SYLLABUS- BCA
SEMESTER I

CA1CRT01 : Computer Fundamentals and Digital Principles (Core)

Theory:4 hrs. per week
Credits:4

Unit-1: (12 hrs.)
Introduction: Functional units of a computer system, Different types of computers, Computer Software and Hardware, Types of software-System software and Application programme. Characteristic of computers. Input Devices – Keyboard, Mouse, Optical input devices, Output devices – Monitors and Printers.
Unit-2: (10 hrs.)
Introduction to Operating Systems and Networking:
Definition of an Operating System – Different types of PC Operating Systems. Computer Networks- categories of networks - LAN, WAN,MAN. The Internet - Working of Internet - Major Features of Internet.
Unit 3: (12 hrs.)
Number Systems:
Base or radix ,Positional number system, Popular number systems(Decimal, Binary, Octal and Hexadecimal), Conversion-From one number system to another, Concept of binary addition and subtraction, Complements in binary number systems,1s Complement, 2s Complement and their applications, Signed magnitude form, BCD numbers- concept and addition.
Unit 4: (20 hrs.)
Boolean Algebra and Gate Networks:
Logic gates- AND, OR, NOT, NAND and NOR Truth tables and graphical representation, Basic laws of Boolean Algebra, Simplification of Expressions, De Morgans theorems, Dual expressions, Canonical expressions, Min terms and Max terms, SOP and POS expressions, Simplification of expression using K-MAP (up to 4 variables), Representation of simplified expressions using NAND/NOR Gates, Don't care conditions, XOR and its applications, parity generator and checker.

Unit5: (18 hrs.)
Sequential and Combinational Logic. Flip flops- Latch, Clocked, RS, JK, T, D and Master slave , Adders-Half adder, Full adder(need and circuit diagram), Encoders, Decodes, Multiplexers and Demultiplexers(working of each with diagram), Analog to digital and digital to analog converters (Diagram and working principle), : Concept of Registers, Shift Registers

Books of study :
1. Peter Nortons- Introduction to Computers, Sixth Edition, Published by Tata McGraw Hill
2. P K Sinha & Priti Sinha - Computer Fundamentals , Fourth Edition, BPB Publications.
3. M Morris Mano-Digital Logic and Computer design, Fourth Edition, Prentice Hall.

References Text:
1. Thomas C Bartee- Digital computer Fundamentals, Sixth Edition, TATA McGraw Hill Edition
2. Thomas L Floyd- Digital Fundamentals, Ninth edition, PEARSON Prentice Hall.
3. Malvino & Leach- Digital Principles and Applications, Sixth Edition, Tata McGraw Hill, 2006

CA1CRT02 -Methodology Of Programming And C Language (Core)

Theory:4 hrs. per week
Credits:3

UNIT 1 (12 hrs.)
Introduction to programming, Classification of computer languages, Language translators (Assembler, Compiler, Interpreter), Linker, Characteristics of a good programming language, Factors for selecting a language, Subprogram, Purpose of program planning, Algorithm, Flowchart, Pseudocode, Control structures (sequence, selection, Iteration), Testing and debugging

UNIT 2(12 hrs.)
C Character Set, Delimiters, Types of Tokens, C Keywords, Identifiers, Constants, Variables, Rules for defining variables, Data types, C data types, Declaring and initialization of variables, Type modifiers, Type conversion, Operators and Expressions- Properties of operators, Priority of operators, Comma and conditional operator, Arithmetic operators, Relational operators, Assignment operators and expressions, Logical Operators, Bitwise operators.

UNIT 3 (15 hrs.)
Input and Output in C – Formatted functions, unformatted functions, commonly used library functions, Decision Statements If, if-else, nested if-else, if-else-if ladder, break, continue, goto, switch, nested switch, switch case and nested if. Loop control- for loops, nested for loops, while loops, do while loop.

UNIT 4(15 hrs.)
Array, initialization, array terminology, characteristics of an array, one dimensional array and operations, two dimensional arrays and operations. Strings and standard functions, Pointers, Features of Pointer, Pointer and address, Pointer declaration, void wild constant pointers, Arithmetic operations with pointers, pointer and arrays, pointers and two dimensional arrays.

UNIT 5(18 hrs.)
Basics of a function, function definition, return statement, Types of functions, call by value and reference. Recursion -Types of recursion, Rules for recursive function, direct and indirect recursion, recursion vs iterations, Advantages and disadvantages of recursion. Storage class, Structure and union, Features of structures, Declaration and initialization of structures, array of structures, Pointer to structure, structure and functions, typedef , bitfields , enumerated data types, Union, Dynamic memory allocation, memory models, memory allocation functions.

Book Of Study:
1. Ashok Kamthane - Programming in C, Third Edition, Pearson Education
2. P K Sinha & Priti Sinha - Computer Fundamentals , Fourth Edition, BPB Publications.
Reference Text
1. E. Balaguruswamy -Programming in ANSI C ,Seventh Edition , McGraw Hill Education
2. Byron Gotfried - Programming with C, Second Edition, Schaums Outline series. McGraw Hill

CA1CRP01-Software Lab I (Core)

Software Lab: 4 hrs. per week
Credits:2

Syllabus

1. Programs to familiarize printf() and scanf() functions.
2. Programs Based on Decision statements , break, goto, continue, switch and Loop controls statements.
3. Programs Based on One dimensional and two dimensional arrays.
4. Programs on Strings and string handling functions.
5. Programs based on Pointers, operations on pointers, Arrays & Pointers,
6. Programs based on functions, Call by value, Call by reference, Recursion,
7. Programs based on structure and union, array of structures, Pointer to structure, structure and functions
8. Simple programs using pointers and malloc().

Scheme of Evaluation for software lab I external is as follows:

Division of Marks (Practical - 3 hours External)

First program from part 1& 2 **- 25 marks**
1.Flowchart - 5 marks
2.Logic **–** 10 marks
3.Successful compilation **–** 5 marks
4.Result **–** 5 marks
Second program should be based on advanced concepts ,part 3 to part 8 **- 35 marks**
1.Logic **–** 20 marks
2.Successful compilation **–** 10 marks
3. Result **–** 5 marks)
Viva Voce **- 10 marks**
Lab Record (minimum of 25 Programs) **- 10 marks**
Total Marks - 80 marks

BCA- SEMESTER II

CA2CRT03- Database Management Systems (Core)
Theory:4 hrs. per week
Credits:3
Unit 1: Introduction (12 hrs.)
Characteristics of the Database Approach – Database users :DBA , Database Designers ,End users – Advantages of using the DBMS Approach – Data models, Schemas , and Instances – Three-Schema Architecture and Data Independence. DBMS Languages: DDL, DML – The Database System Environment: DBMS Component Modules.

Unit 2: Relational Model (16 hrs.)
Entity Relationship Modeling: Introduction –Entity Types , Entity Sets , Attributes and Keys – Relationship Types ,Relationship Sets, Roles , and Structural Constraints – Weak Entity Types – Notation for ER diagrams – Sample ER diagrams.
Relational Model concepts: Domains ,Attributes , Tuples , and Relations – Characteristics of Relations – Relational Model Constraints and Relational Database Schemas : Domain Constraints, Key Constraints , Relational Database Schemas , Entity Integrity , Referential Integrity, and Foreign Keys .

Unit 3: SQL(14 hrs.)
Data Types – Data Definition commands : CREATE , ALTER ,DROP - Adding constraints in SQL – Basic SQL Queries : INSERT ,SELECT ,DELETE ,UPDATE - Substring comparison using LIKE operator ,BETWEEN operator – Ordering of rows – SQL set operations UNION , EXCEPT , INTERSECT – Complex Queries : Comparison involving NULL and Three-valued logic ,Nested queries , EXISTS and UNIQUE functions, Renaming of attributes and Joining of tables, Aggregate functions ,Grouping – Managing Views.

Unit 4: Normalization and Indexing Structures for Files(15 hrs.)
Normalization: Informal Design Guidelines for Relational Schemas –Functional Dependencies – Normal forms : First Normal Form , Second Normal Form , Third Normal Form – General Definitions of Second and Third Normal Forms –BCNF.
Indexing Structures for files: -Types of Single-Level Ordered Indexes: Primary Indexes, Clustering Indexes, and Secondary Indexes.

Unit 5: Transaction Processing and Database Security (15 hrs.)
Transaction Processing: Introduction to Transaction Processing - Transaction and System Concepts – Desirable properties of Transactions.
Database Security and Authorization: Types of Security – Control measures – Database Security and DBA – Access Control , User Accounts, and Database Audits –Access Control based on Granting and Revoking Privileges.
***Books of study*:**
1.Ramez Elmasri and Shamkant B.Bavathe - DATABASE SYSTEMS , Sixth Edition, Pearson Education.
References*:*
1. C.J Date- An Introduction to Database Systems, Eighth edition, Pearson Education,2003
2. Reghu Ramakrishnan and Johannes Gehrke- Database Management Systems , Third edition, Mc Graw Hill International Edition.
3. Dipin Desai , An Introduction to Database Systems , First Edition, Galgoria Publications .

CA2CRT04 : Computer Organization and Architecture (Core)

Theory:4 hrs. per week
Credits:3

Unit 1: (12 hrs.)

Basic computer organization and design

Operational concepts, Instruction codes, Computer Registers, Computer Instructions, Memory locations and addresses, Instruction cycle, Timing and control, Bus organization.

Unit 2: (15 hrs.)

Central Processing Unit:

General Register Organization, Stack Organization, Addressing modes, Instruction Classification, Program control.

Unit 3: (16 hrs.)

Memory Organization

Memory Hierarchy, Main Memory, Organization of RAM, SRAM, DRAM, Read Only Memory-ROM-PROM,EROM,EEPROM, Auxiliary memory, Cache memory, Virtual Memory, Memory mapping Techniques.

Unit 4: (15 hrs.)

Parallel Computer Structures:

Introduction to parallel processing, Pipeline computers, Multi processing systems, Architectural classification scheme-SISD, SIMD, MISD, MIMD.

Unit 5: (14 hrs.)

Pipelining and Vector processing: Introduction to pipelining, Instruction and Arithmetic pipelines (design) Vector processing, Array Processors.

Book of study :

1. M.Morris Mano-Computer Systems Architecture, Third Edition, Pearson Education
2. Kai Hwang and F A Briggs-Computer Architecture and parallel processing, McGraw Hills,1990

Reference

1. Carl Hamacher -Computer Organization, Fifth Edition, Tata McGraw Hill.
2. John P Hayes -Computer Architecture & Organization–Mc Graw Hill
3. William Stallings-Computer Organization and Architecture , Seventh Edition, Pearson Education

CA2CRT05- Object Oriented Programming using C++ (Core)

Theory:3 hrs. per week
Credits:4

Unit 1: (10 hrs.)

Principles of Object Oriented Programming, Beginning with C++

Procedure Oriented Programming-Object Oriented Programming-Basic concepts of object-oriented programming- Benefits of OOP- Applications of OOP-A simple C++program-Structure of C++ program-C++ data types- Symbolic constants- Reference by variables-Operators in C++- Operator precedence-Control structures- Function in C++ - The main function, Function prototyping- Call by reference- Return by reference- Inline function- Default arguments- Function overloading.

Unit 2: (10 hrs.)

Classes and Objects : Specifying a class- Defining member functions- Nesting of member functions - Private member functions - Arrays within a class - Memory allocation for objects-Static data members - Static member functions -Arrays of objects - objects as function arguments -Friendly functions- Returning Objects.

Unit 3: (12 hrs.)

Constructers and Destructors, Overloading

Constructors- Default constructor-Parameterized constructor-Copy constructor- Multiple constructors-Constructors with default arguments- Dynamic constructor-Destructors- Operator overloading- Unary and Binary operator overloading- Overloading using friends- Rules for overloading- Type conversion.

Unit 4: (10 hrs.)

Inheritance: Inheritance - Defining derived classes-Visibility modes-Single, Multilevel, Multiple, Hierarchical and Hybrid inheritance- Virtual base classes- Abstract classes- Constructors in derived classes- Nesting of classes.

Unit 5: (12 hrs.)

Pointers, Virtual Functions and Polymorphism, Working with Files : Pointers- Pointers to objectsthis pointer-Pointers to derived classes- Virtual functions- Pure virtual functions- File Stream classes, Opening and closing a file- File opening modes- File pointers and their manipulations- Sequential input and output operations.

Book of Study:

1. E. Balagurusamy - Object Oriented Programming with C++, Fifth edition, Tata McGraw Education Hill , 2011.

Reference*:*

1. Ashok N. Kamthane, Object oriented Programming with ANSI & Turbo C++, First Edition, Pearson India
2. Robert Lafore, Object Oriented Programming in Turbo C++, First Edition, Galgotia Publications.
3. D Ravichandran, Programming with C++, Second edition, Tata McGraw- Hill.

CA2CRP02-Software Lab II (Core)

Software Lab: 5 hrs. per week
Credits:2

I. SQL Commands (2 hrs. per week)

1. Data definition commands - CREATE, ALTER, DROP, Adding Constraints Primary key, foreign key, unique key, check, not null.
2. Basic SQL queries INSERT, SELECT, DELETE, UPDATE, Using multiple tables, ordering of rows using ORDER BY option, Set operations using UNION, EXCEPT, INTERSECT, Substring Comparison using LIKE operator, BETWEEN operator.
3. Complex Queries Nested Queries, EXISTS and UNIQUE/DISTINCT functions, NULL values, Renaming of attributes and Joining of tables, Aggregate functions and grouping.
4. Managing views, Simple stored procedures.
5. Data Control commands - Access Control and Privilege commands.

II. Object Oriented Programming using C++ (3 hrs. per week)

1. Programs based on default arguments, function overloading.
2. Programs based on array of objects, friend functions, passing objects as arguments to function.
3. Programs based on operator overloading (binary, unary) using member functions and friend functions.
4. Programs based on constructors, different types of constructors.
5. Programs based on inheritance, different types of inheritance.

Scheme of Evaluation for software lab II external is as follows:
(There will be two questions; the first from DBMS and second from C++)

Division of Marks (Practical - 3 hours External)
First program - questions from DBMS **- 25 marks**
1. Logic **–** 10 marks
2.Successful compilation **–** 8 marks
3. Result **–** 7 marks
Second program **–** questions from Object Oriented Programming using C++ **- 35 marks**
1. Logic **–** 20 marks
2.Successful compilation **–**10 marks
3. Result **–** 5 marks
Viva Voce **- 10 marks**
Lab Record **- 10 marks**
(DBMS -Minimum of 10 Programs
C++ -Minimum: of 15 Programs)
Total Marks - 80 marks

BCA- SEMESTER III

CA3CRT06 - Computer Graphics (Core)

Theory:4 hrs. per week
Credits:4

Unit 1 : (12 hrs.)

Introduction: A survey of Computer Graphics, overview of graphics systems-Video display devices- Refresh CRT, Raster-Scan and Random-Scan Displays ,Color CRT Monitors, DVST, Flat-Panel Displays , Raster Scan systems, Random scan systems, Input devices, Hard copy devices, Graphics software.

Unit 2: (14 hrs.)

Output primitives: Line drawing algorithms: DDA algorithm, Bresenham's line algorithm, Circle generating algorithm- Midpoint circle algorithm, Character generation.

Unit 3: (18 hrs.)

2D geometric Transformations: Basic transformations: Translation, Rotation, Scaling; Other transformations-Reflection and shear, Matrix representation and homogenous coordinates, Composite transformation, Interactive picture construction Techniques.

Two-dimensional viewing: viewing pipeline, window and viewport, window to viewport transformation. Clipping operations- Point clipping, Line clipping:- Cohen Sutherland line clipping, Polygon clipping:- Sutherland- Hodgeman polygon clipping, Text Clipping.

Unit 4: (14 hrs.)

Three-dimensional concepts: Three dimensional display methods, Three dimensional object representations- Polygon surfaces, Sweep representations, Constructive solid geometry methods, octrees and quadtrees.

Unit 5 (14 Hrs)

Computer Animation: Design of animation sequences, raster animations, computer animation languages, key-frame systems, morphing, motion specifications.

***Book of study* :**

1. Donald D.Hearn & M. Pauline Baker, Computer Graphics C Version, Second Edition,, PHI Pvt. Ltd.

References:

1. Newman W M & R F Sproul, Principles of Interactive Computer Graphics, Second Edition Mc-Graw Hill Publishers.
2. Plastock R & Xiang Z, Theory and problems of computer Graphics, Second Edition Schaum Series, McGraw Hill Publishers.

CA3CRT07 -Microprocessors and PC Hardware (Core)

Theory:3 hrs. per week
Credits:3

Unit1: (10 hrs.)
Introduction : Evolution of microprocessors. **Introduction to the concept of 8085 microprocessor:** Intel 8085 introduction, Architecture ,Pin diagram, Instruction cycle, Timing diagrams, Interrupts of Intel 8085.

Unit 2 : (10 hrs.)
Instruction Set of Intel 8085 : Introduction, Instruction and data format, Addressing modes, Status flags, Intel 8085 instruction set.

Unit3: (12 hrs.)
Motherboard : Components of motherboard — expansion slots, Processor socket, coprocessor, memory modules, BIOS and CMOS, chipset. Super I/O chip, ROM BIOS, System buses- Processor Buses, Memory buses, I/O Bus(ISA,PCI Local Bus, AGP, USB), Motherboard selection criteria.

Unit4: (10 hrs.)
Hard disk: Hard Disk drive, Definitions, Hard Disk operations, Disk formatting, Basic hard disk drive components, Hard disk features, Hard disk drive installation procedure, FAT Disk, VFAT, FAT NTFS.

Unit5: (12 hrs.)
Types of memory: Physical Memory, Memory modules:- SIMMs, DIMMs, RIMMs, Brief study of conventional base memory, Upper memory area, High memory area, Extended memory, Expanded memory.

Book of study :

1. B Ram -Fundamentals of microprocessors and microcontrollers, Seventh revised edition, Dhanpat Rai Publications.
2. Manahar Lotia and Pradeep Nair- All about motherboard, First edition, 2005, BPB Publications..
3. Manahar Lotia and Pradeep Nair- Modern all about Hard Disk Drive , First edition, BPB publications.

References:

1. Scott Mueller - Upgrading and repairing PCs , 18th Edition, Pearson.
2. R S. Gaonkar- Micro processor Architecture, Programming and applications with 8085, Sixth Edition, PENRAM International Publishing.

CA3CRT08 - Operating Systems (Core)

Theory:4 hrs. per week
Credits:4

Unit 1: (10 hrs.)
Introduction: OS Definition, Functions, Evolution of OS,OS Structure Operating System Operations, Operating System Services, User Operating System Interface, System Calls, Types of System Calls.

Unit 2: (14 hrs.)
Process: Basic Concepts, Process Scheduling, Operations on Processes, Inter process communication, Process Scheduling - Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling.

Unit 3: (18 hrs.)
Process Coordination: Synchronization - The Critical Section problem, Semaphores, Classic Problems of Synchronization, Monitors. Deadlocks: System Model, Deadlock Characterization, Methods of handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

Unit 4: (16 hrs.)
Memory Management: Memory Management Strategies - Swapping, Contiguous memory allocation, Paging, Segmentation. Virtual Memory Management- Demand paging, Page Replacement.

Unit 5: (14 hrs.)
Storage Management: File System: - File Concept, Access Methods, Directory structure. Implementing File Systems:-File System Structure, Allocation Methods, Free Space Management, Disk Scheduling.

Book of study:
1. Abraham Silberschatz, Peter Galvin and Greg Gagne - Operating System Principles, Seventh Edition, John Wiley
2. William Stallings - Operating Systems, Sixth Edition, Prentice Hall of India, Pearson
Reference:
1. Milan Kovic - Operating Systems, 2ndEdition, (TMH)

CA3CRT09 - Data Structures using C++

Theory:4 hrs. per week
Credits:3

Unit 1 (12 hrs. **)**
Concept of Structured data - Data structure definition, Different types and classification of data structures, Arrays – Memory allocation and implementation of arrays in memory, array operations, Applications - sparse matrix representation and operations, polynomials representation and addition, Concept of search and sort – linear search, binary search, selection sort, insertion sort, quick sort.

Unit 2 (12 hrs.**)**
Stacks – Concepts, organization and operations on stacks using arrays (static), examples, Applications - Conversion of infix to postfix and infix to prefix, postfix evaluation, subprogram calls and execution, Multiple stacks representation. Queues - Concepts, organization and operations on queues, examples. Circular queue – limitations of linear queue, organization and operations on circular queue. Double ended queue, Priority queue.

Unit 3 (18 hrs.**)**
Linked list: Concept of dynamic data structures, linked list, types of linked list, linked list using pointers, insertion and deletion examples, circular linked list, doubly linked lists
Applications- linked stacks and queues, memory management basic concepts, garbage collection.

Unit 4 (15)
Trees - Concept of recursion, trees, tree terminology, binary trees, representation of binary trees, strictly binary trees, complete binary tree, extended binary trees, creation and operations on binary tree, binary search trees, Creation of binary search tree, tree traversing methods – examples, binary tree representation of expressions.

Unit 5 (15)
File - Definition, Operations on file (sequential), File organizations - sequential, Indexed sequential, random files, linked organization, inverted files, cellular partitioning, hashing – hash tables, hashing functions, collisions, collision resolving methods.

Books of study :
1. G.S Baluja - Data Structures Through C++ (A Practical Approach), Second Edition-2004, Danapat Rai & Co.
2. Ellis Horowitz and Sartaj Sahni - Fundamentals of Data Structures in C++ , Second Edition, Galgotia Publications.
References:
1. Seymour Lipschutz, Theory and Problems of Data Structures, Schaums Outline Series,2006, McGraw Hill
2. Yedidyah Langgsam, Moshe Augustein, Aaron M Tenenbaum- Data structures using C and C++ , Second Edition, Prentice Hall

CA3CRP03-Software Lab III (Core)

Software Lab: 6 hrs. per week
Credits:2

Syllabus

Module I

Array – Insertion , Deletion, Polynomial addition using arrays
Sort – Selection, Insertion, Quick
Search – Linear search, Binary search
Sparse matrix – Sparse form representation, transpose and addition using the sparse form

Module II

Stack - Implementation using arrays (linear stack), Infix to postfix conversion, Postfix evaluation
Queue – Implementation using arrays (linear queue), Implementation of circular queue

Module III

Singly linked list – Implementation using dynamic memory allocation techniques, arrange the list based on the ascending or descending order of the information field, concatenate two linked lists, interchange any two nodes in a list, Implementation of circular list, Implementation of linked stacks and queues.
Doubly linked list – Implementation of doubly linked list, Implementation of circular doubly linked list.

Module IV

Creation of binary search trees, Insertion and deletion of nodes, Tree traversals.

Scheme of Evaluation for software lab III external is as follows:

(There will be two questions)
Division of Marks (Practical - 3 hours External)
First program - questions from module 1 & II - **25 marks**
1. Logic – 10 marks
2.Successful compilation – 8 marks
3. Result – 7 marks
Second program – questions from module III & IV - **35 marks**
1. Logic – 20 marks
2.Successful compilation –10 marks
3. Result – 5 marks
Viva Voce - **10 marks**
Lab Record - **10 marks**
(Minimum of 25 Programs)
Total Marks - 80 marks

BCA - SEMESTER IV

CA4CRT10 - Design and Analysis of Algorithms (Core)

Theory:4 hrs. per week
Credits:4

Unit 1: (12 hrs.)
Introduction, Definition of Algorithm, Algorithm design techniques, Algorithm Analysis, performance analysis - space complexity, time complexity, Best, Worst, And average case complexity.

Unit 2 (14 hrs.)
Divide and Conquer General method, Binary search, finding the maximum and minimum, merge sort, quick sort, performance measurement of quick sort, Selection, Strassen's matrix multiplication.

Unit 3 (18 hrs.)
Greedy Algorithm General Characteristics of greedy algorithms, Problem solving using Greedy Algorithm - Knapsack problem, Minimum Spanning trees (Kruskal's algorithm, Prim's algorithm).

Unit 4: (16 hrs.)
Dynamic programming The general method, multistage graphs, all-pairs shortest path, Single source shortest path, 0/1 Knapsack problem, Traveling Sales person problem.

Unit 5: (12 hrs)
Basic traversal and search techniques - BFS and traversal, DFS and traversal, Bi-connected components and DFS, Backtracking General method, 8-queens problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles.

Book of study*:*
1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekharan, Computer algorithms/C++,Second Edition, Universities Press.
References:
1. Anany Levitin- Introduction to design and analysis of algorithms, Third Edition, Addison Wesley Low price edition.
2. Richard Neapolitan & Kumarss Naimipour, Foundation of Algorithms using C++ Pseudocode, Third edition, Jones And Bartlett Publishers.

CA4CRT11 - System Analysis & Software Engineering (Core)

Theory:4 hrs. per week
Credits:4

Unit 1: (12 hrs.)
Information systems concepts, Business information systems; Describing the business organization – organization chart , organization function list ; information system levels - operational, lower, middle, top management; SDLC Life cycle activities- life cycle flow chart, task, management review, baseline specifications, role of system analyst.

Unit 2: (14 hrs.)
Introduction to Software Engineering - Definition, Program Vs Software, and Software process, Software Characteristics, Brief introduction about product and process, Software process and product matrices. Software life cycle models , Definition, Waterfall model, Increment process models- Iterative , RAD , Evolutionary process models-Prototyping ,Spiral. Selection of a life cycle model.

Unit 3: (18 hrs.)
Software Requirement Analysis and Specification Requirements Engineering type of requirements, Feasibility Studies, Requirement Elicitation – Use Case, DFD, Data Dictionaries , Various steps for requirement analysis, Requirement documentation, Requirement validation, an example to illustrate the various stages in Requirement analysis. Project planning-Size estimation, cost estimation, the constructive cost model (COCOMO).

Unit 4: (14 hrs.)
Software Design - Definition, Various types, Objectives and importance of Design phase, Modularity, Strategy of design, Function oriented design, IEEE recommended practice for software design descriptions. Steps to Analyze and Design Objected Oriented System. Software Reliability Definition, McCall software quality model, Capability Maturity Model.

Unit 5: (14 hrs.)
Software Testing : What is testing?, Test, Test case and Test Suit, Verification and Validation, Alpha, beta and acceptance testing, functional testing, techniques to design test cases, boundary value analysis, Equivalence class testing, decision table based testing, cause effect graphing technique, Structural testing path testing, Graph matrices, Data flow testing; Levels of testing Unit testing, integration testing, system testing, validation testing,

Book of Study:

1. Marvin Gore & John Stubbe -Elements Of System Analysis, Fourth Edition, Galgotia Book Source.
2. K K Aggarwal, Yogesh Singh - Software Engineering,Third Edition, New Age International Publications.

References :

1. Roger S Pressman - Software Engineering: A Practitioner's Approach, Sixth Edition, McGraw-Hill Higher Education.
2. Ian Sommerville - Software Engineering , Seventh Edition, Pearson Education.
3. Pankaj Jalote - An Integrated approach to Software Engineering, Second Edition, Narosa Publishing Company.

CA4CRT12 - Linux Administration (Core)

Theory:4 hrs. per week
Credits:4

Unit-1 (12 hrs.)
Overview of Linux : What is Linux, Linux's root in Unix, Common Linux Features, advantage of Linux,
Overview of Unix and Linux architectures, Linux files system, hardware requirements for Linux, Linux standard directories. Commands for files and directories cd, ls, cp, rm, mkdir, rmdir, pwd, file, more, less, Creating and viewing files using cat, file comparisons.

Unit 2 (15 hrs.)
Essential Linux commands: Processes in Linux, process fundamentals, connecting processes with pipes, redirecting input/output, Background processing, managing multiple processes, process scheduling – (at, batch), nohup command, kill, ps, who, find, sort, touch, file, file processing commands - wc, cut, paste etc Mathematical commands - expr, factor etc. Creating and editing files with vi editor.

Unit 3 (15 hrs.)
Shell programming - Basics of shell programming, various types of shell available in Linux, comparisons between various shells, shell programming in bash.Conditional and looping statements, case statement, parameter passing and arguments, Shell variables, system shell variables, shell keywords, Creating Shell programs for automating system tasks

Unit-4 (18 hrs.)
System administration - Common administrative tasks, identifying administrative files configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disabling of users accounts, creating and mounting file system, checking and monitoring system performance - file security & Permissions, becoming super user using su. Getting system information with uname, host name, disk partitions & sizes, users, kernel, installing and removing packages with rpm command.

Unit-5: (12 hrs.)
Simple filter commands: pr, head, tail, cut, sort, uniq, tr - Filter using regular expression grep, egrep, sed **Understanding various Servers :**DHCP, DNS, Squid, Apache, Telnet, FTP,Samba.

Book of study :
1. Cristopher Negus - Red Hat Linux Bible, Wiley Dreamtech India 2005 edition.
2. Yeswant Kanethkar - UNIX Shell Programming, First edition, BPB.
References :
1. Official Red Hat Linux Users guide by Redhat, Wiley Dreamtech India
2. Graham Glass & King Ables - UNIX for programmers and users, Third Edition, Pearson Education.
3. Neil Mathew & Richard Stones - Beginning Linux Programming, Fourth edition, Wiley Dreamtech India.

CA4CRT13 -Web Programming Using PHP

Theory:3 hrs. per week
Credits:3

Unit 1 (8 hrs.)
Introduction to web, WWW architecture, Fundamentals of HTML, text formatting tags, marquee, inserting images, links, lists, creating tables, frames, working with form elements.

Unit 2 (10 hrs.)
CSS introduction, <link> and <style> elements, CSS properties, Controlling Fonts, Text formatting, Text- pseudo classes, Selectors, Links, Backgrounds, lists, Introduction to Java Script, Java Script variables, operators, decision control statements, looping, functions, arrays, events, popup boxes-alert, prompt, conform box, built-in objects, writing JavaScript, form validation

Unit 3 (10 hrs.)
Introduction to PHP, server side scripting, role of web server software, php comments, variables, echo and print, PHP operators, data types, branching statements, loops, arrays

Unit 4 (12 hrs.)
PHP functions, PHP form, Passing information between pages, $_GET, $_POST, $_REQUEST. String functions, include and require, session and cookie management, error handling in PHP, Object Oriented Programming using PHP

Unit 5 (14 hrs.)
Introduction to MySQL, datatypes, SQL commands-CREATE, UPDATE, INSERT, DELETE, SELECT, PHP functions for MySQL connectivity and operation- mysql_connect, mysql_select_db, mysql_query, mysql_fetch_row, mysql_fetch_array, mysql_result, mysql_list_fields, mysql_num_fields, insertion, updation and deletion of data using PHP, displaying data from MySQL in webpage.

Book of Study:

1. Dave W Mercer, Allan Kent, Steven D Nowicki, David Mercer, Dan Squier, Wankyu Choi - "Beginning PHP", Wiley Publishing, Inc
2. Ivan Bayross - "HTML, DHTML, JavaScript, Pearl & CGI ", Fourth Revised Edition, BPB Publication.
3. "Programming PHP",Rasmus Lerdorf and Kevin Tatore, Shroff Publishers & Distributors Pvt. Ltd
4. "Beginning PHP", Dave W Mercer, Allan Kent, Steven D Nowicki, David Mercer, Dan Squier, Wankyu Choi, Wiley Publishing, Inc

CA4CRP04 - Software Lab IV (Core)

Software Lab: 6 hrs. per week
Credits:2

I. Linux (2 hrs. per week)

II.

Sl.No Topic and Details

1 Getting started –Commands
2 The Linux Architecture and command usage – Commands, Generalpurpose utilities
3 The File system –Commands
4 Process related commands
5 Handling ordinary files, Basic file attributes
6 The vi editor
7 Simple Filters, Filters using regular expressions-use of grep command
8 Introduction to shell concept and writing shell script
9 Introduction to shell concept and writing shell script, Essential Shell Programming
10 User management, monitoring system performance, disk usage etc.

II. **Web Programming using PHP** (4 hrs. per week)

1. Creating programs based on HTML
2.Creating Java script based programs
3.Creating simple programs based on PHP
4.Programs using PHP functions
5.Programs based on MY SQL

Scheme of Evaluation for software lab IV external is as follows:

(There will be two questions; the first from LINUX and second from PHP)

Division of Marks (Practical - 3 hours External)

First program - questions from LINUX **- 25 marks**
1. Logic – 10 marks
2.Successful compilation – 8 marks
3. Result – 7 marks
Second program – questions from PHP **- 35 marks**
1. Logic – 15 marks
2.Successful compilation –15 marks
3. Result – 5 marks
Viva Voce **- 10 marks**
Lab Record **- 10 marks**
(LINUX -Minimum of 10 Programs
PHP -Minimum of 15 Programs)
Total Marks - 80 marks

BCA - SEMESTER V

CA5CRT14 : Computer Networks (Core)

Theory:3 hrs. per week
Credits:4

Unit 1: (10 hrs.)
Introduction to Networks, Data and signals-analog and digital, periodic analog signals, digital signals, bit rate, baud rate, bandwidth. Transmission impairments- attenuation, distortion and noise.
Data communication protocols and standards, Network models - OSI model-layers and their functions. TCP/IP protocol suite.

Unit 2: (10 hrs.)
Bandwidth utilization Multiplexing: FDM, TDM, spread spectrum.
Transmission Media- guided media and unguided media.
Switching: message, Circuit and packet switched networks, datagram networks, virtual- circuit networks.

Unit 3: (12 hrs.)
Data link layer: Error Detection and Correction, Framing, flow and error control, Protocols - Noiseless channels (Simplest, Stop and Wait) and Noisy channels (Stop and Wait and Piggy Backing).
Multiple Access Protocols. Random Access-ALOHA, CSMA. Wired LANs-IEEE standards, wireless LANs-Bluetooth, Cellular Telephony

Unit 4: (12 hrs.)
Network layer and Transport layer: Repeaters, Bridges, Gateways and routers. Logical addressing – IPV4 and IPV6 addressing, Internet protocol - IPV4 and IPV6. Connectionless and Connection Oriented Services: UDP and TCP. Congestion Control, Quality of Service.

Unit 5: (10 hrs.)
Application layer: HTTP, FTP, SMTP, DNS. Network security: Common Threats- Firewalls (advantages and disadvantages), Cryptography.

Book of study:
1. B. A. Forouzan - Data communication and Networking, Fourth edition-,TMH
2. Andrew S Tanenbaum - Computer Networks ,Fourth Edition, Prentice Hall of India.

CA5CRT15 - IT & Environment (Core)

Theory:4 hrs. per week
Credits:4

Unit 1 : (18 hrs.)
Multidisciplinary nature of environmental studies : Definition, scope and importance, Need for public awareness. (**2 hrs**)
Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems.
a) **Forest resources**: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.

b) **Water resources**: Use and over-utilization
of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c)**Mineral resources**: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) **Food resources**: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) **Energy resources**: Growing energy needs, renewable and non renewable energy
sources, use of alternate energy sources, Case studies.

f) **Land resources**: Land as a resource, land
degradation, man induced landslides, soil erosion and desertification. Role of individual in conservation of natural resources. Equitable use of resources for sustainable life styles. (**10hrs**)

Ecosystems : Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids., Introduction, types, characteristic features, structure and function of the given ecosystem:- Forest ecosystem (**6 hrs**)

Unit 2: (26 hrs)
Biodiversity and its conservation: Introduction, Biogeograhical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values., India as a mega-diversity nation, Hot-sports of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India (**8 hrs**)

Environmental Pollution : Definition, Causes, effects and control measures of: - Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste Management: Causes, effects and control measures of urban and industrial wastes., Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides. (**8 hrs**)

Social Issues and the Environment : Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people: its problems and concerns,

Case studies, Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion , nuclear accidents and holocaust, Case studies, Consumerism and waste products, Environment Protection Act , Air (Prevention and Control of Pollution) Act, Water

(Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness. (**10hrs**)

Unit 3: (10 hrs.)
Internet as a knowledge repository, academic search techniques, creating cyber presence. Academic websites, open access initiatives, opens access publishing models, Introduction to use of IT in teaching and learning -Educational software, Academic services–INFLIBNET, NPTEL, NICNET, BRNET . (**10hrs**)

Unit 4: (10 hrs.)
IT & Society- issues and concerns- digital divide, IT & development, the free software movement , IT industry: new opportunities and new threats, software piracy, cyber ethics, cyber crime, cyber threats, cyber security, privacy issues, cyber laws, cyber addictions, information overload, health issues- guide lines for proper usage of computers, internet and mobile phones. e-wastes and green computing, impact of IT on language & culture-localization issues- Unicode- IT and regional languages, Green Computing Concept.

Unit 5: (8 hrs.)
Human Rights– An Introduction to Human Rights, Meaning, concept and development, Three Generations of Human Rights (Civil and Political Rights; Economic, Social and Cultural Rights). **Human Rights and United Nations –** contributions, main human rights related organs - UNESCO,UNICEF, WHO, ILO, Declarations for women and children, Universal Declaration of Human Rights. **Human Rights in India –** Fundamental rights and Indian Constitution, Rights for children and women, Scheduled Castes, Scheduled Tribes, Other Backward Castes and Minorities **Environment and Human Rights** - Right to Clean Environment and Public Safety: Issues of Industrial Pollution, Prevention, Rehabilitation and Safety Aspect of New Technologies such as Chemical and Nuclear Technologies, Issues of Waste Disposal, Protection of Environment **Conservation of natural resources and human rights**: Reports, Case studies and policy formulation. Conservation issues of western ghats- mention Gadgil committee report, Kasthurirengan report. Over exploitation of ground water resources, marine fisheries, sand mining etc. **(8 Hrs)**

Internal: Field study

- Visit to a local area to document environmental grassland/ hill /mountain
- Visit a local polluted site – Urban/Rural/Industrial/Agricultural Study of common plants, insects, birds etc
- Study of simple ecosystem-pond, river, hill slopes, etc

(Field work Equal to 5 lecture hours)

References:

1. "Technology in Action" Alan Evans, Kendall Martin, Mary Anne Poatsy, Pearson
2. Bharucha Erach, Text Book of Environmental Studies for undergraduate Courses. University Press, IInd Edition 2013 (TB)
3. Clark.R.S., Marine Pollution, Clanderson Press Oxford (Ref)
4. Cunningham, W.P.Cooper, T.H.Gorhani, E & Hepworth, M.T.2001 Environmental Encyclopedia, Jaico Publ. House. Mumbai. 1196p .(Ref)
5. Dc A.K.Enviornmental Chemistry, Wiley Eastern Ltd.(Ref)
6. Down to Earth, Centre for Science and Environment (Ref)
7. Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge University Press 1140pb (Ref)
8. Jadhav.H & Bhosale.V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p (Ref)

9. Mekinney, M.L & Schock.R.M. 1996 Environmental Science Systems & Solutions. Web enhanced edition 639p (Ref)
10. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co. (TB)
11. Odum.E.P 1971. Fundamentals of Ecology. W.B. Saunders Co. USA 574p (Ref)
12. Rao.M.N & Datta.A.K. 1987 Waste Water treatment Oxford & IBII Publication Co.Pvt.Ltd.345p (Ref)
13. Rajagopalan. R, Environmental Studies from crisis and cure, Oxford University Press, Published: 2016 (TB)
14. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut (Ref)
15. Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science (Ref)
16. Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Stadards, Vol I and II, Enviro Media (Ref)
17. Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (Ref)
51
18. Wanger K.D., 1998 Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p (Ref)
19. M-Magazine, R-Reference TB- Text Book

CA5CRT16 – Java Programming using Linux (Core)

Theory:3 hrs. per week
Credits:3

UNIT 1 (10 hrs.)
Concepts of Object oriented programming, Benefits of OOP, Features of java. Java environment, java tokens, Constant, variables, data types, operators, Control Statements-branching statements, looping statements, jump statements, labeled loops.

UNIT 2 (10 hrs.)
Defining a Class, Fields declaration, Method declaration, Creating object, Accessing class members, method overloading, Constructors, constructor overloading, super keyword, static Members, Inheritance, overriding methods, dynamic method dispatch, final(variables, methods and classes), abstract methods and classes, interfaces, visibility control.

UNIT 3 (12 hrs.)
Arrays- One dimensional arrays, declaration, creation, initialization of arrays, two dimensional arrays, String class. Packages: - java API packages overview (lang, util, io, awt, swing, applet), user defined packages-creating packages, using packages. Exception Handling Techniques-try-catch-throw-throws-finally -Multithreading- creation of multithreaded program-Thread class-Runnable interface, Thread life cycle.

UNIT 4 (10 hrs.)
Event Handling-Delegation Event Model-Event Classes-Sources of Events-Event Listeners- Event classes- Swing- architecture, components of swing- JLabel, JButton, JCheckBox, JRadioButton, JList, JComboBox, JTextField, JText Area, JPanel, JFrame, Layout Managers(Flow Layout, Grid Layout, Card Layout, Border Layout, Box Layout, Null Layout).

UNIT 5 (10 hrs.)

Applet Fundamentals -applet tag, applet life cycle, passing parameters to applets. Working with graphics -Line, Rectangle, Oval, Arc, color setting. JDBC architecture- JDBC connection, JDBC statement object, JDBC drivers.

Book of study :
1. E. Balagurusamy- Programming with Java , Third Edition, McGraw Hill Companies.
2. K. Somasundaram - PROGRAMMING IN JAVA2, First Edition, Jaico Publishing House.
Reference*:*
1. Patrick Naughton - Java2 The Complete Reference, Seventh Edition:
2. Cay S Horstmann & Gary Cornell - Core Java Volume 1- Fundamentals, Eighth edition.
3. Java 6 Programming Black Book 2007 Edition, Dreamtech press.

CA5CRP05 : Software Lab V (core)

Software Lab**: 5** hrs. per week
Credits: 2

Syllabus
Part I. Applet, JDBC connection and swing based Programs
Part II (using class and read inputs from keyboard)
Java Programs: Method Overloading- Method Overriding-inheritance-abstract class, interfaces- packages-Exception Handling-Multithreading

Scheme of Evaluation for software lab V external is as follows:

(There will be two questions; the first from Part I and second from Part II)
Division of Marks (Practical - 3 hours External)
First program - questions from Part I **- 25 marks**
1. Logic **–** 10 marks
2.Successful compilation **–** 8 marks
3. Result **–** 7 marks
Second program **–** questions from Part II **- 35 marks**

1. Logic **–** 20 marks
2.Successful compilation **–**10 marks
3. Result **–** 5 marks

Viva Voce **- 10 marks**
Lab Record **- 10 marks**
(Minimum of 25 Programs)
Total Marks - 80 marks

CA5CRP06 : Software Development Lab I (core)

Software Development Lab: 6 hrs. per week
Credits: 2

Mini project can be a small complete application project, to make the student confident in designing a system based on Software engineering course. The internal and external evaluation is to be done with the project demonstration and presentation, viva and modification. It must be done in the college lab under the guidance of a faculty.

Scheme of Evaluation for Software Development Lab I external is as follows:
Division of Marks (Software Development Lab I)

Project demonstration and Presentation **- 25 marks**
Modification **- 15 marks**
Viva Voce **- 15 marks**
Project report with proper content and binding **- 25 marks**
Total Marks - 80 marks

BCA - SEMESTER VI

CA6CRT17 - CLOUD COMPUTING (Core)
Theory:4 hrs. per week
Credits:4

Unit 1: (14 hrs.)
Introduction: Cloud Computing at a Glance, Historical Developments, Building Cloud Computing Environments, Computing Platforms and Technologies, Principles of Parallel and Distributed Computing: Eras of Computing, Parallel vs. Distributed Computing, Elements of Parallel Computing, Elements of Distributed Computing.

Unit 2: (14 hrs.)
Virtualization: Introduction, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples.

Unit 3: (14 hrs.)
Cloud Computing Architecture :Introduction, Cloud Reference Model, Types of Clouds, Economics of the Cloud, Open Challenges.

Unit 4: (16 hrs.)
Aneka: Cloud Application Platform: Framework Overview, Anatomy of the Aneka Container, Building Aneka Clouds, Cloud Programming and Management, Data Intensive Computing: Map-Reduce Programming - What is Data-Intensive Computing?, Technologies for Data-Intensive Computing, Aneka MapReduce Programming.

Unit 5: (16 hrs.)
Cloud Platforms in Industry: Amazon Web Services, Google AppEngine, Microsoft Azure, Cloud Applications: Scientific Applications, Business and Consumer Applications.

Book of Study:
1. Rajkumar Buyya, Christian Vecchiola, S ThamaraiSelvi- Mastering Cloud Computing, Tata McGraw Hill Publications.

References:
57
1. Kumar Saurabha, “Cloud Computing “ Wiley Publication Krutz ,Vines “Cloud Security”. Wiley Publication.
2. A Srinivasan & J. Suresh “ Cloud Computing : A Practical Approach for learning and Implementation “ , First edition ,Pearson

CA6CRT18 -**Mobile Application Development – Android** (Core)

Theory:4 hrs. per week
Credits:4

Unit 1 (10 hrs.)

Introduction to Android, Android Versions, Android Activity, Android Features and Architecture, Java JDK, Android SDK, Android Development Tools, Android Virtual Devices, Emulators, Dalvik Virtual Machine, Layouts – Linear, Absolute, Frame, Relative and Table.

Unit 2 (16 hrs.)

Android User Interface- Fundamental UI design , User interface with View- Text View, Buttons, Image Button, Edit Text, Check Box, Toggle Button, Radio Button and Radio Group, Progress Bar, Autocomplete Text View, Spinner, List View, Grid View, Image View, Scroll View, Custom Toast Alert and Time and Date Picker.

Unit 3 (14 hrs.)

Activity - Introduction, Intent, Intent_filter, Activity Life Cycle, Broadcast Life Cycle, Services, multimedia-Android System Architecture, Play Audio and Video, Text to Speech.

Unit 4 (16 hrs.)

SQLite Database in Android- Introduction to SQLite Database, Creation and Connection of the Database, Extracting values from Cursors, Transactions, Telephoning and Messaging-SMS Telephony, Sending SMS, Receiving SMS, Wi-Fi Activity.

Unit 5 (16 hrs.)

Introduction to JSON and XML, Use of JSON, Syntax and Rule of JSON, JSON Name, JSON Values, JSON Objects, JSON Arrays, Parsing JSON and XML.

Google Play services, Location services, Maps

Book of Study:

1. Prasanna Kumar Dixit - ANDROID, Vikas Publishing House.
2. Anubhav Pradhan, Anil Deshpande, Composing Mobile Apps using Android, Wiley India Pvt.Ltd,2014

References:

1. Kevin Grant and Chris Haseman, Beginning Android Programming – Develop and Design, Pearson.

Software Lab Work (**Four** hours per week)

Module II
Installation and configuration of Eclipse and Development Tools

Module III
Creating simple apps using Interface Tools

Module IV
Creating Andoid Apps using SQLite

Module V
Familiarizing with JSON and XML, Creation and distribution of Android Apps.

Elective papers (core)

CA6ELT01- DATA MINING (Core)

Theory:4 hrs. per week
Credits:4

Unit 1: (12 hrs.)
Introduction Data Mining, Data Ware House, Transactional Databases, Data Mining Functionalities Characterization and Discrimination, Mining frequent patterns, Association and correlation, Classification and Prediction, Cluster Analysis, Classification of Data Mining Systems, Data Mining Task Primitive, Integration of Data Mining systems, Major issues in Data Mining, Data integration and transformation, Data reduction, Data discretization.

Unit 2: (12 hrs.)
Data Warehouse and OLAP technology Data Warehouse, Multidimensional data Model, Data warehouse architecture, Data Warehouse implementation, OLAP, Data Warehouse and data mining.

Unit 3: (18 hrs.)
Association Rules and Classification Concepts Efficient and Scalable Frequent item set Mining methods, Mining various kind of association rules, from association mining to Co-relation analysis, Classification and prediction, Issues, Classification by Decision tree induction, Bayesian Classification, Rule-based classification, Support Vector Machines, Learning from your neighbors, Prediction.

Unit 4: (18 hrs.)
Cluster Analysis Definition, Types of data in cluster analysis, A categorization major Clustering methods- Partitioning methods, K-means and k-medoids, from k-medoids to CLARANS, Hierarchical methods, Density based methods.

Unit 5: (12 hrs.)
Mining Complex Data Spatial Data Mining, Multimedia Data Mining, Text Mining and Mining WWW.

Book of study:

1. Jiawei Han and Micheline Kamber - Data Mining - Concepts and Techniques,Second Edition, Elsevier, 2006

Reference:

1. Witten and Frank - Data Mining Practical Machine Learning Tools and Techniques, Second Edition, Elsevier, 2005
2. Soman, Divakar and Ajay, Data Mining Theory and Practice, PHI, 2006
3. Margaret H Dunham- Data Mining –Introductory and Advanced Topics, Fourth Edition, Person 2006

CA6ELT02 -Digital Image Processing

Theory:4 hrs. per week
Credits:4

Unit 1: (10 hrs.)
Digital Image Fundamentals
Image, Digital Image, Digital image processing-definitions, Examples of fields that use Digital Image Processing, Fundamental steps in Digital Image Processing, Components of Image processing system.

Unit 2 : (14 hrs.)
Elements of visual perception
Elements of visual perception- Image Formation, Brightness adaptation and Discrimination, Image sampling and quantization- basic concepts, spatial and Intensity resolution, Basic relationship among Pixels.

Unit 3: (16 hrs.)
Image Enhancement in Spatial and Frequency Domain
Intensity Transformation and spatial Filtering Basics, Intensity transformation functions- Image Negatives, Log Transformations, Power Law Transformations, Histogram Processing, Spatial filteringcorrelation and convolution; Fourier transform and frequency domain.

Unit 4: (15 hrs.)
Morphological Image Processing
Introduction, basis of set theory, Dilation, Erosion, Structuring elements, Opening and Closing, Hit or miss transformation.

Unit 5: (17 hrs.)
Image Segmentation
Point, Line, Edge detection-detection of isolated points, Basic edge detection- Gradient operators; Pixel based approach-Basics of intensity thresholding, Basic global thresholding; Region based segmentationregion growing, region splitting and merging.

Book of Study:
1. Rafael C. Gonzalez, Richard E. Words- Digital Image Processing, Third Edition, Pearson.
References:
1. Anil K Jain- Fundamentals of Digital Image Processing , Pearson Education.
2. Er. Rishabh Anand, Digital Image Processing, MEDTEC Publications.

CA6ELT03- Soft Computing Techniques

Theory:4 hrs. per week
Credits:4

Unit 1 (14 hrs.)
Soft Computing, Difference between soft computing and hard computing. **Neural Networks:** Basic concepts of Neural Networks, Human Brain, Artificial Neuron model, Activation functions,Neural network architecture,Single layer and multilayer feedforward networks, Recurrent networks, Neural network characteristics, Learning methods, Rosenblatt's perceptron,Perceptron and linearly separable tasks, XOR problem, Neural network applications.

Unit 2 : (14 hrs.)
Back Propagation Networks: Architecture- perceptron model, solution, single layer artificial neural network, multilayer perception model, back propagation learning- input layer computation, hidden layer computation, output layer computation, calculation of error, Training of neural network, effect of learning rate coefficient, Back propagation algorithm.

Unit 3: (15 hrs.)
Fuzzy Set Theory: Fuzzy versus crisp, Crisp sets, Operations on crisp sets, Properties of crisp sets, Partition and covering, Fuzzy sets, Membership functions, Basic fuzzy set operations, Properties of fuzzy sets, Crisp relations, Operations on crisp relations, Fuzzy relations, Fuzzy cartesian product, Operations on fuzzy relations.

Unit 4 : (15 hrs.)
Fuzzy Systems: Crisp logic, Laws of propositional logic, Inference in propositional logic, Predicate logic, Interpretations of predicate logic formula, Inference in predicate logic, Fuzzy logic, Fuzzy propositions, Fuzzy connectives, Fuzzy quantifiers, Fuzzy inference, Fuzzy rule based system, Defuzzification methods, Applications.

Unit 5: (14 hrs.)
Genetic Algorithm: History, Basic concepts, Biological background, Creation of offsprings, Encoding, Fitness function, Reproduction, **Genetic Modeling**:Crossover, Inversion and deletion,Mutation,Bit-wise operators used in geneticalgorithm, Generational cycle, Convergence of a genetic algorithm, Issues and benefits of GA, Application domains.

Book of study:
1. S. Rajasekaran and G.A VijayalakshmiPai- Neural Networks, Fuzzy Logic, and Genetic AlgorithmsSynthesis and Applications, Prentice-Hall of India Pvt.Ltd ,2004.
References:
1. S. N. Sivanandan and S. N. Deepa, Principles of Soft Computing, Wiley India 2nd Ed, 2011.
2. B K Tripathy, J. Anuradha, Soft computing Advances and Applications, Cengage Learning.
3. B Yegnanarayana, Prentice, Artificial Neural Network, Hall of India Pvt.Ltd ,2012.

CA6CRP07 : Seminar (core)

Seminar Presentation: 2 hrs. per week
Credits: 2

Each student can choose a latest topic of current day interest in the areas of Computer Science / Information Technology and present a seminar presentation using appropriate presentation media. A seminar presentation report in bound form in the pattern of a complete technical report (with contents page, well structured presentation, references etc.) should be submitted. There will not be any external evaluation for Seminar Presentation.

Scheme of Evaluation of Seminar Presentation (core) for INTERNAL is as follows:

Division of Marks
Seminar Presentation Internal (100 marks)

Presentation - 40 marks

Discussion(Questions and Answers) - 30 marks

Documentation 10 marks

Seminar report with proper Content and Binding - 20 marks

Total Marks -100 marks

CA6CRP08 : Software Development Lab II (Main Project) (Core)

Software development lab: 7 hrs. per week
Credits: 3

Individual project.
The project topic shall be chosen from areas of current day interest using latest packages / languages running on appropriate platforms (Except the tools used in software development-I), so that the student can be trained to meet the requirements of the Industry. A project report should be submitted in hard bound complete in all aspects. For internal evaluation, the progress of the student shall be systematically assessed through various stages of evaluation at periodic intervals.

Scheme of Evaluation for Software Development Lab II external is as follows:
Division of Marks (Software Development Lab II)

Project demonstration and Presentation **- 40 marks**
Viva related to project **- 20 marks**
Project report with proper content and binding **-20 marks**
Total Marks - 80marks

CA6VVT01 –VIVA VOCE (Core)

Credit :1

Scheme of Evaluation of Viva voce (core) for External is as follows:

Each student should attend a course viva voce based on syllabus from semester I to semester IV.

Total Marks – 100 marks

SYLLABUS- B.S