grade Point Average is the mean Grade Point Average (GPA) from all academic terms within a given academic year, whereas the GPA may only refer to one term.

Eligibility and Fees

The eligibility of a candidate to take admission to M.Sc. (Computer Science) 2 years program is B.Sc. with any one subject from Physics, Chemistry, Computer Science, Electronics, Mathematics group or B.Sc. Computer Science or B.C.A.. More details on admission procedure and fee structure can be seen from the prospectus of the University.

Features of CBCS pattern

[1] Master Degree would be of 100 Credits

[2] Each semester shall consists of four theory courses and two practical courses and one foundation Course or seminar

[3] Four theory courses = 16 Credits

[4] two practical courses= 8 Credits

[5] one seminar=1 credit

[6] Total credits per semester= 25

[7] Total Credits of Four Semesters= 100

[8] Total marks per semester= 625

[9] Total marks for Master Degree program =2500

[10] One Credit = 25 marks

[11] Two Credits = 50 Marks

[12] Four Credits = 100 Marks

[13] Each Theory Course/Practical course = 100 Marks

Internal Exam evaluation	External Exam evaluation
50 Marks = 2 Credits	50 Marks = 2 Credits

[14] Break up of internal marks evaluation for each Theory course

Home Assignments /Seminar / Mini Project/ E – Content Development / Examination/ Skill based activity or Concerned Teacher can adopt any other internal evaluation method	Total Marks 50 Marks = 2 Credits

[15] Practical Course = 100 Marks

Internal Exam evaluation	External Exam evaluation
50 Marks = 2 Credit	50 Marks = 2 Credits

[16] Break up of internal exam marks for Practical

Internal Exam	Total Marks
Record Book /Experiments / Mini Project/ E – Content Development / Examination/ Skill based activity / Concern Teacher can adopt any other internal evaluation method	50 marks = 2 Credits

Passing rules: As per the CGPA system of the University

Outline of M.Sc. Computer Science Syllabus (As per CBCS Pattern)

Sr. No	Course category	Course Code	Course Title	Internal credits	External credits	Total credits
First Semester						
1.	**Core**	CS 1-1	System Analysis and Design	2	2	4
2	**Subjects**	CS 1-2	Advances in Operating System	2	2	4
3		CS 1-3	Practical Lab I	2	2	4
Choose any one from CS 1-4 A and 1-4 B						
4	**Subject**	CS 1-4 A	Analysis of Algorithm	2	2	4
5	**Elective**	CS 1-4 B	Principles of Programming Languages	2	2	4
6		CS 1-5	Practical Lab II A / Lab II B	2	2	4
7	**Open Elective**	CS 1-6	Internet Programming	2	2	4
8	**Foundation course**	CS 1-7	Skill based activity	1	-	1
						25
Second Semester						
1	**Core**	CS 2-1	Advances in DBMS	2	2	4
2	**Subjects**	CS 2-2	Mathematical Foundation	2	2	4
3		CS 2-3	Practical Lab III	2	2	4
Choose any one from CS 2-4 A and 2-4 B						
4	**Elective**	CS 2-4 A	Computer Graphics	2	2	4
5	**Subjects**	CS 2-4 B	Java Programming	2	2	4
6		CS 2-5	Practical Lab IV A / Lab II B	2	2	4
7	**Open Elective**	CS 2-6	Networking Concepts	2	2	4
8	**Foundation course**	CS 2-7	Skill based activity	1	-	1
						25

Sr. No	Course category	Course Code	Paper Title	Internal credits	External credits	Total credits
			Third Semester			
1.	**Core**	CS 3-1	Theoretical Computer Science	2	2	4
2	**Subjects**	CS 3-2	Artificial Intelligence	2	2	4
3		CS 3-3	Dot Net Programming	2	2	4
4		CS 3-4	Practical Lab V	2	2	4
			Choose any one from CS 3-5 A and CS 3-5 B			
5	**Elective**	CS 3-5 A	Digital Image Processing	2	2	4
6	**subjects**	CS 3-5 B	Geographic Information System (GIS)	2	2	4
7		CS 3-6	Practical Lab VI A / Lab VI B	2	2	4
8	**Seminar**	CS 3-7	Seminar	1	-	1
						25
			Fourth Semester			
1	**Core**	CS 4-1	Compiler Designing	2	2	4
2	**Subjects**	CS 4-2	Soft Computing	2	2	4
3		CS 4-3	Project	-	4	4
4		CS 4-4	Practical Lab VII	2	2	4
			Choose any one from CS 4-5 A and 4-5 B			
5	**Elective**	CS 4-5 A	Big Data Analysis	2	2	4
6	**Subjects**	CS 4-5 B	Cloud Computing	2	2	4
7		CS 4-6	Practical Lab VIII	2	2	4
8	**Seminar**	CS 4-7	Seminar	1	-	1
						25

Course Title: System Analysis and Design
Course Code: CS 1-1
 Objectives:
- To identify the Software projects and their functional requirements in an organization after studying various functionalities in the organization
- To develop the Analytical, Technical, Management and Interpersonal Skills to become system analyst
- To develop the design, implementation and documentation skills

Outcome:
- Students will be able to define Software requirement specification
- Students will be able to develop skills required for a System analysts

Module I: Introduction to System

Introduction, Types of systems, Real Life Business Subsystems, Real Time Systems, Distributed Systems, Development of a successful System, Approaches for development of Information Systems, Structured Analysis and Design Approach.

Module II: System Analyst as a Profession

Need of the System Analyst, Analyst in various functional areas, Roles and responsibilities of system analyst, Skills of system analyst

Module III: System Development Process

Systems Development Life Cycle, Phases of SDLC, Project Identification and Selection, Project Initiation and planning, Analysis, Logical Design, Physical Design, Implementation, Maintenance, Product of SDLC Phases, Approaches to Development.

Module IV: Planning and System Design

Fact finding Techniques-Interviews, Group Discussion, Site Visits, Presentations, Questionnaires, Feasibility Study- Technical Feasibility, Operational Feasibility, Economic Feasibility, Legal Feasibility. Cost Benefit Analysis, Preparing Schedule, System Design- Logical and Physical Design, Design Principles- Top Down Design and Bottom Up Design, Goals of Design, Coupling and Cohesion, Process Modeling-Data Flow Diagrams, Data Modeling- E-R Diagrams, Database Design process from E-R diagrams , Process Specification Tools-Decision Tables, Decision Trees and Data Dictionary.

Module V: System Development using CASE Tools

Definition of CASE Tools, Use of CASE tools for systems, Role of CASE Tools, Advantages and Disadvantages of CASE Tools, Components of CASE Tools, Types of CASE Tools, Traditional systems development and CASE based systems development, Emerging CASE Tools.

Suggested readings :
1. Elias Awad, System Analysis & Design, Galgotia Publication, 2nd Ed., New Delhi,2001
2. Gary B. Shelly, Harry J. Rosenblatt, Systems Analysis and Design, 9th Edition
3. Harry J. Rosenblatt, Systems Analysis and Design, 10th Edition
4. Jalote , "An integrated approach to Software Engineering" , Galgotia Publication, New Delhi
5. Roger Pressman, Software Engineering, 5th Edition
6. Whiten, Bentley , 2007, "System Analysis & Design methods" McGraw-Hill/Irwin, 7th Ed.

Course Title: Advanced Operating System

Course Code: CS 1-2

Objective:
- To introduce concepts of Advanced Operating Systems
- To learn Multiprocessor and Distributed Operating system
- To practice on Unix/Linux and Windows as representative examples

Outcome:
- Students will be able to understand the working of various types of Operating System
- Students will be able to write shell script of various operating systems to perform operations

Module I: Overview of Operating System

Operating System Concepts, Operating System Structure, Process and Thread Management, Memory Management, File System, deadlocks.

Module II: Multimedia Operating Systems

Introduction to Multimedia, Multimedia Files, Video Encoding, Audio Encoding, The JPEG Standard The MPEG Standard, Multimedia Process Scheduling, Scheduling Homogeneous Processes, General Real-Time Scheduling, Rate Monotonic Scheduling, Earliest Deadline First Scheduling, Placing a File on a Single Disk, Two Alternative File Organization Strategies, Placing Files for Near Video on Demand, Placing Multiple Files on a Single Disk, Placing Files on Multiple Disks, Static Disk Scheduling, Dynamic Disk Scheduling.

Module III: Multiple Processor System

Multiprocessor, Multiprocessor Hardware, Multiprocessor Operating System Types, Multiprocessor Synchronization, Multiprocessor Scheduling, MULTICOMPUTERS, Multicomputer Hardware, Low-Level Communication Software, User-Level Communication Software, Remote Procedure Call, VIRTUALIZATION, Requirements for Virtualization, Type I Hypervisors, Type 2 Hypervisors, Para virtualization

Module IV: Distributed Operating System

Motivation, Types of Network based Operating Systems, Network Structure, Network Topology, Communication Structure, Communication Protocols, Robustness, Design Issues An Example: Networking, Introduction to distributed file system.

Module V: Case study: Linux

 Linux History, Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File Systems, Input and Output, Inter process Communication, Network Structure, Security Summary.

Suggested readings:

1. Abraham Silberschatz, Peter B. Galvin, G. Gagne, "Operating System Concepts", Sixth Edition, Addison Wesley Publishing Co., 2003
2. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Addison Wesley, 2001
3. Andrew S.Tanenbaum, "Distributed operating system", Pearson education, 2003
4. Mukesh Singhal and N. G. Shivaratri, "Advanced Concepts in Operating Systems", McGraw- Hill, 2000
5. Pradeep K.Sinha, "Distributed operating system-Concepts and design", PHI, 2003

Course Title: Lab II
Course Code: CS 1-3

Practical based on Advanced Operating System

1. Processor Management

2. Memory Management

3. Scheduling Algorithm

4. Multimedia based operations

5. Demo of distributed operating System

6. Linux Commands

    a. Shell programming : Ten programs based on shell programming

(Apart from the above list, concerned teacher can conduct different kinds of programs for the better understanding of the concepts)

Course Title: ANALYSIS OF ALGORITHMS
Course Code: CS 1-4 A
Objective:
- To study the various types of Data Structure
- To determine the complexity of each Data Structure
- To study the operations performed on each type of Data structure

Outcome:
- Students will be able to calculate/ measure the complexity of algorithm
- Students will be able to select appropriate type of structure for a particular problem
- Students will be able to determine the efficient data structure

Module I: Introduction

Introduction to Data structure, Definition, basic operations, Data structure types

Module II: Algorithm Analysis

Introduction to Analysis of Algorithm and Motivation, Idea of analyzing an algorithm through examples, comparison of algorithms, demonstration of algorithm analysis with example, merge sort. Asymptotic Analysis: Detailed coverage of asymptotic notations and analysis. Big Omicron, Big Theta, Big Omega, Small theta, Small omega. Comparison of the Insertion Sort and the Merge Sort Algorithms.

Module III: Linear Data Structure I

Arrays and Linked list :Memory Representation of Array and Linked list, Traversing,   insertion, deletion of array and linked list, Linear & binary search algorithm, Bubble   Sort, Types of Arrays and Linked list.

Module IV: Linear Data Structure II

Stack and Queue : Memory Representation of Stack and Queue, Traversing, insertion, deletion of Stack and Queue, Polish notations, Evaluation of Postfix expression,   Conversion of Infix to Postfix Expression by using Stack, Types of Queues.

Module V: DP and GA

Introduction to Dynamic Programming, Greedy Algorithms, Greedy vs. DP, methodology, illustrative problems, e.g. the knapsack problem using a greedy technique.

Suggested readings:

1. A.V.Aho, J.E.Hopcroft, J.D.Ullman, "Design and Analysis of Algorithms", Addison Wesley,1975
2. D.E.Knuth, "The Art of Computer Programming" , Vols. 1 and 3, Addison Wesley,1985
3. E.Horowitz, S.Sahni, "Fundamentals of Computer Algorithms", Galgotia Publishers
4. K.Melhorn, "Data Structures and Algorithms" , Vols.1 and 2, , Springer Verlag
5. P.W.Purdom, Jr. and C.A.Brown, Holt Rhinehart, "The Analysis of Algorithms"
6. Saymour Lipscrutz, "Introduction to data structure", Tata Mcgraw Hill publications.
7. T.H.Cormen, C.E.Leiserson, R.L.Rivest, "Introduction to Algorithms", , PHI,

Course Title: Principles of Programming Languages
Course Code: CS 1-4 B
Objectives:
- To understand how language features work. To develop a greater understanding of the issues involved in programming language design and implementation
- To understand design/implementation issues involved with data, data types, control flow, subroutines, parameter passing
- To understand concepts of object orientation, data abstraction, and implementation To introduce several different paradigms of programming using programming languages

Outcome:
- Students will be able to understand general features of Computer Languages
- Students will be able to use Functional Programming language to solve the problems

Module I: Introduction

Programming Languages and Paradigms, Programming language spectrum, Programming Environments, Functional Programming Language Basic LISP Primitives, Procedure definition and binding, Predicates and Conditional, Procedure Abstraction and Recursion

Module II: Data types and Control Flow

Introduction, Primitive Data Types, Character String Types, User defined Ordinal types- Enumeration & Sub range types, Array types, Associative Arrays, Record types, Union Types, Pointer and Reference Types, Control Flow Expression Evaluation, Structured and Unstructured Flow, Sequencing, Selection, Iteration, Recursion

Module III: Subprograms and Implementing subprograms

 Fundamentals of subprograms, Design issues for subprograms, Local referencing environments, Parameter passing methods, Parameters that are subprograms, Overloaded subprograms, Generic subprograms, , Co-routines, Semantics of Calls and Returns.

Module IV: Programming language based on Logic (Turbo Prolog)

 Introduction, Facts, Objects and Predicates, Variables, Using Rules, Input and Output, Controlling execution repeat and cut predicate, Arithmetic operations, Compound objects, Dynamic database, Lists, Strings, Files

 Module V : Names, Scopes, and Bindings

The Notion of Binding Time, Object Lifetime and Storage Management, Scope Rules, The meaning of Names in a Scope, The Binding of Referencing Environments, The Binding of Referencing Environments, Macro Expansion

Suggested readings
1. Carl Townsend , "Introduction to Turbo Prolog" sybex pub. , 1987
2. Ghezzi , "Programming Language Concepts" third edition, Wiley publication
3. Patrick Henry Winston & Berthold Klaus Paul Horn "LISP Programming" , 3rd edition (BPB)
4. T. W. Pratt and M. V. Zelkowitz, "Programming languages: Design and implementation" (4th Ed.), Prentice Hall, 2001
5. Robert W. Sebesta , "Concepts of Programming Languages" , 8 th Edition, Pearson Education.
6. Tennent R.D. , "Principles of Programming Languages", Prentice Hall, 1981

Course Title: Lab II A
Course Code: CS 1-5
Practical based on analysis of Algorithm

1. Write a program for Insertion and Deletion of Elements from Arrays

2. Write a program for Insertion and Deletion of Elements from Linked List

3. Write a program for Insertion and Deletion of Elements from Stack

4. Write a program for Insertion and Deletion of Elements from Queue

5. Write a program for traversing of Tree

6. Write a program for Bubble sort Technique

7. Write a program for Selection Sort Technique

8. Write a program for Linear Search

9. Write a program for Binary Search

10. Write a program for two way or doubly linked list

11. Write a program to find elapsed time for Quick sort technique

12. Write a program to solve knapsack problem using Greedy method

13. Write a program to solve travelling salesman problem

14. Write a program to find out shortest path for a graph V(G)

15. Write a program to convert infix notation into postfix notation

(Apart from the above list, concerned teacher can conduct different kinds of programs for the better understanding of the concepts)

Course Title: Lab II B
Course Code: CS 1-5
Practical based on Principles of Programming Languages

1. Write a program to demonstrate various operators in a language (choose any language).

2. Write a program to demonstrate various Data types in a language (choose any language).

3. Write a program to demonstrate Control structure in a language (choose any language).

4. Write a program to demonstrate Subroutines/ procedure/ function in a language (choose any language).

5. Write a program to demonstrate Recursive function in a language (choose any language).

6. Write Ten programs using a specific language to solve mathematical based/ reasoning based / structure based/ statistics based problems

(Apart from the above list, concerned teacher can conduct different kinds of programs for the better understanding of the concepts)

Course Title: Internet Programming
Course Code: CS 1-6
Objective:
- To improve the web designing skills of students as per the standards
- To understand and use CSS and Client side scripting languages to create professional deigning of web

Outcome:
- Students will be able to develop the web pages
- Students will be able to use various scripts in web pages

Module I: Introduction

Introduction to Internet Programming- Client-Server model, Browsers-Graphical and   Hypertext Access to the Internet, HTTP–Hyper Text Transfer Protocol (how it actually works), The Phases of Web Site Development

Module II: HTML

Creating Internet World Wide Web pages- HTML - Hypertext Markup Language , Basic HTML Concepts, HTML: Structured Language ,headers, body, html tags, tables , Text, graphics, sounds, video clips, multi-media ,Client side image mapping

Module III: Forms in HTML and CSS

HTML forms programming: Building a form, Text fields and value, size, max length html buttons, radio, checkboxes, Selection lists.

CSS: Introduction To Style sheet, types of style sheets- Inline, External, Embedded CSS, text formatting properties, CSS Border, margin properties, Positioning Use of classes in CSS, color properties, use of <div> & <span>

Module IV: JavaScript

Intro to script, types, intro of JavaScript, JavaScript identifiers, operators, control & Looping structure, Intro of Array, Array with methods, Math, String, Date Objects with methods User defined & Predefined functions, DOM objects, Window Navigator, History, Location, Event handling, Validations On Forms

Module V: XML

Intro & features of XML, XML writing elements, attributes etc. XML with CSS, DSO, XML Namespaces XML DTD, XML Schemas, Writing Simple sheets using XSLT, SAX & DOM Parsers, SOAP Introduction

Reference books:

1. Joe Fawcett,Danny Ayers,Liam R.E. Quin, "Beginning XML" Wrox Press, 5th Ed., 2012
2. Deitel & Deitel, "XML how to program", Pearson, 2000
3. Hofstetter fred , "Internet Technology at work", Osborne pub. , ISBN : 9780072229998, 2004
4. Ivan Bayross , "HTML, DHTML, JavaScript, Perl & CGI" ,BPB pub. 3rd Ed.,2004
5. Ivan Bayross, "Web enabled commercial application development using HTML, DHTML, JavaScript, PERL-CGI", BPB pub., 2nd Ed., 2000

Course Title: Skill based activity
Course Code: CS 1-7

Skill I Oral Communication

Task I: Language and communication

Definition of Language, nature of language, Characteristics of Human Language

Varieties of English Language: British, American, Indian, Australian etc.,English for specific and

special purposes.

Task II: Communication:

Importance of communication; Animal and human communication, Methods of communication

(Verbal & Non-Verbal), Barriers of communication.

Task III: Oral Communication

Basic skills of communication, listening to and Understanding,

Extended natural speech in business situations (Both face to face and on the telephone),

Understanding standard American, British and Indian accents, speaking with correct,

Pronunciation, English Consonants, English Vowels, Speaking with right accent

Task IV: Presentation Skills

Planning and preparing to speak, Strategies for making powerful openings in presentations,

Body Language, Voice Modulations

Teacher can adopt or select any other course based on development of Skills in a specific area.

Course Title: Advances in DBMS
Course Code: CS 2-1
Objectives
- To acquire the new developments and emerging trends in database technology
- To Interpret and explain the impact of emerging database standards
- To develop practical expertise using these developments in databases to fulfill software industry requirements.

Outcome:
- Students will be able to perform operations on database using oracle 9i or 10g
- Students will be able to prepare normalize database
- Students will be able to prepare a serializable schedule

Module I: Introduction to DBMS

Basics of Database, Need of DBMS, Characteristics of DBMS, Advantages, Database Users, 3-tier and 2-tier architecture of DBMS, Data Models, Codd's rules, Relational data model & relational algebra, DDL and DML commands in SQL, Normalization and Normal forms(1 NF, 2 NF, 3 NF, BCNF, 4 NF), Loss less joins and dependency preserving decomposition.

Module II: Transaction Management and Concurrency control

Concept of transaction, ACID properties, States of transaction, Schedules, Serializibility, and Concurrency control, Locking techniques, Deadlocks, Time stamp based protocols.

Module III: Crash Recovery and Backups

Failure classifications, storage structure, Recovery & Atomicity, Log based recovery,   Recovery from concurrent transactions, Database backup from failures, Remote Backup System

Module IV: Security and Privacy

Database security issues, Access control based on grant & revoking privilege, Mandatory access control and role based access control for multilevel security, Encryption & public key infrastructures.

Module V: Distributed and Parallel Databases

Parallel database, Study of   Parallel database architecture, I/O parallelism, Inter-query and Intra-query parallelism, Inter-operational and Intra-operational parallelism, parallel query evaluation, Distributed Databases, Study of DDBMS architectures, Advantages & Disadvantages of Distributed Databases, Difference between Parallel and distributed, Comparison of Homogeneous and Heterogeneous Databases, Distributed transactions, Concurrency control in distributed databases, Distributed data storage.

Suggested readings:
1. Abraham Silberschatz, Henry Korth, S. Sudarshan,Database Systems Concepts, 6th Ed. McGraw-Hill
2. Bipin Desai, "Database Management Systems", Galgotia Pub.
3. C.J.Date, " Introduction to database systems", Pearson.
4. Chakrabarti, "Advanced Database Management system", ISBN: 9788177228021, Wiley India
5. Korth, "Database system concept" ,TMH,5th Ed.
6. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", TMH
7. Singh, "Database Systems: Concepts, Design and Applications", ISBN: 9788131760925, Pearson

Course Title: Mathematical Foundation
Course Code: CS 2-2
Objective:
- To create the basic foundation of mathematical techniques largely used in Computer Science and information technology
- This course covers possibly required mathematics for application development

Outcome:
- Students are able to perform Mathematical operations based on crisp Sets, Numerical Analysis and probability

Module I: Numerical Analysis

Floating point representation, arithmetic operations with normalized floating point numbers, some pitfalls in computing, errors in numbers, iterative methods, bisection method, false position method, Newton Raphson iterative method, secant method, Numerical integration, simpson's rule, Trapezoidal Rule, Range Kutta method.

Module II: Set Theory

Sets, Subsets, Operations on Sets, De Morgan's Laws, Power Set of a Set, Cartesian Product, Equivalence relation, Partition of a Set, Partial order on a set, combinations of Sets, finite and infinite sets, multi sets, propositions.

Module III: permutations, combinations and discrete probability

Introduction, The rules of sum and products, permutations, combinations, generation of permutation and combinations, discrete probability, conditional probability

Module IV: Graphs

Basic Concepts, isomorphisms and subgraphs, trees and their properties, spanning trees, directed trees, binary trees, planner graphs, multigraphs,

Module V: Linear System

Linear System of equations, pivoting strategies, determinant of matrix, matrix factorization, norms of vector and matrices, Eigenvalues and Eigenvectors.

Suggested readings:
1. C L Liu, D P Mohapatra, " Elements of Discrete Mathematics" 3rd edition, McGraw Hill, 2008
2. E balguruswami, "Numerical Methods" Tata McGraw Hill, 2009
3. G.D. Smith, "Numerical Solution of Partial Differential Equations: Finite Difference Methods", 3rd edition, Oxford University Press, 1985
4. Joe Mott, Abraham Kandel Theodore baker, " Discrete Mathematics for Computer Scientist and Mathematicians" PHI, 2nd Edition, 2000
5. J. Nocedal and S.J. Wright, "Numerical Optimization", 2nd edition, Springer, 2006
6. L.N. Trefethen and D. Bau, "Numerical Linear Algebra", SIAM, 1997
7. Richard Burden, J Douglas Faires, "Numerical Analysis" 9th edition, Cengage Learning, 2012
8. V. Rajaraman, "Computer oriented Numerical Methods", PHI, 2011.

Course Title: Practical Lab III
Course Code: CS 2-3
Practical based on Advances in DBMS

1. Create employee table with emp_id, emp_name, empadd, empsal fields and enter at least 10 records into it.

2. Display all the record of employee table with select query.

3. Use different select query clauses with different condition and display the output.

4. Create a table **employee** (emp_id : integer, emp_name: string) **department** (dept_id: integer, dept_name:string) **paydetails** (emp_id : integer, dept_id: integer, basic: integer, deductions: integer, additions: integer, DOJ: date) **payroll** (emp_id : integer, pay_date: date)

   a. Create the tables with the appropriate integrity constraints

   b. Insert around 10 records in each of the tables

   c. List all the employee names who joined after particular date

   d. List the details of employees whose basic salary is between 10,000 and 20,000

   e. Give a count of how many employees are working in each department

   f. Give a names of the employees whose netsalary>10,000

   g. List the details for an employee_id=5

   h. Create a view which lists out the emp_name, department, basic, dedeuctions, netsalary

   i. Create a view which lists the emp_name and his netsalary.

5. Adding primary, foreign keys at the table creation time as well as with the alter query.

6. Joining the different tables and fields of the table using Join.

7. Creating users and giving and removing permissions with grant and revoke.

8. Write a program to demonstrate %type and %rowtype attributes

9. Write a PL/SQL program to check whether the given number is Armstrong or not

10. Write PL/SQL program for displaying the data from tables on the screen.

11. Write PL/SQL program for updating the table contents using different conditions

12. Create a PL/SQL procedure to find reverse of a given number

13. Create a PL/SQL procedure to update the salaries of all employees as per the given data

14. Create a cursor, which update the salaries of all employees as per the given data.

15. Create a cursor, which displays all employee numbers and names from the EMP table.

16. Create a cursor, which displays names of employees having salary > 50000.

17. Create a trigger before/after delete on employee table for each row/statement.

18. Create a trigger before/after insert on employee table for each row/statement.

(Apart from the above list, concerned teacher can conduct different kinds of programs for the better understanding of the concepts)

Course Title: Computer Graphics
Course Code: CS 2-4 A
Objectives:
- To understand the various representation formats of visualization.
- To introduce the structures and Hierarchical Modeling and GUI interactive.
- To understand the concept of Digital Image processing.

Outcome:
- Students will be able to use Computer Graphics tools
- Students will be able to perform of 2D and 3D Transformation of an Image

Module I: Computer Graphics overview and output primitives

Overview of Computer Graphics: Presentation Graphics, Visualization, DIP, refresh cathode ray tube, Raster Scan Display, Random scan display, color CRT monitors, direct view storage, input devices, graphics software's, Output Primitives: point line algorithms, DDA Algorithm, Bresenham's algorithm, parallel line algorithm, line function, Circle generating algorithms, curve functions, pixel addressing and object Geometry.

Module II: Two Dimensional Transformation and Viewing

Basic Transformation, Translation, rotation, scaling, matrix representation, composite transformation, translation, rotation and scaling, shear, Affine transformation, transformation function, raster method for transformation, two dimensional viewing functions, clipping operations

Module III: Structures and Hierarchical Modeling

Structure concept, Basic Structure Function, setting structure, attribute, editing structures, structure lists and the element pointer, setting the edit mode, inserting structure element, deleting structure element, labeling structure element and copying element from one structure to another structure, basic Modeling concept, model representation and symbol Hierarchies, Hierarchical model with structure.

Module IV: Graphical User Interfaces and Interactive input Methods

The user dialogue window and icon, accommodating Multiple skill level, consistency, minimizing memorization, backup and error handling input of graphical data, classification of input devices, locator device, stoke device, string device, valuator device, choice device, pick device, input function models, request mode interactive picture construction techniques.

Module V: Three Dimensional Concepts and Multimedia

Three dimensional display methods, parallel projection, perspective projection, three dimensional graphics packages, design of animation sequence, general computer animation function, raster animation, computer animation languages.

Suggested readings:
1. D. Hearn and M. Pauline Baker, "Computer Graphics (C Version)", Pearson Education, 2nd Edition, 2004
2. D. F. Rogers and J. A. Adams, "Mathematical Elements for Computer Graphics", 2nd Edition, McGraw-Hill International Edition, 1990
3. F. S. Hill Jr., "Computer Graphics using OpenGL", Pearson Education, 2003
4. J. D. Foley, A. Van Dam, S. K. Feiner and J. F. Hughes, "Computer Graphic: Principles and Practice", Second Edition in C, Pearson Education, 2003

Course Title: JAVA PROGRAMMING
Course Code: CS 2-4 B
Objective:
- Core java introduces object oriented concepts like abstraction, inheritance, polymorphism
- Better utilization Classes and objects, Function prototyping, Array of objects, Constructors, Operator overloading, Inheritance, Templates, Streams
- Also covers RMI, database connectivity and web based application development

Outcome:
- Students will be able to use concepts of Object Oriented Programming using java
- Students will be able to establish the connectivity between database and Java program
- Student will be able to develop complete application using Java Programming

Module I: Introduction to Core Java

Class and Object, Object Oriented concepts with respect to Java, Interfaces, Packages and Exception Handling, Applets

Module II: Abstract Window Toolkit and Swing

Components and Graphics, Containers, Frames and Panels,   Layout Managers   Border layout, Flow layout Grid layout, Card layout, AWT all components, Swing & Its Features ,JApplet ,Icons & Labels Button & Label, Text Field & Toggle Buttons, checkboxes , Radio buttons ,Combo Box & Lists ,Scroll panes ,Trees ,Tables ,Menu Bars & Menus ,Tool Bars ,Dialog Boxes, File Dialog , Progress Bar, Choosers

Module III: Multithreading and I/O

Multithreading concepts, Thread Life cycle, Creating multithreaded application, Thread priorities, Thread synchronization. Java Input Output: Java IO package, Byte/Character Stream, Buffered reader / writer, File reader / writer, Print writer, File Sequential / Random

Module IV: JDBC

Java Database Connectivity (JDBC)**:** Introduction to JDBC, Types of JDBC Connectivity, Types of statement objects (Statement, PreparedStatement and CallableStatement), Types of resultset, ResultSetMetadata, Inserting and updating records, JDBC and AWT Connection pooling.

Module V: RMI and Servlet

Introduction & Architecture of RMI, Java rmi classes and interfaces, Writing simple RMI application,

Parameter passing in remote methods (marshalling and unmarshalling).

Servlet Overview & Architecture, Setting up Apache Tomcat Server, Handling HTTP Get Request, Handling HTTP Get Request Containing Data Handling HTTP Post Request

Suggested readings:
1. Herbert Schildt, Java "The Complete Reference", Tata McGraw-Hill
2. John Zukouski , "Mastering Java2 J2SE1.4", PBP Publication
3. H.M Deitel, P.J. Deitel , "Java^{TM} How to Program", sixth Edition
4. E. Balagurusamy, "Programming With JAVA A Primer" 3nd Edition , TH.
5. Deitel and Deitel. "Java - How to Program", Addison-Wesley Press, Reading, Mass
6. David Flanagan "Java in a Nutshell (Java 2.1)" , 2nd Ed., O'Reilly and Associates Publishing, Sebastopol, CA,

Course Title: Practical Lab IV A
Course Code: CS 2-5
Practical based on Computer Graphics

1. Point plotting, line & regular figure algorithms
2. Raster scan line & circle drawing algorithms
3. Clipping & Windowing algorithms for points, lines & polygons
4. 2-D / transformations
5. 3-D transformations
6. Simple handling of graphical data input
7. pixel representation
8. Create animation
9. Using CG techniques create one small application as per your choice

(Apart from the above list, concerned teacher can conduct different kinds of programs for the better understanding of the concepts)

Course Title: Practical Lab IV B
Course Code: CS 2-5
Practical based on Java

1. Simple structure of Java program
2. Write the Interfaces
3. Creating Packages
4. Program based on Exception Handeling
5. Program based on Applets
6. Program based on Designing of Frames
7. Program based on Inserting components on frame
8. Program to demonstrate Layouts
9. Program based on ActionListener
10. Programs based on Menus and Dialog boxes
11. Program based on Multithreading
12. Program based on I/O
13. Program based on JDBC connectivity (Insert, delete, update operations)
14. Program based on RMI
15. Program based on Servlert

(Apart from the above list, concerned teacher can conduct different kinds of programs for the better understanding of the concept)

Course Title: NETWORKING CONCEPTS
Course Code: CS 2-6
Objectives:
- To aware Network topology
- To establish various kinds of Networks
- To aware Network Communication

Outcome:
- Students will be able to establish the Local Area Network
- Students will be able to perform the communication between client and server

Module I: Introduction to Networking

Hardware Architecture Topologies, Media, Devices, Transmission Techniques Twisted Pair, Coaxial Cable, Fiber optics, Wireless Transmission Switching Circuit Switching, Message Switching, Packet Switching

Module II: Common Network Architecture

Connection oriented N/Ws Connectionless N/Ws Example of N/Ws-P2P, X, 25, ATM, Ethernet Wireless LANs - 802.11, 802.11x, Gigabit 5 1

Module III: The OSI Reference Model

Protocol Layering, OSI Model, TCP/IP Model, OSI vs. TCP/IP

Module IV: IP Addressing & Routing

IP addresses – Network part and Host Part , Network Masks, Network addresses and   Broadcast addresses, Address Classes, Loop back address, IP routing concepts, Routing   Tables, Stream & Packets What IP does? , What TCP does? Sliding Windows, TCP – a   reliable pipe, TCP connection – Multiple conversations, Port Numbers, Multiple Connection from many hosts and one host IPV6: The next generation Protocol

Module V: Domain Network Services (DNS)

Domain Names, Authoritative Hosts, Delegating Authority, Resource Records, SOA records, DNS protocol, DHCP & Scope Resolution

Suggested readings:
1. Abndrew S. Tanenbaum , "Computer Networks" Prentice Hall, 4th ed,2010
2. Douglas E. Comer , "Computer Networks and Internets with Internet Applications", PHI, 4th ed,2008
3. Eugene Blanchard, "Introduction to Networking and Data Communications"
4. H.Kim Lew , Steve Spanier , Tim Stevenson , Merilee Ford, " Internetworking Technology Handbook CISCO System", Cisco press, 4th Ed., 2003
5. Network Essential Notes GSW MCSE Study Notes
6. William R. Cheswick , "Firewalls and Internet Security", Addison-Wesley, 2nd Ed., 2004

Course Title: Skill based activity
Course Code: CS 2-7

Skill I Written Communication

Task I: Reading

Reading and understanding business letters, Reports and memos, Reading and understanding scientific texts, Reading a dictionary, thesaurus, and encyclopedia, Reading passages and poems.

Task II: Writing

Letters- Formal and Informal, Reports, Curriculum Vitae, Making advertisements for newspapers, rearranging the jumbled sentences

Task III: Use of Grammar and usage reference sources

 Morphology: Word formation processes, Word classes, Phrase, Clause and Sentence,

Punctuation and Capitalization, Common errors in the use of English.

Teacher can adopt or select any other course based on development of Skill in a specific area.

Course Title: Theoretical Computer Science
Course Code: CS-3-1
Objectives:

- To understand the symbols, relation of Formal languages
- To understand Context free grammar of Formal Languages
- To aware the concept of Turing Machine

Outcome:
- Students will be able to use context free grammar for formal languages
- Students will be able to use the concepts of Turing Machine

Module I: Introduction

Symbol, Alphabet, String, Prefix& & Suffix of Strings, Sets, Operations on sets, Finite & infinite sets Formal Language - Relation, Equivalence Relation(reflexive, transitive and symmetric closures).

Module II: Regular Languages

Regular Expression: Definition, Examples, & Identities, Finite Automata: Concept, DFA: Definition & examples, NFA: Definition, examples, Language accepted by FA, NFA with ε moves, Regular Expression to FA: Method and Problems, NFA with ε moves to NFA, NFA to DFA: Method Problems, Minimization of DFA: Problem using Table, Method - FA with output: Moore & Mealy Machines: Definition and their equivalence, Closure Properties: Union, Intersection, Concatenation, Complement,

Module III: Context Free Languages

Chomsky Hierarchy, CFG: Definition & examples, Ambiguous Grammar : Concept & Examples Simplification of CFG: Removing Useless, Symbols, removing unit productions and removing Nullable symbols: Methods & Problems, Normal Forms : CNF & GNF : Method & Problems, Regular Grammar : Definition ,Equivalence of FA & Regular Grammar

Module IV: Properties of Context Free Languages

 Pumping Lemma for CFL: methods & problems, Closure Properties of CFL's

Module V: Turing Machine

Recursive & recursively enumerable language, Introduction to LBA (Basic Model) & CSG., Definition Of TM, Design of TM for language recognition, Types of Turing

Suggested readings:
1. Daniel I.A. Cohen , "Introduction to Computer Theory", Wiley 2nd Ed.
2. John E. Hopcroft , Rajeev Motwani, Jeffrey D. Ullman , "Introduction to Automata Theory, Languages and Computation" , Pearson education 2nd Ed
3. K.L.P.Mishra & N. Chandrasekaran, " Theory of Computer Science (Automata Languages And Computation)" , PHI 2nd Ed.
4. Thomas A. Sudkamp, "An Introduction to the Theory of Comp. Sci. Languages & Machine ", (3rd Ed. Pearson education)

Course Title: Artificial Intelligence

Course Code: CS3-2

Objectives:

- To understand the concept of Artificial Intelligence
- To study the Heuristic Search Techniques for problem solving
- To study knowledge representation and logic

Outcome:

- Students will be able to develop application for Machine intelligence
- Students will be able to use various searching techniques to find the solution of the problem

Module I: Introduction

 What is Artificial Intelligence: The AI Problems, Underlying Assumptions, AI   Techniques

Module II: Heuristic Search Techniques

  Defining problem as State Space Search, production system, Problem Characteristics,   Water Jug Problem, Generate and Test, Hill Climbing, Best First Search, A*,AO*

Module III: Knowledge Representation and Logic

Representations and Mappings, approaches to Knowledge representation, Issues in   Knowledge Representation, Introduction to Prepositional Logic and Predicate Logic, Representing Simple Facts in logic, representing Instance and ISA relationships.

Module IV: Weak and Strong slots and Filler Structure

Weak slots and Filler Structure: Semantic Nets and Frames Strong slots and Filler   Structure: Conceptual Dependency, Scripts

Module V: Expert System and Agents

 Expert Systems : Representing and using Domain knowledge, Expert System Shells, Explanation, Knowledge acquisition, Agents , internet and Soft bots ,Interface agents   and reactive systems , Soft bots and info agents, the three layer model , process   automation and agents

Suggested readings:

1. Edward A. Bender "Mathematical Methods in Artificial Intelligence", Wiley , 1996
2. Elaine Rich and Kerin Knight , "An Introduction to Artificial Intelligence", McGraw Hill, 4th ed., 2001
3. Kishen Mehrotra, Sanjay Rawika, K Mohan, "Elements of Artificial Neural Network"
4. Russell and Norvig , "Artificial Intelligence: a modern approach", PHI , 3rd ed, 2013
5. Patrik Henry Winston " Artificial Intelligence", 3rd ed., ISBN-10: 0201533774, 2004
6. Woolbridge, "Reasoning about Intelligent Agents", ISBN-10: 0262515563,

Course Title: DotNet Programming
Course Code : CS 3-3
Objectives:
- To understand the basics and advances in .Net programming environment for developing good quality software project
- To apply .Net programming services for efficient and fast software development process
- To acquire web development skills using ASP.Net which is the industry demands

Outcome:
- Students will be able to establish the connectivity between form with database
- Students will be able to develop application using dotnet

Module I: The Microsoft Dot Net Framework

Introduction to Microsoft .Net framework, Microsoft .Net framework architecture, Working of Common Language Runtime, CTS and CLS, Garbage collection, Assembly, Components of Assembly and their types.

Module II: VB .Net Programming

Windows Forms: Working with forms, adding control to form, working with properties at design time, setting properties at run time, working with multiple forms, creating message box and input box and dialog box, handling events, creating MDI forms. **Controls:** Label control, Texbox, Button,Combobox, Listbox, Checkbox, Radio Button, Group Box, Panel, Picture Box, Progress bar, Timer, Treeview, Menustrip and Built in Dialogue boxes **Mouse Events:** Click, DoubleClick, Mouse UP and Down, Hover **Keyboard Events**: Keypress, Keydown, Keyup. **Console Applications** Structure of console program, input output statements, keywords, tokens, constants identifiers, Decision making statements, Control flow statements, working with collections, arrays and enumeration. **Exception Handling:** Importance of Exception handling, Exception handling using Try_Catch., User defined Exception handling programs such as divide by zero.

Module III: Object Oriented Programming using VB .Net

Class and objects, propertied, methods and events, member functions, constructor and destructors, Inheritance, Access modifiers: Private, Public, Protected, Friend, Interfaces, and Polymorphism.

Module IV: Web Applications Using VB. Net

Introduction to ASP.Net, features of ASP.Net, Anatomy of ASP.NET pages, creating web applications using ASP.Net, working with web forms, events handling, multiform web applications, Data preservation in client and server, ASP.Net controls: Button, Label control, Texbox, Button, Combobox, Listbox,Checkbox, Radio Button, Tables, Hyper Links and Image Buttons, LinkButtons, Group Box, Panel. HTML controls, Validation controls

Module V: Databases in VB.Net

Database connection, Data adapter, Datasets, connection to the database with server control, data binding with some control like Text Boxes, List boxes, Navigating Data source, data validation, connection objects, command object, connected and disconnected architecture using ADO.Net.

Suggested readings:

1. Math J. Croush , "ASP.net & VB.net web programming" (Pearson Education) ISBN-10: 0201734400
2. Willis, Cross Land and Blair , "Beginning VB.NET 2003" , Wiley
3. Steven Holzner , "Visual Basic .Net Programming Black Book" wiley , 2005

Course Title: Lab V
Course Code: CS 3-4
Practical based .Net Programming

1. Program for changing the properties of form at run time and displaying the message in the textbox "Welcome to VB.Net".
2. Console program for checking the odd/even number using simple if statements.
3. Console program for checking the prime number from 1-100 using while and for loop.
4. Console program for decision making in grade of the students as per their percentage using select case.
5. Write a console program to accept any character from keyboard and display whether it is vowel or not using select case.
6. Windows application for designing GUI with command button, list box and combo box and write a code for adding, deleting items into the list box.
7. Windows application for designing GUI with command button, Textbox, checkbox and ration button. Write a code for changing the font and its style according to checkbox and radio button selection.
8. Develop a form in VB.NET to pick a date from Calendar control and display the day, month, and year details in separate text boxes.
9. Windows application for designing GUI with command button, Progress bar Timer control and write a code for showing the status of application loading into the progress bar.
10. Develop a menu based VB.Net windows application to implement a text editor with cut, copy, paste, save and close operations.
11. Write a program to demonstrate predefined exceptions
12. Write a user defined exception for checking the divide by zero error.
13. Write a program for calculation of employee salary using inheritance.
14. Program for Function and operator overloading.
15. Program for implementing the interfaces.
16. Web application using ASP.Net , Design a page with some controls and display the message in the textbox.
17. Program for validation using coding as well as by validation control of ASP.Net
18. Program for navigation through the pages and web page design using different server controls.
19. Program for preservation of data using cookies and sessions in ASP.Net
20. Program for database connection using ADO.Net and displaying data from database on the forms.
21. Develop a database application to store the details of students using ADO.NET
22. Develop a database application using ADO.NET to insert, modify, update and delete operations.
23. Develop a VB.Net application using Datagrid control to display, add, edit and modify records.
24. Program for connected and disconnected architecture of ADO using different datasets and adapter classes.
25. Create a web application in ASP.NET using three different controls to the ASP.NET page for reserving rooms in hotel. The three controls are a button control, a label control, and a drop-down list control.

(Apart from the above list, concerned teacher can conduct different kinds of programs for the better understanding of the concepts)

Course Title: DIGITAL IMAGE PROCESSING

Course Code: CS 3-5 A

Objective:

- To understand the techniques and tools for digital image processing as development of DIP based application development
- To Introduce image analysis techniques in the form of image segmentation
- The course is primarily meant to develop on-hand experience in applying these tools to process the images

Outcome:

- Students will be able to use the tools used for Digital Image Processing
- Students will be able to perform Image Classification, Image Enhancement and Image Segmentation

Module I: Introduction and fundamentals of DIP

The Origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamental Steps in Digital Image Processing Digital Image Fundamentals, Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization , Some Basic Relationships between Pixels, An Introduction to the Mathematical Tools Used in Digital Image Processing

Module II: Intensity Transformations and Spatial and frequency Domain.

Background, Some Basic Intensity Transformation Functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters Filtering in the Frequency Domain, Preliminary Concepts, The Discrete Fourier Transform (DFT), The Basics of Filtering in the Frequency Domain, Image Smoothing Using Frequency Domain Filters, Image Sharpening Using Frequency Domain Filters.

Unit: III: Morphological Image Processing

Erosion and Dilation, Opening and Closing, Gray-Scale Morphology, Some Basic Morphological Algorithms

Module IV: Image Segmentation

Point, Line, and Edge Detection, Thresholding, Region-Based Segmentation,

Segmentation Using Morphological Watersheds

Module V: Object Representation, Description and Recognition

Representation, Boundary Descriptors, Region Descriptors, Pattern and Pattern Classes, Matching.

Suggested readings:

1. A.K. Jain, PHI, New Delhi, "Fundamentals of Digital Image Processing ",2012
2. Chanda Dutta Magundar, "Digital Image Processing and Applications", Prentice Hall of India, 2000
3. Millman Sonka, Vaclav hlavac, Roger Boyle, Broos/colic, Thompson Learniy, "Image Processing Analysis and Machine Vision" (1999)
4. Rafael C Gonzalez, Richard E Woods 2nd Ed., "Digital Image Processing" Pearson Education2003.
5. William K Pratt, "Digital Image Processing", John Willey (2001).

Course Title: Geographic Information System
Course Code: CS 3-6 B
Objective:
- To introduce the Geographic Information System and its applications.
- Study of Representation of Geospatial Data and Terrain model.
- Finally study of Future issues and prospectus

Outcome:
- Students will be able to identify the unused Land within a specific area.
- Students will be able to use various GIS tools

Module I: Introduction to Geographic Information System

Overview, Definition of GIS, Evolution of GIS, Components of GIS, Approaches to the study of GIS, Introduction of Maps, Characteristics of Maps, Map Projection, plane and geographic coordinates, Acquisition of G eospatial Data, Topographic mapping, acquisition of attribute data: Thematic Mapping.

Module II: Representation of Geospatial Data

Issues pertaining to the Digital Representation of Geospatial Data, Database and Database Management System, Raster Geospatial Data representation, Vector Data Representation, the relationship between data representation and data analysis in GIS, definition of data quality, components of geospatial data quality, assessment of data quality.

Module III: Raster and Vector Geoprocessing

Characteristics of Raster Geoprocessing, acquiring and handling raster geospatial data, output functions of Raster geoprocessing, cartographic modeling, characteristics of Vector geoprocessing, Vector data input functions, nontopological GIS Analysis function, feature based toplogical functions, layer based topological functions.

Module IV: Digital Terrain Modeling

Introduction, Definitions and terminology, Approaches to Digital Terrain Data Sampling, Acquisition of Digital Terrain Data, Data Processing, Analysis and Visualization, Application of Digital Terrain Models.

Module V: GIS Issues and Prospects

Introduction, GIS becoming mainstream information technology, issues of implementation GIS, Trends in GIS Development , frontiers of GIS Research.

Suggested readings:

1. C.P.Lo Albert, K.W. Yonng, "Concepts & Techniques of GIS", Prentice Hall (India) Publications.2009
2. Kang tsung chang, "Geographic Information System", TMH Publications & Co., 2000
3. Fundamental of GIS by Mechanical designs John Wiley & Sons 2008
4. Peter A Burragh and Rachael ,A. Mc Donnell, Principals of Geo physical Information Systems Oxford Publishers 2004.
5. Remote Sensing and its applications by LRA Narayana University Press 1999.
6. S.Kumar,Basics of Remote sensing & GIS , Laxmi Publications. 2005

Course Title: Lab VI A
Course Code: CS 3-6
Practical based on Digital Image processing

1. program to read and write images

2. Program to show the different types of images

3. Program to show various images in single axis

4. Program to rotate, resize the images

5. Program to read different types of Images (PNG, JPEG, TIF etc)

6. Program to various pixel relationship operation

7. Program to basic Intensity Transformation Function ,

8. Program to Histogram based processing

9. Program for represent the histogram of Images.

10. Program based on spatial Image enhancement

11. Program based on Frequency based image enhancement

12. Program based on morphological operation

13. Program based on Opening and Closing Operation

14. Program based on Thresholding

15. Program based on line, edge detection.

16. Program based on region based segmentation.

(Apart from the above list, concerned teacher can conduct different kinds of programs for the better understanding of the concepts)

Course Title: Lab VI B
Course Code: CS 3-6
Practicals based on GIS taking in to consideration of

1. Fundamental cartographic knowledge of map projections, scale, coordinates and mapping accuracy.
2. Recognizing and identifying geographic data's four components: position, attributes, spatial relationships, and time to aid in retrieving, manipulating, analyzing and displaying spatially-referenced data.
3. A working knowledge of GIS software and associated hardware to determine appropriate use of the technology.
4. Methods of visual interpretation of imagery from digital sensors;
5. The principles of basic digital image processing for information extraction;
6. Provide hands-on experience in digital image analysis;

(Apart from the above list, concerned teacher can conduct different kinds of programs for the better understanding of the concepts)

Course Title: Seminar
Course Code: CS 3-7

1. Student should choose the Seminar Topic from the any one core or subject elective course.
2. Student should prepare a seminar report consisting of following points
    i.   Introduction
    ii.   Need
    iii.   Objectives
    iv.   Methodology/ Architecture
    v.   Conclusion/Application
3. Student should deliver seminar on the selected topic (Time allocated for presentation : 15 Min.)

Course Title: Compiler Design
Course Code: CS4-1
Objectives
- To understand the phases of Compiler
- To aware the Finite Automata and Lexical Analysis
- To understand Parsing Techniques

Outcome:
- Students will be able to perform Syntax as well as Semantic analysis
- Students will be able to plot transition diagrams for DFA and NFA

Module I: Introduction to Compilation

Compiler Basics, Issues in Compilation, Phases of Compilation: the Analysis – Synthesis Model, Compiler Construction Tools

Module II: Designing a Lexical Analyzer

Role of Lexical Analysis, Input Buffering, Specification of Tokens, Recognition of Tokens, Finite automata, Conversion from regular expression to NFA, Deterministic finite automata, Conversion from NFA to DFA, Minimization of DFA, Creating Lexical Analyzer with LEX

Module III: Designing Syntax Analyzer

Role of Syntax Analyzer, Classification of parsers, **Top-Down Parsing:** Introduction, Problems in top-down parsing, Recursive Parsing, Problems in Recursive Procedures, Predictive Parsing, Error Handling in Predictive Parsers, **Bottom Up Parsing**: Shift Reduce Parser, Actions of shift reduce parser, Construction of parse tree, Operator Precedence Parsing, Components of operator precedence parsers, Parsing action, Construction of operator precedence parsers, Advantages and disadvantages of operator precedence Parsing. LR Parsing: Simple LR parser, LALR parser.

Module IV: Intermediate Code Generation

Need For Intermediate Code Generation, Intermediate Forms: Polish Notation, Quadruples, Triples, Indirect Triples & Bloks

Module V: Code Optimization

Introduction, need for code optimization, Classification of code optimization techniques: Optimization techniques that work on machine code, Optimization techniques that work on intermediate forms of source code i.e. Optimization with in Basic Blocks: Folding, Redundant operation elimination, Optimization with in Loop: Strength Reduction, Dead code elimination, Moving operation within block out of block.

Suggested readings :

1. Aho A.V., R. Sethi and J.D. Ullman, Compiler Principle, Techniques and Tools , Addison Wesley.
2. Barret, Couch, Compiler Construction Theory and Practice, , Asian Student Edition.
3. Dhamdhere D.M, "Compiler Construction Principle and Practice", McMillan India.
4. David Galles, Modern Compiler Design, Pearson Education, 2009.
5. Gres D., "Compiler Construction for Digital Computer", Wiley.

Course Title: Soft Computing
Course Code: CS4-2
Objective:
- Introduce students to soft computing concepts and techniques
- Foster their abilities in designing and implementing soft computing based solutions for real-world and engineering problems

Outcome:
- Students will be able to use the concepts of Neural Network, Fuzzy Logic and Genetic Algorithm
- Students will be able to used NN tool and FL tool to solve the problem

Module I: Foundations of intelligent and soft computing

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

Module II: Operations on Fuzzy Sets

Fuzzy complements, Fuzzy Union, Fuzzy Intersections, Crisp & Fuzzy Relation, Binary Fuzzy Relation, Binary Relation on single set, Fuzzy Equivalence Relations, Fuzzy Compatibility Relation

Module III: Introduction to Neural Networks :

Biological Neuron and their Artificial Neuron , McCulloch-Pits Neuron Model ,Perceptron Classification ,Linearly Seperatibility, XOR Problem ,Overview of Neural Network Architecture ,Learning Rules ,Supervised Learning ,Unsupervised Learning ,Perceptron Learning , Reinforcement Learning ,Delta Learning Rule

Module IV: Multilayer Feed forward

Generalized Delta Learning, Back propagations training algorithm and derivation of weight ,Variant in Back propagations ,Radial Basis Function (RBF) ,Application of BP and RBF N/W

Module V: Recurrent Network and Unsupervised Learning

Hopfield Network ,Counter propagation networks , Boltzman Machine, Application in Pattern Recognitions.

Suggested readings:

1. George J. Klir, Bo Yuan ,Fuzzy Sets and Fuzzy Logic Theory and Application
2. George J. Klir, Tina A. Floger ,Fuzzy Sets Uncertainty and Information
3. John hertz, Krogh and Richard , Introduction to the Theory of Neural Competition, Addision Wesely
4. Jaeck M. Zurada, Introduction to Artificial Neural Network
5. Koska , Neural Network and Fuzzy System A Dynamic System PHI Edition

Course Title: Project

Course Code: CS 4-3

Rules for Project

1. Maximum three students are allowed to do a project

2. Project should be developed at their practical Lab only

3. Students should submit the synopsis/ planning of project on the date of commencement of classes for the IV Semester

4. Students should submit progress report of Project work twice in the month (Six progress reports are expected) though the Project guide

5. The students those interested to do project at Industry level should submit the undertaking of Industry authority for the project

6. Project report should be prepared as per the Appendix A

Course Title: Lab VII

Course Code: CS 4-4

Practical Based on Fuzzy logic and Neural Network

1. Introduction to MATLAB
2. Creating Row, Column Vectors &Matrix, Matlab Operators
3. Simple Plotting functions in MATLAB
4. Plotting Activation Functions
5. 2D Classification using Perceptron Learning Rule
6. 3D Classification using Perceptron Learning Rule
7. SDPTA & SCPTA Algorithms
8. Solving XOR Problem by MLP
9. Implement Error Back propagation Training Algorithm
10. Demonstrate RBF function in MATLAB
11. Demonstrate fuzzy union & intersection in MATLAB
12. Demonstrate fuzzy complement operations in MATLAB
13. Write a program for fuzzy membership functions in MATLAB
14. Program to demonstrate pattern recognition application (Digit, Handwritten, fingerprint, etc.)
15. Implement Fuzzy neural network for pattern recognition application

(Apart from the above list, concerned teacher can conduct different kinds of programs for the better understanding of the concepts)

Course Title: Big Data Analysis
Course Code: CS 4-5 A
Objectives :
- To make more effective use of data stored in huge databases and create a clean, consistent repository of data within a data warehouse.
- To discover hidden patterns and knowledge that is embedded in the data using different data mining techniques.
- To use different data mining techniques for taking business decisions designing policies.

Outcome:
- Students will be able to use the tools used for Big Data Analysis
- Students will be able to perform various data mining tasks

Module I: Data Mining Introduction

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Tasks, Data Mining Task Primitives, Data Mining Vs KDD's, Major issues in DM.

Module II: Data Warehouse and OLAP Technology for Data Mining

Introduction to Data Warehouse, Data Warehouse Features, Data Warehouse Architecture, Data Warehouse Implementation, OLAP and OLTP, Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization, Data Marts Vs Data warehouse.

Module III: Classification

Introduction, Classification by Statistical based algorithms, Decision Tree based algorithms, Neural Network based algorithms, Rule based algorithms, Bayesian Classification, Support Vector Machines (SVM).

Module IV: Association rules and Clustering

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Frequent Item set Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining, Cluster Analysis Introduction : Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Constraint-Based Cluster Analysis, Outlier Analysis

Module V: Introduction to Web Mining

Introduction: Web Mining- Content Mining, Web Structure Mining, Web Usage Mining, Examples of web mining and applications.

Suggested readings:
1. Arun K Pujari, Data Mining Techniques, 2nd edition, Universities Press.
2. Han, Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann
3. K.P.Soman, S.Diwakar, V. Ajay,Insight into Data Mining, PHI, 2008.
4. M.H. Dunham, "Data Mining Introductory and Advanced Topics", Pearson Education.
5. M Berry and G. Linoff, "Mastering Data Mining", John Wiley.
6. Pieter Adriaans, Dolf Zantinge , "Data Mining", Pearson Education Asia
7. Sam Aanhory & Dennis Murray, Data Warehousing in the Real World, Pearson Edn Asia.

Course Title: Cloud Computing
Course Code: CS 4-5 B
Paper 2 : Cloud Computing
Objectives:
- To understand the concepts of cloud computing
- To aware the services provided by cloud computing
- To study the security issues of cloud computing

Outcome:
- Students will be able to use cloud services
- Students will be able to establish the security system for cloud computing

Module I: Introduction to Cloud Computing

Cloud Computing: Definition, Cloud Architecture, Cloud Storage, Advantages and Disadvantages of Cloud Computing, Companies in the Cloud Today, Cloud Services, **Cloud Types:** The NIST Model, The Cloud Cube Model, Deployment Models, Service Models Cloud **Computing, Service Models:** Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS).

Module II: Developing Cloud Services

Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds

Module III: Cloud Computing for Everyone

Centralizing Email Communications – Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events – Cloud Computing for the Corporation

Module IV: Using Cloud Services

Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing - Collaborating on Databases – Storing and Sharing Files

Module V: Cloud Security and Challenges

Cloud computing security architecture: Architectural Considerations- General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro-architectures; Identity Management and Access control Identity management, Access control, Autonomic Security **Cloud computing security challenges:** Virtualization security managementvirtual threats, VM Security Recommendations, VM-Specific Security techniques, Secure Execution Environments and Communications in cloud.

Suggested readings

1. Barrie Sosinsky, "Cloud Computing Bible", Wiley India pub
2. Dinakar Sitaram, "Moving to The Cloud", Elsevier, 2014.
3. Danc.Marinercus, "Cloud Computing Theory And Practice", Elsevier, 2013.
4. Judith Hurwitz, Robin Bloor, Marcia Kaufman, and Dr. Fern Halper, "Cloud Computing for Dummies", Wiley Publishing, 2010.
5. Michael Miller, "Cloud computing", Pearson Pub.

Course Title: Lab VIII A
Course Code: CS 4-6
Lab Manual for Big Data Analysis

1. Demonstration of Weka 3.6.9 IDE. And tools for data mining

2. Demonstration of preprocessing technique on the existing data set of Weka 3.6.9,

    a. Select weather. nominal data set and preprocess the .ARFF file.

    b. Select weather . numeric data set and preprocess the .ARFF file.

3. Demonstration of classification technique using J48 algorithm on

    a. Select weather. nominal dataset

    b. Select weather. numeric dataset.

    c. Create your own .ARFF file and classify it and visualize the classifier error.

4. Demonstration of classification technique using id3 and naïve bayes algorithm algorithm on

    a. Select weather. nominal dataset

    b. Select weather. numeric dataset.

    c. Create your own .ARFF file and classify it and visualize the classifier error.

5. Demonstration of Association Rule using Apriori algorithm

    a. Dataset test. ARFF using apriori algorithm.

    b. Dataset contact lenses. ARFF using apriori algorithm

6. Demonstration of clustering rule process on dataset iris. ARFF using simple k-means algorithm.

7. Demonstration of clustering rule process on own dataset student.arff using simple k-means algorithms.

8. Demonstration of Predicting the price of house using linear and nonlinear regression algorithm based on different parameters of house.

(Apart from the above list, concerned teacher can conduct different kinds of programs for the better understanding of the concepts)

Course Title: Lab VIII B
Course Code: CS 4-6
Practical based on Cloud Computing

Students should develop four programs for each application area as shown below

1. Application Hosting

2. Web Hosting | Cloud Computing

3. Backup and Archiving

4. Disaster Recovery

5. Virtual Desktop Infrastructure

(Apart from the above list, concerned teacher can conduct different kinds of programs for the better understanding of the concepts)

Course Title: Seminar
Course Code: CS 4-7

1. Student should choose the Seminar Topic excluding their syllabus
2. Student should prepare a seminar report consisting of following points
    1. Introduction
    2. Need
    3. Objectives
    4. Methodology/ Architecture
    5. Conclusion/Application
3. Student should deliver seminar on the selected topic (Time allocated for presentation: 15 Min.)