

| VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN | | | | | | | |
|--|--------------|---|-----------|-----------|------------|------------|------------|
| ELAYAMPALAYAM, TIRUCHENGODE - 637 205 | | | | | | | |
| MASTER OF COMPUTER APPLICATIONS (MCA) | | | | | | | |
| COURSE STRUCTURE AND SCHEME OF EXAMINATIONS UNDER CBCS | | | | | | | |
| FOR THE CANDIDATES ADMITTED FROM THE YEAR 2016-2017 | | | | | | | |
| SEM | COURSE CODE | TITLE | HOURS | CREDIT | MARKS | | |
| | | | | | CIA | EE | TOTAL |
| I | 16P1CA01 | Core Course- 1 Programming in C | 4 | 4 | 25 | 75 | 100 |
| | 16P1CA02 | Core Course - 2 Digital Computers and Microprocessors | 4 | 4 | 25 | 75 | 100 |
| | 16P1CA03 | Core Course- 3 Data Structures and Algorithms | 4 | 4 | 25 | 75 | 100 |
| | 16P1CA04 | Core Course- 4 Discrete Mathematics | 4 | 4 | 25 | 75 | 100 |
| | 16P1CA05 | Core Course- 5 Financial & Management Accounting | 4 | 4 | 25 | 75 | 100 |
| | 16P1CAP01 | Core Course Practical - 1 C & Data Structures Lab | 5 | 2 | 40 | 60 | 100 |
| | 16P1CAP02 | Core Course Practical - 2 Office Automation | 5 | 2 | 40 | 60 | 100 |
| | | Total | | 30 | 24 | 205 | 495 |
| II | 16P2CA06 | Core Course - 6 Object Oriented Programming with C++ | 4 | 4 | 25 | 75 | 100 |
| | 16P2CA07 | Core Course - 7 Relational Data Base Management Systems | 4 | 4 | 25 | 75 | 100 |
| | 16P2CA08 | Core Course - 8 Software Engineering | 4 | 4 | 25 | 75 | 100 |
| | 16P2CA09 | Core Course - 9 Computer Networks | 4 | 4 | 25 | 75 | 100 |
| | 16P2CA10 | Core Course - 10 Operations Research | 4 | 4 | 25 | 75 | 100 |
| | 16P2CAP03 | Core Course Practical - 3 C++ Lab | 5 | 2 | 40 | 60 | 100 |
| | 16P2CAP04 | Core Course Practical - 4 RDBMS Lab | 5 | 2 | 40 | 60 | 100 |
| | | Total | | 30 | 24 | 205 | 495 |
| III | 16P3CA11 | Core Course - 11 Advanced Data Structures | 4 | 4 | 25 | 75 | 100 |
| | 16P3CA12 | Core Course - 12 Graphics and Multimedia | 4 | 4 | 25 | 75 | 100 |
| | 16P3CA13 | Core Course - 13 Advanced DBMS | 4 | 4 | 25 | 75 | 100 |
| | 16P3CAE0_ | Elective Course – I | 4 | 4 | 25 | 75 | 100 |
| | | Non Core Course - EDC – 1 | 4 | 4 | 25 | 75 | 100 |
| | 16P3CAP05 | Core Course Practical - 5 Advanced Data Structures Lab | 4 | 2 | 40 | 60 | 100 |
| | 16P3CAP06 | Core Course Practical – 6 Graphics and Multimedia Lab | 4 | 2 | 40 | 60 | 100 |
| | 16P3CAJ01 | Job Oriented Course - I Soft Skills | 2 | 1 | 25 | 75 | 100 |
| | Total | | 30 | 25 | 230 | 570 | 800 |

| | | | | | | | |
|-----------|------------|--|---|---|----|----|-----|
| IV | 16P4CA14 | Core Course - 14 . Advanced Java Programming | 4 | 4 | 25 | 75 | 100 |
| | 16P4CA15 | Core Course - 15 Operating System | 4 | 4 | 25 | 75 | 100 |
| | 16P4CA16 | Core Course - 16 Compiler Design | 4 | 4 | 25 | 75 | 100 |
| | 16P4CA17 | Core Course - 17 Advanced Networks | 4 | 4 | 25 | 75 | 100 |
| | 16P4CAE0_ | Elective Course – II | 4 | 4 | 25 | 75 | 100 |
| | 16P4CAP07 | Core Course - Practical - 7 Adv Java LAB | 4 | 2 | 40 | 60 | 100 |
| | 16P4CAPR01 | Core Course Project - 1 (Mini) | 4 | 2 | 40 | 60 | 100 |
| | 16P4CAP08 | Job Oriented lab- Web Designing | 2 | 1 | 40 | 60 | 100 |

| | | | | | | | |
|-----------|------------|--|------------|------------|-------------|-------------|-------------|
| | | Total | 30 | 25 | 245 | 555 | 800 |
| V | 16P5CA18 | Core Course - 18 Unix and Network programming | 4 | 4 | 25 | 75 | 100 |
| | 16P5CA19 | Core Course - 19 Open Source Technologies | 4 | 4 | 25 | 75 | 100 |
| | 16P5CA20 | Core Course - 20 Data Mining and Warehousing | 4 | 4 | 25 | 75 | 100 |
| | 16P5CAE0 _ | Elective Course – III | 4 | 4 | 25 | 75 | 100 |
| | 16P5CAE0 _ | Elective Course – IV | 4 | 4 | 25 | 75 | 100 |
| | 16P5CAP09 | Core Course Practical - 9 UNIX and Networking Lab | 5 | 2 | 40 | 60 | 100 |
| | 16P5CAP10 | Core Course Practical – 10 Web Programming Lab | 5 | 2 | 40 | 60 | 100 |
| | | Total | 30 | 24 | 205 | 495 | 700 |
| VI | 16P6CAPR02 | Core Course Project – 2 Dissertation and Viva Voce | - | 18 | 50 | 150 | 200 |
| | | Total | 0 | 18 | 50 | 150 | 200 |
| | | Grand Total | 150 | 140 | 1125 | 2775 | 3900 |

Elective : I

| | Course Code | Title |
|---------------------|--------------------|-------------------------------------|
| Semester III | 16P3CAE01 | Principles of Programming Languages |
| | 16P3CAE02 | Soft Computing |
| | 16P3CAE03 | Mobile Computing |
| | 16P3CAE04 | Distributed Computing |

Elective II

| | Course Code | Title |
|--------------------|--------------------|---|
| Semester IV | 16P4CAE05 | Advanced Software Engineering |
| | 16P4CAE06 | Artificial Intelligence & Expert System |
| | 16P4CAE07 | Cryptography and Network Security |
| | 16P4CAE08 | E-Commerce |

Elective III

| | Course Code | Title |
|-------------------|--------------------|-------------------------------|
| Semester V | 16P5CAE09 | XML and Web Services |
| | 16P5CAE10 | Wireless Application Protocol |
| | 16P5CAE11 | Middleware Technologies |
| | 16P5CAE12 | Big Data Analysis |

Elective IV

| | Course Code | Title |
|-------------------|--------------------|-------------------------------|
| Semester V | 16P5CAE13 | Digital Image Processing |
| | 16P5CAE14 | Embedded Systems |
| | 16P5CAE15 | Enterprise Resource Planning |
| | 16P5CAE16 | Management Information system |

SEMESTER - I

| | | | |
|---|---|---------------------------|--------------------|
| Subject Title | Programming in C | Semester | I |
| Subject Code | 15P1CA01 | Specialization | NA |
| Type | Core | L:T:P:C | 4: 0 : 0 :4 |
| Objectives: | | | |
| To understand the programming features of C language. By learning the programming concepts using arrays, structures, pointers and file processing the students will be able to able to write programs for any complex applications involving memory management. | | | |
| Unit | Syllabus Contents | Number of Sessions | |
| I | Fundamentals of C: History – Importance – Basic Structure – Keywords – Identifiers – Constants – Variables – Data types – Operators and Expressions – Managing input and output operations – Preprocessor.. | 8 | |
| II | Control Structures: Decision making with IF statement – IF.. ELSE statement – Nested IF ... ELSE Statement – FOR statement – DO. WHILE statement – WHILE statement – GOTO statement - SWITCH statement. | 8 | |
| III | Arrays: One Dimensional - Two Dimensional – Multidimensional – Character Array – String Manipulation. C functions: Definition – Function Parameters – Passing arguments to Function – Scope Rules – Recursion. | 12 | |
| IV | Structures: Definition, Nested Structure - Structure and Functions – Array of Structure – Type Definitions – Bit Field – Union. Files: Introduction to File Management – Sequential and Random Access – Error handling – Command Line Argument. | 12 | |
| V | Pointers: Introduction to Pointers – Pointers and Arrays – Pointers and Functions – Structures and Pointers – Dynamic Allocation – Pointer Function – Self Referential Structures. | 10 | |

| | |
|---------------------------|--|
| Learning Resources | |
| Text Books | |

| | |
|--------------------------|--|
| | 1. R.Balagurusamy, “ <i>Programming in C</i> ” 3rd Edition Tata McGraw Hill, 2000 |
| Reference Books | 1. Brian W Kernighan & Dennis M Ritchie , ‘ <i>C Programming Language</i> ’, Prentice Hall of India Ltd, 2001. 2. ‘Let us C ‘Yashwant Kanetkar 9th Ed. |
| Web Sites / Links | 1. www.cprogramming.com/ 2. www.c4learn.com/ 3. www.cprogrammingexpert.com/ 4. www.programmingsimplified.com/ |

| | | | |
|---|--|-----------------------|---------------------------|
| Subject Title | Digital Computers and Microprocessors | Semester | I |
| Subject Code | 15P1CA02 | Specialization | NA |
| Type | Core | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: To understand the basics of digital electronics and Microprocessors | | | |
| Unit | Syllabus Contents | | Number of Sessions |
| I | Number system: Binary, Decimal, Octal, Hexadecimal – Conversion from one to another – complements – Binary codes. Basic Logic Gates – | | 8 |

| | | |
|---------------------------|---|-----------|
| | Basic Theorems and Properties of Boolean Algebra – NAND, NOR implementation – Sum of Products – Product of Sums – Karnaugh map – Tabulation Method – Don't Care Conditions | |
| II | Combinational Logic Circuit Design : Multiplexers – Demultiplexers – Decoders – Encoders –Half Adder- Full Adder- Half Subtractor- Full Subtractor - Parallel Adders. Flip-Flops: RS, D, JK Flip-Flops – Registers – Shift Registers – Ripple Counters – Synchronous Counters. | 12 |
| III | Register Transfer and Micro Operations: Arithmetic Circuit – Logic Circuit – Shift Circuit – Arithmetic Logic Shift Unit – Stack Organization – Instruction Formats – Addressing Modes – Data Transfer, Data Manipulation and Program control instructions.. | 12 |
| IV | Evolution of Microprocessor – Typical Micro Computer Architecture – Single Chip Microprocessor- Memory – Input/Output. Intel 8085: Introduction – Register Structure- Memory Addressing – 8085 Addressing modes – 8085 Instruction Set. | 8 |
| V | bit Microprocessor: Intel 8086: Introduction – Architecture – Addressing Modes. Motorola MC 68000: Introduction – Registers – Memory Addressing – Instruction Format – Addressing modes – Motorola 68000 I/O. Advanced Microprocessor – Pentium: Instruction set, Architecture and Addressing Modes. | 10 |
| Learning Resources | | |
| Text Books | <ol style="list-style-type: none"> 1. M.Morris Mano, “Digital Logic and Computer Design “, PHI, 2000. 2. M.Morris Mano , “Computer System Architecture “, Third Edition , Pearson Education, 2002. 3. M.Rafiquzzaman, “Microprocessors Theory and Applications: Intel and Motorola”, Prentice Hall India, Revised Edition, 2004. | |
| Reference Books | <ol style="list-style-type: none"> 1. Albert Paul Malvino , Donald P.Leach “ Digital Principles andApplications” Tata McGraw Hill Pub.Company.Ltd.J.P.Hayes , “ Computer Architecture and Organization” Tata Mc Graw Hill Pub. Company Ltd. | |

| | |
|--------------------------|--|
| | 2. William Stallings,” Computer Organization & Architecture –Designing for performance”, Pearson Education, Sixth Edition. R.S.Gaonkar, “Microprocessor Architecture, Programming and Applications with the 8085”, 1995 |
| Web Sites / Links | <ol style="list-style-type: none"> 1. www.allaboutcircuits.com 2. computer.howstuffworks.com/microprocessor.htm 3. www.britannica.com/technology/digital-computer 4. www.ecs.soton.ac.uk/module/ELEC1202 |

| | | | |
|---|---|---------------------------|----------------------|
| Subject Title | Data Structures and Algorithms | Semester | I |
| Subject Code | 15P1CA02 | Specialization | NA |
| Type | Core | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: | | | |
| To understand the basic concept of data structures and its usage in memory management and to learn about designing algorithms | | | |
| Unit | Syllabus Contents | Number of Sessions | |
| I | Algorithms: Problem solving – Procedure - Top-Down and Bottom-up approaches to algorithm design - Use of algorithms in problem solving: Developing an algorithm-Characteristic of algorithmic language-Design of algorithms - Implementation of algorithm -Verification of algorithm- Efficiency analysis of algorithms: Space, Time complexity, and Frequency | 10 | |

| | | |
|------------|---|-----------|
| | count - Simple algorithms. Arrays: Definition - Terminology – One-Dimensional Array - Multi-Dimensional Arrays - Pointer Arrays. | |
| II | Stacks: Introduction –Definition - Representation of stacks - Operations on stacks. Linked Lists: Definition – Single Linked List – Circular Linked List – Double Linked List - Circular Double Linked List - Memory Representation. Queues: Introduction- Definition – Representation of Queues- Various Queue Structures. | 12 |
| III | Trees: Basic terminology-The ADT tree-Implementation of trees-Binary Trees- Basic operations on sets – Introduction to sets – Bit –vector implementation of sets- Linked-List implementation of sets-The Dictionary – Simple dictionary implementation – Hash table data structures-Priority queues –Implementation of priority queues. | 8 |
| IV | Directed Graph: Basic definition –Representation of directed graph-The Single Source shortest path problem – The All–pairs shortest path problem-Traversals of directed graphs-Directed acyclic graphs-Strong components. Undirected Graph: Definitions –Minimum cost spanning trees-Traversals-Articulation and bi-connected components-Graph matching | 10 |
| V | Searching and Sorting: Searching –Sequential and Binary Search – Indexed Search – Hashing Schemes- Hashing functions: Division/Remainder methods- Mid Square method- Folding method. Sorting: Selection sort-Bubble sort-Insertion Sort – Quick Sort –Radix sort- Shell Sort -Heap sort. | 10 |

| Learning Resources | |
|---------------------------|---|
| Text Books | <ol style="list-style-type: none"> 1. "Data Structure made simple", Sathish Jain, Shashi Singh, BPB publications, New Delhi 2006. (Unit –I) 2. "Classic Data Structures:, D.Samanta, Prentice Hall of India Private Limited, New Delhi 2008 (Unit –II,V) 3. Alfred V.Aho, John E.Hopcroft and Jeffrey D.Ullman, "Data Structures and Algorithms". Addison Wesley Longman private limited, New Delhi. |

| | |
|--------------------------|--|
| | (Unit III,IV). |
| Reference Books | <ol style="list-style-type: none"> 1. “Algorithms and Data Structures: The Basic Toolbox.” K. Mehlhorn and P. Sanders. Springer, Verlag, 2008. 2. “Algorithms in C, C++, Java (CoreAlgorithms, Data Structures, Sorting, Searching)” R. Sedgewick Addison-Wesley, 200X. |
| Web Sites / Links | <ol style="list-style-type: none"> 1. www.computer.org 2. www.sciencedirect.com 3. www.studyjaar.com 4. www.allaboutcircuits.com 5. www.abebooks.com/ 6. ww3.datastructures.net/ |

| Subject Title | Discrete Mathematics | Semester | I |
|---|---|---------------------------|----------------------|
| Subject Code | 15P1CA04 | Specialization | NA |
| Type | Core | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: | | | |
| To understand the basic concept of Discrete Mathematics | | | |
| Unit | Syllabus Contents | Number of Sessions | |
| I | Mathematical Logic – Statements and Notations – Connectives – Negation – conjunction – Disjunction – Statement Formulas and Truth Table – Conditional and Biconditional – Well formed Formulas – Tautologies | 10 | |
| II | Normal Forms – Disjunctive Normal Forms – Conjunctive Normal Forms – Principal Disjunctive Normal Forms – Principal Conjunctive Normal Forms– The Theory of Inference for the Statement Calculus – Validity using Truth tables – Rules of Inference – Consistency of premises and indirect method of proof. | 8 | |

| | | |
|------------|---|-----------|
| III | Functions - Definitions and introduction – Composition of functions- Inverse functions – Binary and n-ary Operations – Characteristic function of a set – Hashing functions – Peuno axioms and mathematical induction – Cardinality. | 11 |
| IV | Lattices as partially ordered Sets- Definition and Examples – some properties of Lattices – Lattices as Algebraic systems –Sub Lattices – Direct product and homomorphism. Boolean Algebra- Definition and Examples – sub algebra, direct product and homomorphism – Boolean Functions – Boolean Forms and Free Boolean Algebras – Values of Boolean Expression and Boolean Functions | 11 |
| V | Basic definitions –Path- Rechability and Connectedness – Matrix representation of Graphs – Trees – Finite state machines: Introductory special circuits – Equivalence of finite state machines.. | 10 |

| Learning Resources | |
|---------------------------|---|
| Text Books | 1. J.P. Trembly, R.Manohar, <i>Discrete Mathematical structures with application to computer science</i> . Publishing Company Tata Mc Graw Hill, NewDelhi 2001. |
| Reference Books | 1. Prof.V. Sundaresan, K.S. Ganapathy Subramaniyan, K. Ganesan , <i>Discrete Mathematics</i> , Publishing Company Tata Mc Graw Hill, NewDelhi 2001. Lovarz,J. Pelikan, K. Vexztergombi , <i>Discrete Mathematics</i> Springer International Publishing company Edition 2002. |
| Web Sites / Links | <ol style="list-style-type: none"> 1. www.abstractmath.org 2. http://cseweb.ucsd.edu 3. www.freetechbook.com |

| Subject Title | Financial & Management Accounting | Semester | I |
|--|---|-----------------------|---------------------------|
| Subject Code | 15P1CA05 | Specialization | NA |
| Type | Core | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: | | | |
| To understand the basic concept of Financial & Management Accounting | | | |
| Unit | Syllabus Contents | | Number of Sessions |
| I | Accounting: Definition – Objectives - Branches of Accounting - Accounting Concepts and Conventions - Groups Interested in Accounting Information - Accounting Rules – Journal - Ledger - Trial Balance – Preparation Final Accounts of Sole Trading Concerns | | 10 |
| II | Analysis and Interpretation of Financial Statements: Tools used - Comparative Statement - Common Size Statement and Trend Percentage. Ratio Analysis: Meaning - Advantages and Limitations - Classification of Ratios – Solvency – Profitability - Activity and Capital Structure Ratios. | | 11 |
| III | Fund Flow Analysis: Concept of Funds - Fund Flow Statement - Uses and Limitation - Preparation of Fund Flow Statement. Cash Flow Analysis: Computation of Cash from operation and Preparation of Cash Flow Statement | | 9 |
| IV | Rate o Budget and Budgetary Control: Meaning – Advantages and limitations - Classification of Budgets - Preparation of Production - Sales - Cash and Flexible Budgets. Capital Budget: Meaning and Importance - Methods of Ranking Investment Proposals - Pay-Back - Average f Return and | | 11 |

| | | |
|----------|--|----------|
| | Discounted Cash Flow Methods | |
| V | Marginal Costing: Meaning - Advantages and Uses - Cost Volume - Profit Analysis - Break-even Concept - Uses and Assumptions - Decisions Involving Alternative Choices. | 9 |

| Learning Resources | |
|---------------------------|---|
| Text Books | <ol style="list-style-type: none"> 1. Shukla M.C. & Grewal T.S., S.Chand, “Advanced Accounts”, 1991. (Unit I) 2. Dr.S.N.Maheswari, “Principles of Management Accounting”, Sultan Chand & sons,2005.(Unit II to Unit V) |
| Reference Books | <ol style="list-style-type: none"> 1. S.P.Jain & K.L.Narang,Kalyani, “Advanced Accountancy – Part-I ”, Publishers,1991. 2. Gupta R.L.& Radhasamy M., “Advanced Accounts (Vol.II)”, S.Chand, 1991. 3. R.K.Sharma & Shasi K.Gupta, “Management Accounting – Principles And Practices ”, Kalyani publishers, 1992. 4. Man mohan & S.N.Goyal, “Principles of Management Accounting”, Agra, Sahithya Bhawan, 1987. 5. Hingorani N.L. & Ramanathan A.R., “Management Accounting”, S. Chand, Edn.2, 1982. |
| Web Sites / Links | <ol style="list-style-type: none"> 1. www.accountingformanagement.org/ 2. www.imanet.org/ 3. www.managerialaccounting.org/ 4. https://www.cpacanada.ca/en/...and-accounting.../management-accounting |

| Subject Title | Practical - I C & Data structure Lab | Semester | I |
|---|---|-----------------------|---------------------------|
| Subject Code | 15P1CAP01 | Specialization | NA |
| Type | Core | L:T:P:C | 0 : 0 : 5 : 2 |
| Objectives: | | | |
| To have a practical experience in handling Data structures concept using C Language. | | | |
| List Of Experiments | | | Number Of Sessions |
| PROGRAMMING IN C – LAB 1. Solution of a quadratic equation. 2. Ascending and Descending order using arrays. 3. Sorting of names in alphabetical order. 4. Matrix operation. (All operations) 5. String manipulation. 6. Program using files. | | | 60 |
| DATA STRUCTURE – LAB 1. Stack and Queue operation 2. Infix to Postfix conversion. 3. Polynomial addition using List. 4. Tree traversals. 5. Sorting- Merge, Heap and Quick. 6. Searching- Binary and Linear. | | | |

| Subject Title | Practical - II Office Automation | Semester | I |
|---|---|-----------------------|---------------------------|
| Subject Code | 15P1CAP02 | Specialization | NA |
| Type | Core | L:T:P:C | 0 : 0 : 2 : 5 |
| Objectives: | | | |
| To have a practical experience in handling word processing, spread sheet and presentations packages. | | | |
| List Of Experiments | | | Number Of Sessions |
| Word Processing: 1. Text manipulation - Change the font size and type - Aligning and justification on text - Underline the text - Indenting the text a. Prepare a bio-data b. Prepare a letter 2. Usage of numbering, Bullets, Footer and Headers - Usage of Spell check and find and Replace a. Prepare a document in newspaper format b. Prepare a document with bullets and footers and headers 3. Tables and manipulations - Creation, insertion, deletion (Columns & Rows) and usage of Auto Format. a. Create a mark sheet using table and find out the total marks. b. Create a calendar and auto format it. 4. Picture insertion and alignment a. Prepare a greeting card b. Prepare a handout 5. Creation of documents using templates - Creation of templates a. Prepare a letter using any template b. Prepare two data using various kinds of templates 6. Mail merge concepts | | | 60 |

a. Prepare a business letter for more than one company using merge

b. Prepare an invitation to be sent to specific addresses in the data source

7. Copying text and pictures from excel

a. Draw a chart in Excel and paste it on word

b. Import a picture from Excel and edit the picture

Worksheet Package:

1. Usage of Formulae and Built – in – Functions

2. Describe the types of functions

3. File manipulations

4. Data sorting – Ascending and Descending (both numbers and alphabets)

5. Worksheet, preparation

6. Mark list preparation for a student

7. Individual pay bill preparation

8. Electricity pay bill preparation

9. Inventory Report preparation

10. Drawing Graphs

11. Usage of Auto formatting

Presentation Software:

Prepare a presentation document by using appropriate text, picture, charts and tables.

SEMESTER – II

| | | | |
|---|--|-----------------------|---------------------------|
| Subject Title | Object Oriented Programming with C++ | Semester | II |
| Subject Code | 15P2CA06 | Specialization | NA |
| Type | Core | L:T:P:C | 4: 0 : 0 : 4 |
| <u>Objectives</u> | | | |
| To learn the basic concepts of object oriented programming & the syntax of C++ language. To impart the programming skills C++ and the concepts of OO Software Development Life Cycle and about Unified Modeling Language. | | | |
| Unit | Syllabus Contents | | Number of Sessions |
| I | Basic Concepts of OOP – Benefits of OOP – Applications of OOP - Structure of C++ - Applications of C++ -Tokens – Keywords - Identifiers and Constant - Data types - Variables – Operators - Manipulators-Expressions- Control Structures. Functions – Prototype - Call by Reference - Return by reference- Inline Functions- Default Arguments- const Arguments- Function Overloading - Friend and Virtual Function. | | 10 |
| II | Classes and Objects – Class – Member Functions-Array with in a class- Memory Allocation for Objects - Static data members – Static member function- Array of Objects - Objects as Function Arguments – Friendly Functions-Returning Objects - const Member Functions - Pointers to Members, Constructors and Destructors. Operator Overloading and type conversions. | | 10 |
| III | Inheritance: Extending classes- Derived Classes- single inheritance- Multilevel Inheritance- Multiple Inheritance- Hierarchical Inheritance- Hybrid Inheritance- Virtual Base Classes- Abstract Classes, Pointers, virtual Functions and Polymorphism: Pointers – Pointers to Objects – these Pointers Virtual Functions – Pure Virtual Functions. Managing I/O Operations: Streams in C++ - C++ Stream Classes – Formatted and Unformatted I/O | | 12 |

| | | |
|----|--|----|
| | Operations Managing Output with Manipulators. | |
| IV | <p>Working with Files: Classes for file Stream Operations- Opening and closing a File – Detecting end-of-file- File Pointers and their Manipulators – sequential I/O Operations- Updating a file- Error Handling during File Operations- Command Line Arguments- Templates: Class templates- Class templates with Multiple Parameters- Function templates- Function Templates with Multiple Parameters- overloading of Templates Functions- Member Function Templates- Non- type template arguments, Exception Handling: Basics- Exception Handling Mechanism- throwing Mechanism- Catching Mechanism- Rethrowing an Exception – Specifying Exceptions.</p> | 8 |
| V | <p>Object Oriented System Development Life Cycle: Introduction – The software development process – Building High – Quality software – Object Oriented System Development – Reusability. Unified Modeling Language: Introduction – Static and Dynamic models – UML Diagrams – UML class Diagram – Use – case Diagram – UML dynamic modeling – UML Extensibility – UML Meta Model.</p> | 10 |

| Learning Resources | |
|---------------------------|---|
| Text Books | 1. E.Balagurusamy, ” <i>Object-Oriented Programming with C++</i> ”, Tata McGraw Hill Publishing Company Limited, New Delhi, Second Edition, 2001. |

| | |
|--------------------------|--|
| | 2. Gardy Booch, “ <i>Object Oriented Analysis and Design</i> ”, Addison-Wesley Publishing Company, 2 nd Edition, 1994. |
| Reference Books | <ol style="list-style-type: none"> 1. Robert Lafore, “<i>Object Oriented Programming in Turbo C++</i>”, Galgotia, 2001. 2. Herbert Schildt, “<i>Teach Yourself C++</i>”, Third Edition. Tata McGraw Hill, 5th Reprint, 2000 3. K.R Venu Gopal , Rajkumar, T.Ravishankar, “<i>Mastering C++</i>”,Tata McGraw Hill Publishing Company Ltd, New Delhi |
| Web Sites / Links | <ol style="list-style-type: none"> 1. www.cplusplus.com 2. www.learncpp.com 3. www.robertnz.net/cpp_site.htm 4. www.quora.com/What-are-the-best-websites-for-learning-C++ |

| | | | |
|--|---|-----------------------|----------------------|
| Subject Title | Relational Data Base Management System | Semester | II |
| Subject Code | 15P2CA07 | Specialization | NA |
| Type | Core | L:T:P:C | 4 : 0 : 0 : 4 |
| <u>Objectives</u> | | | |
| <p>To understand the concepts of Relational database management systems and enable the students to learn the data base systems, SQL, PL/SQL and Developer 2000. On successful completion of the course the students should understand the designing the data base and concepts of database management system</p> | | | |

| Unit | Syllabus Contents | Number of Sessions |
|------|---|--------------------|
| I | <p>Overview of database systems: Managing data-Historical perspective-File System Vs DBMS-Advantages of DBMS- Describing and storing data in a DBMS-Queries in a DBMS-Transaction management-Structure of DBMS.Database Design and ER diagrams -Entities, attributes and entity sets-Relationships and Relationship sets- Additional features of ER model-Conceptual database design with the ER model.</p> | 9 |
| II | <p>Relational model: Integrity constraints over relations-Enforcing integrity constraints –Querying relational data-Logical database design: ER to relational – Introduction to views-Destroying/Altering Tables & Views. Relational Algebra and Calculus: Relational Algebra- Relational Calculus.</p> | 11 |
| III | <p>PL/SQL: A programming Language: History-Fundamental-Block Structure-Comments-data types-other data types-Declaration- Assignment operation-Bind Variables- Substitution variables-printing-Arithmetic operators.Control structures and Embedded SQL: control structure-Nested blocks-SQL in PL/SQL- Data manipulation-Transaction Control Statements PL/SQL cursor and Exceptions: Cursors-Implicit and Explicit cursors and Attributes-cursor for loops-SELECT...FOR UPDATES-WHERE CURRENT OF CLUAS-cursor with parameters-cursor variables- Exceptions-Types of Exceptions.</p> | 10 |
| IV | <p>PL/SQL Composite data types: Records – Tables -Arrays. Named Blocks: procedures - Functions-Packages- Triggers-Data Dictionary Views.</p> | 8 |
| V | <p>Oracle D2K: Working with forms: Basic concepts-Application Development in Forms-Form module-Using with form designer-creating a form-Generating and running a form-Using the Layout Editor.</p> <p>Master form: Product Master Data Entry Screen-Triggers-The behavior of an ORACLE form in a Commercial Application-Data Navigation via an Oracle form-Procedures- Validations.Working with Reports: Features-Defining a data model for a report-Specify the Layout For reports.</p> | 12 |

| | |
|--|--|
| | Relevant Case Analysis for each units for practical hours |
|--|--|

| Learning Resources | |
|---------------------------|---|
| Text Books | <ol style="list-style-type: none"> 1. Raghu Ramakrishnan ,Jahannes Gehrke, "Database Management System", Third Edition, 2000. 2. Nilesh Shah, "Database System using ORACLE", Second Edition, PHI. 3. Bayross, " Commercial application development using ORACLE Developer 2000" |
| Reference Books | <ol style="list-style-type: none"> 1. Silberschatz, Korth, Sundarshan, "Database System Concepts", Fourth Edition, McGraw - Hill Higher Education, 1998. |
| Web Sites / Links | <ol style="list-style-type: none"> 1. www.rdbms.ca/websites/introduction.html 2. www.ibm.com/developerworks/library/wa-rdbms/index.html 3. www.htmlgoodies.com › Primers › Database/SQL Primer |

| | | | |
|----------------------|-----------------------------|-----------------------|----------------------|
| Subject Title | Software Engineering | Semester | II |
| Subject Code | 15P2CA08 | Specialization | NA |
| Type | Core | L:T:P:C | 4 : 0 : 0 : 4 |
| | | | |

Objectives

To learn the basic concepts of software engineering and the various phases of software development life cycle and to understand the concepts software Quality Issues.

| Unit | Syllabus Contents | Number of Sessions |
|-------------|---|---------------------------|
| I | Software: Evolution of software-Role of software-Changing nature of software-Software process models-Perspective model-Waterfall model-Incremental process model-Evolutionary process model-Software project planning-Objectives-Software scope-Resources-Software project estimation-Empirical estimation model | 9 |
| II | Analysis concepts and principles: Requirement Analysis-Object-oriented analysis-Scenario based modeling-Flow oriented modeling-Risk analysis and management. | 10 |
| III | Design concepts and principles: Design concept-Design process-Design quality-Design model. Software Architecture: Software Architecture-Mapping dataflow into Software Architecture-Transform mapping-Transaction mapping | 11 |
| IV | User Interface Design: User Interface Analysis and Design-Interface analysis-Interface design steps-Design Evaluation. Testing Strategies: Testing Strategies for conventional software-Validation testing-System testing-Art of debugging. Testing Tactics: White box testing-Black box testing. | 10 |
| V | Software reliability and Quality management: Software reliability-Statistical Testing- Software Quality Assurance-Formal approaches to software quality assurance-Statistical software quality assurance. Software maintenance: Software maintenance process models- Estimation of maintenance cost. | 10 |
| | Relevant Case Analysis for each units for practical hours | |

| Learning Resources | |
|---------------------------|--|
| Text Books | 1. Roger S. Pressman, “ <i>Software Engineering – A Practitioner’s Approach</i> ” - 6th Edition - McGraw – Hill International Edition. |
| Reference Books | 1. Richard Fairley, “ <i>Software engineering concepts</i> ” McGraw Hill Publication. |
| Web Sites / Links | 1. www.networkworld.com 2. study.com/.../10_Places_to_Find_Free_Computer_Networking_Tutorials 3. www.networkcomputing.com/ 4. www.orbit-computer-solutions.com/ |

| | | | |
|----------------------|--------------------------|-----------------------|----------------------|
| Subject Title | Computer Networks | Semester | II |
| Subject Code | 15P2CA09 | Specialization | NA |
| Type | Core | L:T:P:C | 4 : 0 : 0 : 4 |
| | | | |

| Objectives | | |
|--|---|---------------------------|
| To learn the concepts of state of art in network protocols, architecture and applications. | | |
| Unit | Syllabus Contents | Number of Sessions |
| I | Introduction – Uses of computer networks – Network hardware: LAN – MAN - WAN – Networks Software: Protocol hierarchies – Reference models: OSI - TCP / IP. The Physical Layer: Guided transmission media- The public switched telephone network: Structure of the telephone system – Switching. | 8 |
| II | The Data Link Layer: Design issues –Error detection and correction – elementary data link protocol – Sliding window protocol – HDLC. The Medium Access Control Sub Layer: Multiple access protocol: CSMA protocol – collision free protocol – Data link layer switching: Repeaters, Hub, Bridges, Switches, Router, and gateways - Bluetooth. | 11 |
| III | The Network Layer: Design issues – Routing algorithms: Optimality principle – Shortest path – Distance Vector – link state – Hierarchal – Broadcasting – Congestion control algorithms – The network layer in internet: IP protocol – IP address. | 10 |
| IV | The Transport Layer: The transport service: service provided to the upper layer – Transport service primitives – Berkeley sockets - Elements of transport protocols – The internet transport protocol: UDP: Introduction – RPC. TCP: Service model – TCP segment header. The Application Layer: DNS – E-Mail: Architecture and services – Message formats - WWW: Architectural overview. | 12 |
| V | Network Security: Cryptography: introduction – Substitution and transposition cipher – Symmetric-key algorithm: DES – public-key algorithms: RSA – Digital signature: symmetric and public key signature – Communication security: IPsec – firewalls – VPN. Authentication protocol: Authentication based on shared key – Diffie-hellman key exchange – Email security: PGP – PEM – Web Security: Threats – secure naming – SSL. | 9 |

| | |
|--|--|
| | Relevant Case Analysis for each units for practical hours |
|--|--|

| Learning Resources | |
|---------------------------|---|
| Text Books | 1. Andrew S. Tanenbaum, “Computer Networks”, 4th edition by, 2003 PHI. |
| Reference Books | 1. William Stallings, “Data and Computer Communication”, 5th edition , PHI. 2. Behrouz A. Forouzan, “Data Communications and Networking”, 3rd edition Tata McGraw Hill. |
| Web Sites / Links | 1. www.software-pointers.com/en-engineering.html 2. www.best-practice-software-engineering.ifs.tuwien.ac.at 3. www.geteducated.com/career-center/detail/computer-software-engineer 4. https://collegegrad.com/careers/software-developers |

| | | | |
|----------------------|--------------------------------|-----------------|-----------|
| Subject Title | Practical - III C++ Lab | Semester | II |
|----------------------|--------------------------------|-----------------|-----------|

| | | | |
|---|------------------|-----------------------|---------------------------|
| Subject Code | 15P2CAP03 | Specialization | NA |
| Type | Core | L:T:P:C | 0 : 0 : 5 : 2 |
| <u>Objectives</u> | | | |
| To have practical understanding in programming in C++. | | | |
| LIST OF EXPERIMENTS | | | Number of Sessions |
| PROGRAMMING IN C++ 1. Programs using Classes and Objects. 2. Constructors & Destructors. 3. Array of objects, Passing objects as Function arguments. 4. Inline Functions. 5. Function overloading. 6. Operator overloading. 7. Inheritance (All Types). 8. Dynamic Polymorphism – Virtual Functions. 9. Formatted I/O and File Operation. 10. Templates. 11. Exception Handling. 12. Pointers. | | | 60 |

| | |
|--|--|
| | |
|--|--|

| | | | |
|--|---------------------------------|-----------------------|----------------------|
| Subject Title | Practical – IV RDBMS Lab | Semester | II |
| Subject Code | 15P2CAP04 | Specialization | NA |
| Type | Core | L:T:P:C | 0 : 0 : 5 : 2 |
| <u>Objectives</u> | | | |
| To explore the programming skills of SQL, PL/SQL and D2K Packages. | | | |
| LIST OF EXPERIMENTS | | | |

PROGRAMMING IN RDBMS

1. Creation of Tables using SQL – Simple Queries
 - a) Comparison Operators
 - b) Logical Operators
 - c) Set Operators
 - d) Sorting and Grouping
 - e) Sub queries
 - f) Built in Functions
 - i. Number functions, Number Group Functions, COUNT Functions, Character Functions and Date Functions.
 - g) Update operations
2. a) Creation of student information records containing Roll no, Name, Subject code and Marks etc.,
 - a) Finding the total and average marks, result for each student.
 - b) Record Manipulations such as Deletion, Modifying, addition and counting the records.
3. Writing a PL/SQL block to calculate electricity bill based on the rules.
4. Write a PL/SQL block to count the number of students in each department.
 - a) If the count value is greater than 50 in each department then transfer excess records into another table
 - b) Department wise. Use exception handler.
5. Write a database trigger to implement the concept of master detail relationship.

60

PACKAGES IN D2K (Use Triggers, Procedures, Menus, Alerts and Reports)

- | | |
|---|--|
| <ol style="list-style-type: none">1. Library Management systems.2. Payroll.3. Tourist Information System.4. Banking System.5. Online reservation system (Bus)6. Student mark Processing (Internal and External Marks)7. College admission system (both UG and PG) | |
|---|--|

SEMESTER – III

| Subject Title | Advanced Data Structures | Semester | III |
|--|--|---------------------------|----------------------|
| Subject Code | 16P3CA11 | Specialization | NA |
| Type | Core | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: To learn about various data structures methods with implementation algorithms. | | | |
| Unit | Syllabus Contents | Number of Sessions | |
| I | INTRODUCTION: Algorithms: Structure, properties – analysis of iterative and recursive algorithms – best case, worst case, average case complexities- Notations. BINARY SEARCH TREES: Operations: Insert, delete, search– implementation-Analysis. | 10 Hrs | |
| II | AVL TREES: Definition – Height – searching – insert, delete operations- AVL rotations – Examples. MULTI-WAY SEARCH TREES: m-way search trees – B-Tree – B+ trees - Tries – Operations: Insert, delete, retrieve- Examples. | 10 Hrs | |
| III | GRAPHS: Definition – terminologies- Representations: Adjacency matrix, Adjacency list, – Graph search methods: Breadth first Search; Depth first Search. DIVIDE AND CONQUER: Method – Examples – Merge sort, Binary Search– analysis. | 10 Hrs | |
| IV | GREEDY METHOD : Method – Examples – Minimum cost spanning tree, Kruskal’s algorithm, Prim’s algorithm. DYNAMIC PROGRAMMING: Method – Examples – All pairs shortest path problem – Traveling salesman problem. | 10 Hrs | |
| V | BACK TRACKING: Method–Examples-Eight queen’s problem, Hamiltonian Cycles. NP-HARD, NP-COMPLETE CLASSES : Basic concepts – Non deterministic algorithms – Satisfiability problem – NP-hard and NP-complete Problems – Cooks theorem (informal proof). | 10 Hrs | |

Learning Resources

| | |
|---|---|
| Text Books & Reference Books | <ol style="list-style-type: none">1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein “ Introduction to Algorithms ”, The MIT Press, 2009.2. Vijayalakshmi Pai G.A, “Data Structures and Algorithms: Concepts, Techniques and Applications”, Tata Mc Graw Hill. , 20093. Horowitz Ellis, Sartaj Sahni and Sanguthevar Rajasekaran, ‘Computer Algorithms/C++’, Orient Black Swan, 2008.4. Horowitz Ellis and Sartaj Sahni, “ Fundamental of Computer Algorithms”, Galgotia publications, 2004.5. Sartaj Sahni, “ Data Structures, Algorithms and Application in C++”, Orient Longman, 2000. |
| Web Sites / Links | <ol style="list-style-type: none">7. www.computer.org8. www.sciencedirect.com9. www.studyjaar.com10. www.allaboutcircuits.com11. www.abebooks.com/ |

| Subject Title | Graphics and Multimedia | Semester | III |
|---|---|---------------------------|----------------------|
| Subject Code | 16P3CA12 | Specialization | NA |
| Type | Core | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: To learn about graphics and multimedia by practicing with drawing algorithms, animation and compression techniques. | | | |
| Unit | Syllabus Contents | Number of Sessions | |
| I | Basic Concepts: Introduction-Origins of Computer Graphics-Working of Interactive Graphics display-Video display devices- Raster Scan System-Random Scan System-Input Devices- Hard Copy devices – Graphics Software. Output Primitives: Points and Lines-Line-Drawing Algorithms: Circle Generating Algorithm-Ellipse Generating Algorithms-Filled Area Primitives. | 10 Hrs | |
| II | Two Dimensional Geometric Transformations: Basic Transformation-Matrix Representation-Composite Transformation-Other transformation. Two-Dimensional Clipping and Viewing. Three-Dimensional Concepts - Three-Dimensional Object Representations – Three- Dimensional Geometric and Modeling Transformations – Three-Dimensional Viewing – Color models – Animation. | 10 Hrs | |
| III | Introduction to Multimedia – Multimedia tools: Hardware components of multimedia system-multimedia PC, The playback system, the development system. Multimedia Elements: Working with text, text intensive titles-software for creating and editing text. Working with graphics: creating and editing graphics-Features of graphics programs-Sources of graphics images. | 10 Hrs | |
| IV | Multimedia elements: Sound, animation and video. Sound: Sampling, MIDI, Animation, Virtual Reality, Video. Multimedia authoring programs: MM Presentation-Applications-How authorizing system works in programming languages. Developing Multimedia: The steps in developing interactive multimedia - the planning phase, the creating phase testing phase. Design for multimedia: Basic design principles, Designing for interactivity – Guidelines for interactive design. | 10 Hrs | |
| V | Managing Multimedia projects: Management issues of multimedia developments, the management process and multimedia projects producing multimedia titles: Compact disk production process, distributing multimedia titles on CD ROM at online, Kisok based multimedia. Multimedia issues and the future of multimedia: The internet and WWW-Design consideration for multimedia on internet – issues and trends in multimedia – Copyright issues, censorship issues and trends in multimedia industry. | 10 Hrs | |

Learning Resources

| | |
|--------------------------|---|
| Text Books | <ol style="list-style-type: none"> 1. Donald Hearn and M.Pauline Baker, “<i>Computer Graphics C Version</i>”, Pearson Education, . (UNIT I & UNIT 2). 2. James E. Shuman “<i>Multimedia in Action</i>”.Indian Edition 1998. <p>(UNIT 3 to 5)(Unit 3: Chapter 1,2 & 3, Unit 4: Chapter 4,5 & 6, Unit 5: Chapter 8,9,10,11 & 12).</p> |
| Reference Books | <ol style="list-style-type: none"> 1. Judith Jeffcoate, “<i>Multimedia in practice technology and Applications</i>”, PHI . 2. Foley, Vandam, Feiner, Huges, “<i>Computer Graphics: Principles & Practice</i>”, Pearson Education. |
| Web Sites / Links | <ol style="list-style-type: none"> 1. https://www.graphics.rwth-aachen.de 2. multimedia.eserver.org 3. https://books.google.co 4. https://msdn.microsoft.com |

Content Beyond the Syllabus:

1. 3D Display methods, Depth Buffer method
2. Distributed Multimedia Systems

| Subject Title | Advanced Database Management Systems | Semester | IV |
|---|--|-----------------------|---------------------------|
| Subject Code | 16P3CA13 | Specialization | NA |
| Type | Core | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: | | | |
| <p>The goal of the course is to introduce students to modern database and data management systems. After completing this course students can be able to:</p> <ul style="list-style-type: none"> • Understand query processing, transaction management, concurrency control etc. in distributed environment. • Understand how to develop an application using an advanced database system. | | | |
| Unit | Syllabus Contents | | Number of Sessions |
| I | Object Oriented Databases And Object:Relational Databases: Object oriented databases - Complex data types, Object-oriented data model, Object-oriented languages, Persistent programming languages – Object relational databases - Nested relations, Complex types, Inheritance, Reference types, Querying with complex types, Functions and procedures, Object-oriented versus object-relational. | | 10 |
| II | Distributed Databases And Parallel Databases: Distributed databases - Homogeneous and heterogeneous databases, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control in distributed databases, Availability, Distributed query processing, Heterogeneous distributed databases. | | 11 |
| III | Directory systems – Parallel databases - I/O parallelism, Inter query parallelism, Intra query parallelism, Intra operation parallelism, Interoperation parallelism, Design of parallel systems. | | 9 |
| IV | Specialized Databases: Spatial databases and spatial, Geographic data - Representation of geometric information - Design databases, Geographic data, Spatial queries, Indexing of spatial data – Temporal and time series databases - Time in databases- Time specification in SQL, Temporal query language. | | 10 |
| V | Other Databases: Multimedia databases – Multimedia data formats, Continuous media data, Similarity-based retrieval - Web databases – Web fundamentals, URL, HTML, Client side scripting and Applets, Web servers and sessions, Servlets, Server side scripting, Improving performance. | | 10 |

| Learning Resources | |
|---------------------------|--|
| Text Books | <ol style="list-style-type: none"> 1. Henry Korth, F., Abraham Silberchatz, Sudarshan, S., Database System Concepts, 4th Edition , Mc Graw Hill International Editions. 2. Elmasri, R., Navathe, S.B., Fundamentals of Database Systems , Addison Wesley, 2000. |
| Reference Books | <ol style="list-style-type: none"> 1. Gary Hanson,W., James Hanson, V., Database Management and Design, Prentice Hall of India Pvt. Ltd., 1999. 2. Alex Benson, Stephen Smith and Kurt Thearling, Building Data Mining Applications for CRM, Tata McGraw-Hill,2000. 3. Stefano Ceri, Giuseppe Pelagatti, Distributed Databases: Principles and Systems , Mc Graw-Hill Computer Science Series. |
| Web Sites / Links | <ol style="list-style-type: none"> 1. www.studyjaar.com 2. www.itportal.in 3. www.ustudy.in 4. www.tutorialspoint.com 5. www.darshan.ac.in 6. www.ibm.com |

Content Beyond the Syllabus:

1. Database systems for advanced applications
2. Database tools

| | | | |
|----------------------|-----------------------------------|-----------------|------------|
| Subject Title | Team Building And Conflict | Semester | III |
|----------------------|-----------------------------------|-----------------|------------|

| | Management | | |
|---|--|---------------------------|--------------------|
| Subject Code | 16P3MBAED1 | Specialization | NA |
| Type | Extra Departmental Course | L:T:P:C | 4 : 0 :0: 4 |
| Objectives: <ol style="list-style-type: none"> 1. To understand the purpose and the value of team building. 2. To apply the principles of conflict resolution to make teams more effective. 3. To comprehend the value of and the techniques of conflict resolution | | | |
| Unit | Syllabus Contents | Number of Sessions | |
| I | GROUP DYNAMICS : Group dynamics – Importance - Functions of groups - Group Decision Making. | 9 Hrs | |
| II | TEAM WORKING : Team working - team roles - types of teams - team building - stages of team development - team effectiveness - Dynamics of power and politics. | 9 Hrs | |
| III | TEAM BUILDING : Creating Effective Teams – Turning individuals into team players – Teams and Quality Management. | 9 Hrs | |
| IV | CONFLICT MANAGEMENT : Conflict Management - Role of conflict - Sources of conflict – Consequences – classification of conflicts-approaches to conflict management. | 9 Hrs | |
| V | COLLABORATION : Collaboration – Functions - Bases - Intervention for collaboration Case studies related to concepts and application of Team building and Conflict management. | 9 Hrs | |

| Learning Resources | |
|---------------------------|--|
| Text Books | 1. Stephen P.Robins, Organisational Behavior , Prentice Hall of India, N.Delhi, 2010. |
| Reference Books | 1. Dwivedi R.S, Human Relations and Organisational Behaviour , Macmillan N. Delhi, 2009 2. Udai Pareek, Understanding Organisational Behaviour , Oxford University Press, N.Delhi, 2011 3. Lan Brooks, Organizational Behaviour , Pearson Education, Delhi, 2010 |
| WebSites / Links | 1. www.changingimages.com 2. www.challengeconsulting.com 3. www.communicationandconflict.com 4. www.focusadventure.in |

Content Beyond the Syllabus:

1. Team building workshops and conflict resolution
2. Conflict management skills in work spaces

| | | | |
|--|-------------------------------|-----------------------|--------------------|
| Subject Title | Soft Skills | Semester | III |
| Subject Code | 16P3CAJ01 | Specialization | NA |
| Type | JOB ORIENTED COURSE- I | L:T:P:C | 2 : 0 :0: 1 |
| Objectives: | | | |
| To emulate students to the current needs of Software Industries and to impart self awareness and | | | |

| self development to pace with the growth of IT field with hundred percent self confidence. | | |
|--|---|---------------------------|
| Unit | Syllabus Contents | Number of Sessions |
| I | Introduction to Soft Skill – Importance of Soft Skill – Attributes of Soft Skill - Soft Skill Social, Thinking, Negotiating, Exhibiting, Identifying and Improving Soft Skill - Soft Skill Training – Sixty different Soft Skill – Practicing Soft Skill – Self Discovery – Importance of knowing Self – SWOT Analysis. | 5Hrs |
| II | Introduction to Communication – Definition – Importance of Communication – Process of Communication – Channels of Communication – Formal and Informal Communication – Importance and Essential Components of Communication – Barriers of Communications – Tips for Effective Communication.Presentation – Tips for powerful presentation – Art of public speaking – Importance of public speaking – Benefits of public speaking – Tips for public speaking – Overcoming fear of public speaking. | 5Hrs |
| III | Introduction to Listening and Group Discussion:Introduction to Listening – Definition of listening – Benefits of active listening – Kinds of listening – Factors affecting listening – Advantages active listening – Listening tips.Introduction to Group Discussion – Meaning and Importance of Group Discussion – Essential characters tested in a Group Discussion – Tips for Group Discussion – Types of Group Discussion – Skills required for Group Discussion – Consequences of Group Discussion – Essentials of Group Discussion – Non Verbal Communication in Group Discussion – Movements and Gestures to be avoided in a Group Discussion. | 5Hrs |
| IV | Introduction to Positive Attitude – Meaning – Features of Attitudes – Attitude and Behavior – Formation of Attitudes – Change of Attitudes – Ways of Changing Attitudes – Attitude in work place – The power of positive attitude – Developing positive attitude – Obstacles in developing positive attitude – Staying positive – Examples of positive attitudes and its results. | 5Hrs |
| V | Introduction to Interview Skills and Career Planning:Introduction to Interview – Importance of an Interview – Types of Interview – Interview Panel – Types of Questions Asked – Reasons for selecting and rejecting a candidate – How to behave and not to behave in an Interview.Introduction to Career Planning – Benefits of Career Planning – Guide lines for choosing a Career – Tips for successful Career Planning – Developing Career Goals. | 5Hrs |

| Learning Resources | |
|---------------------------|---|
| Text Books | 1. “Soft Skills – Know yourself and know the world”, Dr. K. Alex, S. Chand & Company Pvt Ltd., New Delhi, Third Revised Edition 2014. |
| Reference Books | 1. Effective Technical Communication, M. Ashraf Rizvi, Tata McGraw – Hill |

| | |
|--------------------------|--|
| | <p>Publishing Company Limited, New Delhi.</p> <p>2. Monippally, Matthukutty. M. 2001. <i>Business Communication Strategies</i>. 11th Reprint. Tata McGraw-Hill. New Delhi</p> <p>3. Sasikumar.V and P.V. Dhamija. 1993. <i>Spoken English: A Self-Learning Guide to Conversation Practice</i>. 34th Reprint. Tata McGraw-Hill. New Delhi</p> <p>4. Swets, Paul. W. 1983. <i>The Art of Talking So That People Will Listen: Getting Through to Family, Friends and Business Associates</i>. Prentice Hall Press. New York</p> <p>5. Hewings, Martin. 1999. <i>Advanced English Grammar: A Self-Study Reference and Practice Book for South Asian Students</i>. Reprint 2003. Cambridge University Press. New Delhi</p> <p>6. Lewis, Norman. 1991. <i>Word Power Made Easy</i>. Pocket Books</p> |
| Web Sites / Links | <p>1. www.dupont.co.in/soft-skill-development.</p> <p>2. www.wfskillscollege.org.</p> <p>3. mass.educationalinnovation.org.</p> |

Content Beyond the Syllabus:

1. Leadership qualities
2. Professional Skills

| | | | |
|---|-------------------------------------|-----------------------|---------------------|
| Subject Title | Advanced Data Structures Lab | Semester | III |
| Subject Code | 116P3CAP05 | Specialization | NA |
| Type | Core | L:T:P:C | 0: 0 : 4 : 2 |
| Objectives: | | | |
| To give practical training in advanced Data structures. | | | |

| LIST OF EXPERIMENTS | Number of Sessions |
|---|--------------------|
| <p>PROGRAMMING LIST:</p> <ol style="list-style-type: none"> 1. Various types of Matrices and operations 2. Library of string operations 3. Set operations 4. An appropriate illustration using Records and Variant records 5. Stacks : Operations and applications 6. Queues : Operations and applications. 7. Linked Lists: Singly linked, Doubly linked and Circular lists 8. Binary trees and Threaded trees 9. Hash Table | 60 Hrs |

| | | | |
|---|------------------------------------|-----------------------|---------------------|
| Subject Title | Graphics and Multimedia Lab | Semester | III |
| Subject Code | 16P3CAP06 | Specialization | NA |
| Type | Core | L:T:P:C | 0: 0 : 4 : 2 |
| <p>Objectives: To learn the practical knowledge of applications of computer graphics and multimedia.</p> | | | |

| LIST OF EXPERIMENTS | Number of Sessions |
|--|----------------------|
| <p>PROGRAMMING LIST:</p> <ol style="list-style-type: none"> 1. To implement Bresenham's algorithms for line drawing. 2. To implement Bresenham's algorithms for circle drawing. 3. To perform 2D Transformations such as translation, rotation, scaling, reflection and shearing. 4. To implement Cohen-Sutherland 2D clipping and window-view port mapping 5. To perform 3D Transformations such as translation, rotation and scaling. 6. To visualize projections of 3D images. 7. To perform animation using any Animation software 8. To perform basic operations on image using any image editing software | <p>60 Hrs</p> |

SEMESTER – IV

| | | | |
|--|---|---------------------------|--------------------|
| Subject Title | Advanced Java Programming | Semester | III |
| Subject Code | 16P4CA14 | Specialization | NA |
| Type | Core | L:T:P:C | 4: 0 : 0: 4 |
| Objectives: This course gives an insight into advanced features of Java. | | | |
| Unit | Syllabus Contents | Number of Sessions | |
| I | An Overview of Java: Packages and Interfaces-Multithreaded Programming-The Applet Class- Event Handling-Introducing the AWT: Working with Windows, Graphics and Text-Using AWT Controls,Layout Manager and Menus. | 9 Hrs | |
| II | An Overview of Java Beans: The software component - The java beans development kit- Starting with BDk-Building Simple Beans-Your First Bean- Introspection Naming Conventions- Persistence-Customizers-Java beans API –A tour of SWING- RMI: An Overview of RMI-Building a Simple Client/Server Application-Using RMI in a Bean. | 12Hrs | |
| III | Servlets: The Life Cycle of a Servlet-A Simple Servlet- The Servlet API- The javax.servlet Package-Reading Servlet Parameters- The javax.servlet.http Package-Handling HTTP Requests and Responses-Using Cookies-Session Tracking. | 8 Hrs | |
| IV | JSP – Elements of JSP-JSP Syntax and Semantics- Expressions,Scriptlets, and Declarations-Request Dispatching-Session and Thread Management-JSP Tag Extensions: Introduction to Custom Tag-Developing your first Custom Tag. | 11 Hrs | |
| V | JSP Applications: –Database Access with JDBC-Overview of JDBC-JDBC Drivers-Connecting to a Database with DriverManager-The Statement Interface- Result Sets-Using Metadata-JSP and XML-JSP Testing and Debugging-Deploying Web Applications. | 10 Hrs | |

| Learning Resources | |
|---------------------------|---|
| Text Books | <ol style="list-style-type: none"> H. Schildt, 2002, Java 2 Complete Reference, 5th Edition, Tata McGraw Hill, New Delhi.(Unit I,UnitII,Unit III) |

| | |
|--------------------------|--|
| | <ol style="list-style-type: none"> 2. Joseph O'Neil, 1998, Java Beans Programming from the ground Up, Tata McGraw Hill, New Delhi(Unit II) 3. Phil Hanna ,JSP 2.0: The Complete Reference, Tata McGraw Hilll Edition,2003 New Delhi,(?Unit IV, Unit V). |
| Reference Books | <ol style="list-style-type: none"> 1. James Koegh,2003, J2Me: The complete Reference, Tata McGraw Hill, Ne Delhi. 2. J.McGovern, R.Adatia,Y.Fain,2003,J2EE 1.4 Bible, Wiley-Dreamtech India Pvt.Ltd, New Delhi. |
| Web Sites / Links | <ol style="list-style-type: none"> 1. mytestrepositary.googlecode.com 2. https://dzone.com 3. https://archive.org 4. www.amazon.in |

Content Beyond the Syllabus:

1. New technologies in JAVA
2. New tools for java developers

| | | | |
|--|---|-----------------------|---------------------------|
| Subject Title | Operating System | Semester | IV |
| Subject Code | 16P4CA15 | Specialization | NA |
| Type | Core | L:T:P:C | 4: 0 :4 : 4 |
| <p>Objectives:</p> <p>This course provides the overview of computer system and the operating system, the concepts of process management, memory management, storage management, protection and security issues, and distributed systems</p> | | | |
| Unit | Syllabus Contents | | Number of Sessions |
| I | <p>An Over view of Operating System and Its Structures: Introduction : Definition of OS-Mainframe System, Desktop Systems ,Multi processor System-Distributed-Clustered , Real time Systems-Handheld Systems-Operating System Structure-System Components-Services-System Calls-System Programs-System Design and Implementation.</p> | | 10 |
| II | <p>Process Management : Process- Concepts-Process Scheduling-Operations on Processes-Co-operating Processes-Inter Process Communication-CPU Scheduling-Scheduling Concepts-Criteria-Scheduling Algorithms-Multiprocessor Scheduling-Real time Scheduling , Algorithm evaluation – Threads – Over view , Multithreading models, Threading issues.</p> | | 10 |
| III | <p>Process Synchronization and Dead Locks : Process Synchronization – Background ,Critical Section-Synchronization Hardware-Semaphores-Problems of Synchronization-Critical Regions-Monitors-Deadlocks-System model, Characterization-Methods of Handling Deadlocks-Deadlock Prevention-Avoidance-Detection-Deadlock Recovery.</p> | | 10 |
| IV | <p>Memory Management : Background , Swapping ,Contiguous-Non Contiguous Storage Allocation-Paging - Segmentation – Segmentation with paging - Virtual Memory-Basic Concepts- Page Replacement Methods-Allocation of frames-Thrashing.</p> | | 10 |
| V | <p>I/O And File Systems: File Concepts-File System Structure-Access Methods-Directory Structure-Protection-Directory Implementation-Allocation Methods-Free Space Management- I/O systems – Overview – I/O hardware-Mass storage structure – Disk structure - Disk Scheduling, Disk management, Swap Space management</p> | | 10 |

| Learning Resources | |
|---------------------------|---|
| Text Books | <ol style="list-style-type: none"> 1. Silberschatz and Galvin, Operating System Concepts, 6th Edition, John Wiley & Sons, (Asia) Pvt Ltd , 2005. |
| Reference Books | <ol style="list-style-type: none"> 1. Milankovic M., Operating System Concepts and Design, 2nd Edition, McGraw Hill, 1992 2. P.C.Bhatt, An Introduction to Operating Systems-Concepts and Practice, Prentice Hall Of India, 2004 3. H.M.Deitel, An Introduction to Operating Systems, 2nd Edition, Pearson Education, 2002 |
| Web Sites / Links | <ol style="list-style-type: none"> 1. https://technet.microsoft.com 2. https://en.wikipedia.org 3. www.tutorialspoint.com 4. https://books.google.co.in 5. www.webopedia.com 6. www.refdesk.com |

Content Beyond the Syllabus:

1. Operating system projects
2. Operating system installation

| | | | |
|--|------------------------|-----------------------|----------------------|
| Subject Title | Compiler Design | Semester | IV |
| Subject Code | 16P4CA16 | Specialization | NA |
| Type | Core | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: | | | |
| To introduce the major concept areas of language translation and compiler design and to develop an awareness of the function and complexity of modern compilers. | | | |

| Unit | Syllabus Contents | Number of Sessions |
|-------------|--|---------------------------|
| I | Introduction: What is a compiler?-The phases of a compiler- Interpreters- Why learn about compilers? - Lexical Analysis :Introduction - Regular expressions- Shorthands - Nondeterministic finite automata -Converting a regular expression to an NFA -Optimisations - Deterministic finite automata - Converting an NFA to a DFA Solving set equations - The subset construction - Size versus speed - Minimisation of DFAs . | 10 |
| II | Lex: Lexers and lexer generators - Properties of regular languages - Syntax Analysis : Introduction- Context-free grammars - How to write context free grammars- Derivation -Syntax trees and ambiguity - Operator precedence - Rewriting ambiguous expression grammars- Other sources of ambiguity - Syntax analysis - Predictive parsing - Nullable and FIRST - Predictive parsing revisited-A larger example . | 10 |
| III | Parsing: LL(1) parsing - Rewriting a grammar for LL(1) parsing -SLR parsing-Constructing SLR parse tables-Using precedence rules in LR parse tables- Using LR-parser generators-s -Properties of context-free languages- Scopes and Symbol Tables : Introduction-Symbol tables. | 10 |
| IV | Interpretation: Introduction- The structure of an interpreter- A small example language - An interpreter for the example language - Type Checking:Introduction - The design space of types –Attributes- Environments for type checking- Type checking expressions- Type checking of function declarations- Type checking a program - Advanced type checking . | 10 |
| V | Intermediate-Code Generation : Introduction- Choosing an intermediate language -The intermediate language- Syntax-directed translation -Generating code from expressions- Translating statements - Logical operators - Advanced control statements -Translating structured data -Translating declarations - Machine-Code Generation : Introduction-Conditional jumps - Constants - Exploiting complex instructions – Optimizations. . | 10 |

| Learning Resources | |
|---------------------------|---|
| Text Books | <ol style="list-style-type: none"> 1. Basics of Compiler Design by Torben Ægidius Mogensen First published 2000.This edition: August 20, 2010, 2. Book homepage:http://www.diku.dk/~torbenm/Basics |
| Reference | |

| | |
|--------------------------|---|
| Books | <ol style="list-style-type: none">1. Modern Compiler Design ,2nd edition,by Dick Grune, Kees van Reeuwijk, Henri E. Bala, Criel J.H. Jacobs, and Koen Langendoen a Vrije Universiteit, Amsterdam Technische Universiteit, Delft April 10, 2010 |
| Web Sites / Links | <ol style="list-style-type: none">1. https://en.wikipedia.org2. https://books.google.co.in3. www.google.com4. dinosaur.compilertools.net5. www.cse.iitm.ac.in6. www.citemaster.net |

Content Beyond the Syllabus:

1. Register Allocation
2. Stack Allocation & Memory Management

| Subject Title | ADVANCED NETWORKS | Semester | III |
|--|--|---------------------------|----------------------|
| Subject Code | 16P4CA17 | Specialization | NA |
| Type | Core | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: | | | |
| <p>The objective of this course is to introduce students to a set of advanced topics in networking and lead them to the understanding of the networking research with a target of accomplishing a research paper of their own.</p> | | | |
| Unit | Syllabus Contents | Number of Sessions | |
| I | Introduction- overview of network building blocks- Network architecture with layers and protocols-Overview of data link concepts- IP addressing, forwarding, and routing | 10 | |
| II | BGP and adaptive routing- Multi-Protocol Label Switching (MPLS)-MPLS Architecture and related protocols-Traffic Engineering (TE) and TE with MPLS- Transport protocols and congestion control- Quality of Service (QoS) with MPLS technology-Network recovery and restoration with MPLS technology- Virtual Private Networks (L2, L3, and Hybrid) | 10 | |
| III | Metro Networks-Metro technologies- Ethernet over SONET- Resilient Packet Rings- Ethernet transport-Metro Ethernet services- L2 switching-L3/L2VPNs for Metro Pseudowire (PW) concept (multisegment/redundant PW's)- Ethernet over MPLS-VPLS- Optical Networks | 10 | |
| IV | WDM- Wavelength routing- LightPaths/Lighttrails- Wavelength conversion and rerouting-Network Survivability and Provisioning- IP over DWDM-Next generation Optical Networks-Optical Circuit Switching-Optical Burst Switching- Optical Packet Switching | 10 | |
| V | GMPLS (Generalized MPLS)-MPL (lambda)S-GMPLS architecture-Sensor Networks- Mobile Internet -Home networking-TriplePlay/IPTV | 10 | |

| Learning Resources | |
|---------------------------|---|
| Text Books | <p>1. Rajasekaran. S and Vijayalakshmi Pai, Neural Networks, Fuzzy Logic and Genetic Algorithms, PHI, New Delhi-2005.</p> <p>(Unit I-Chapters: 2.1, 2.3-2.10, Unit-II-3.1-3.7, Unit-III-5.1-5.4, Unit-IV-6.3, 6.5, 7.3-7.6, 12.1-12.3, Unit-V-8.2,8.3,8.5,8.7,9.2,9.3,9.4,9.5)</p> |
| Reference Books | <p>1. Fakhreddine O. Karray, Clarence De Silva, Soft Computing and Intelligent Systems Design, Pearson, 2009.</p> <p>2. Sivanandam. S. N and Deepa S. N, Principles of Soft Computing, Wiley India, 2008.</p> |
| Web Sites / Links | <p>1. https://docs.docker.com</p> <p>2. www.microchip.com</p> <p>3. www.sanfoundry.com</p> <p>4. www.oxfordreference.com</p> <p>5. www.nist.gov</p> |

Content Beyond the Syllabus:

1. Advanced networks group
2. Advanced network technology

| | | | |
|--|--------------------------------------|-----------------------|---------------------|
| Subject Title | Advanced Java Programming Lab | Semester | III |
| Subject Code | 116P4CAP07 | Specialization | NA |
| Type | Core | L:T:P:C | 0: 0 : 4 : 2 |
| Objectives: | | | |
| To give practical training in advanced java programming. | | | |

| LIST OF EXPERIMENTS | Number of Sessions |
|--|--|
| <p>PROGRAMMING LIST:</p> <ol style="list-style-type: none">1. HTML to Servlet Applications2. Applet to Servlet Communication3. Designing online applications with JSP4. Creating JSP program using JavaBeans5. Working with Enterprise JavaBeans6. Accessing Database using Java Database Connectivity.7. Updating database using JDBC.8. Creating Web services with RMI.9. Building web applications | <p style="text-align: center;">60 Hrs</p> |

| Subject Title | WEB DESIGNING | Semester | IV |
|---|-------------------------|-----------------------|---------------------------|
| Subject Code | 16P4CAP08 | Specialization | NA |
| Type | JOB ORIENTED LAB | L:T:P:C | 0 : 0 : 2 : 1 |
| Objectives: | | | |
| To give practical training in web designing software's (Flash, Photoshop, Dream weaver) | | | |
| LIST OF EXPERIMENTS | | | Number of Sessions |
| PROGRAMMING LIST: | | | 30 Hrs |
| 1. s | | | |
| 2. n | | | |
| 3. P | | | |
| 4. s | | | |
| 5. s | | | |
| 6. y. | | | |
| 7. C. | | | |
| 8. I. | | | |
| 9. s | | | |

SEMESTER – V

| Subject Title | Unix and Networking programming | Semester | V |
|--|--|---------------------------|----------------------|
| Subject Code | 16P5CA18 | Specialization | NA |
| Type | Core | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: | | | |
| To know about OS concepts and networking applications with UNIX. | | | |
| Unit | Syllabus Contents | Number of Sessions | |
| I | Introduction & File System Overview of UNIX OS - File I/O – File Descriptors – File sharing - Files and directories – File types - File access permissions – File systems – Symbolic links - | 10 | |
| II | Standard I/O library – Streams and file objects – Buffering - System data files and information - Password file – Group file – Login accounting – system identification. | 10 | |
| III | Processes Environment of a UNIX process – Process termination – command line arguments - Process control – Process identifiers - Process relationships terminal logins – Signals -threads. | 10 | |
| IV | Sockets Introduction – transport layer – socket introduction - TCP sockets – UDP sockets - raw sockets – Socket options - I/O multiplexing - Name and address conversions. | 10 | |
| V | Application techniques - TCP echo client server - UDP echo client server - Ping - Trace route - Client server applications like file transfer and chat. | Debugging | 10 |

Learning Resources

| | |
|--------------------------|---|
| Text Books | <ol style="list-style-type: none"> 1. W.Richard Stevens, Advanced programming in the UNIX environment, Addison Wesley, 1999.(Unit 1,2) 2. W. Stevens, Bill Fenner, Andrew Rudoff, "Unix Network Programming", Volume 1,The Sockets Networking API,3rd Edition, Pearson education, Nov 2003.(unit 3, 4 & 5). |
| Reference Books | <ol style="list-style-type: none"> 1. Meeta Gandhi,Tilak Shetty and Rajiv Shah – The ‘C’ Odyssey Unix –The open Boundless C ,1st Edition ,BPB Publications 1992. |
| Web Sites / Links | <ol style="list-style-type: none"> 1. www.webreference.com/programming/unix 2. www.compnetworking.about.com 3. www.amazon.in/UNIX-Network-Programming- |

Content Beyond the Syllabus:

1. Applications of UNIX
2. Tools for Unix programming

| | | | |
|---|--|-----------------------|---------------------------|
| Subject Title | Open Source Technologies | Semester | V |
| Subject Code | 16P5CA19 | Specialization | NA |
| Type | Core | L:T:P:C | 4: 0 : 0 : 4 |
| Objectives: | | | |
| To learn about open source concepts and technologies. | | | |
| Unit | Syllabus Contents | | Number of Sessions |
| I | Web Publishing: A Melding of Technologies – Setting up an Extensible | | 10 |

| | | |
|------------|---|-----------|
| | Web Publishing Frame/Work. The Web Publishing Foundation: The function of HTML in contemporary Web Publishing – Basic Structural Elements and their usage – Traditional text and formatting. | |
| II | Style Sheets Formatting for the future – Using tables for Organization and layouts – Advanced layout and Positioning with style sheets – Creating forms with HTML – Frames and Frame sets – using Images with HTML – Merging Multimedia, Controls and plug – Ins with HTML. | 10 |
| III | OPEN SOURCE PROGRAMMING LANGUAGES: PHP: Introduction – Programming in web environment – variables – constants – data types – operators – Statements – Functions – Arrays – OOP – String Manipulation and regular expression – File handling and data storage – PHP and SQL database – PHP and LDAP – PHP Connectivity – Sending and receiving E-mails – Debugging and error handling – Security – Templates | 10 |
| IV | OPEN SOURCE DATABASE: MySQL: Introduction – Setting up account – Starting, terminating and writing your own SQL programs – Record selection Technology – Working with strings – Date and Time – Sorting Query Results – Generating Summary – Working with metadata – Using sequences – MySQL and Web | 10 |
| V | OPEN SOURCE TOOLS AND TECHNOLOGIES: WEB SERVER: Apache Web server – Working with Web Server – Configuring and Using apache web services. MDA: Introduction to MDA – Genesis of MDA – Meta Object Facility – UML – UML Profiles – MDA Applications. | 10 |

| Learning Resources | |
|---------------------------|---|
| Text Books | <ol style="list-style-type: none"> 1. Shelley Powers et.al. “Dynamic Web Publishing”, Tech Media, 1998. 2. Vivek Chopra, Sing Li, Geff Genender, “Professional Apache Tomcat 6”, Wrox Press, 2007 3. Rasmus Lerdorf and Levin Tatroe, “Programming PHP”, O’Reilly, 2006 4. Steve Suchring, “MySQL Bible”, John Wiley, 2002 5. Stephen J. Mellor, Marc Balces, “Executable UMS: A foundation for MDA”, Addison Wesley, 2002 |
| Reference Books | <ol style="list-style-type: none"> 1. Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, XML and AJAX, Black Book Author Kogent Learning Solutions Inc. |
| Web Sites / Links | <ol style="list-style-type: none"> 1. developer.mozilla.org 2. www.webdesignref.com/default_main.htm 3. www.sophia.org/tutorials/internet-web-technologies |

Content Beyond the Syllabus:

1. Web technologies in demand
2. Applications of open sources

| | | | |
|----------------------|------------------------------------|-----------------------|----------------------|
| Subject Title | Data Mining and Warehousing | Semester | V |
| Subject Code | 16P5CA20 | Specialization | NA |
| Type | Core | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: | | | |

| To introduce the major concepts of Data Mining & Warehousing and also know about the basic data mining functionalities and different analysis methods. | | |
|--|---|--------------------|
| Unit | Syllabus Contents | Number of Sessions |
| I | Introduction – Data mining – Data mining functionalities – kinds of patterns can be mined – classification – major issues. Data warehouse – A multidimensional data model – Data warehouse architecture – Data warehouse implementation – From data warehouse to data mining. | 10 |
| II | Data pre-processing – Data cleaning – Data Integration and Transformation – Data Reduction – Discreditation and concept hierarchy generation – Data mining primitives – Data mining Task | 10 |
| III | Association Rule Mining – Mining single dimensional Boolean association rules from transactional databases –. Classification and prediction – Issues regarding classification and prediction – Bayesian classification- Classification by Back propagation – classification based on concepts from association rule mining | 10 |
| IV | Cluster Analysis – A categorization of Major clustering methods - Partitioning methods- Hierarchical methods – Grid based methods -Model based clustering methods – Density – based methods | 10 |
| V | Applications and Trends in Data Mining – Data mining system products and Research prototypes – Additional themes on Data mining – Social Impacts of Data Mining – Trends in Data mining-Mining Spatial Databases – Mining Time-series and sequence data – Mining the World wide web. | 10 |

| Learning Resources | |
|------------------------|--|
| Text Books | 1. Jiwei Han, Michelen Kamber, “Data Mining Concepts and Techniques”, Morgan Kaufmann Publishers an Imprint of Elsevier, 2001. |
| Reference Books | 1. Arun K.Pujari, “Data Mining Techniques”, Universities Press (India) Limited, 2001. 2. George M. Marakas, Modern Data warehousing, Mining and Visualization: core |

| | |
|------------------------------|---|
| | <p>concepts, Printice Hall, First Edition, 2002.</p> <p>3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson, 2008.</p> <p>4. Soman K. P, Shyam Diwakar, V. Ajay, Data Mining, Printice Hall, 2008.</p> |
| Web Sites / Links | <p>1. www.Solver.com/XLminer</p> <p>2. www.knowledge-management-tools.net/data-warehousing.html</p> |

Content Beyond the Syllabus:

1. Data mining and warehousing in healthcare
2. Data mining tools

| Subject Title | Unix And network Lab | Semester | V |
|--|-----------------------------|-----------------------|--------------------------|
| Subject Code | 16P5CAP09 | Specialization | NA |
| Type | Core | L:T:P:C | 0 : 0 : 5 : 2 |
| Objectives: To have practical understanding in web technologies | | | |
| LIST OF EXPERIMENTS | | | NUMBER OF SESSION |
| 1. Program using basic network commands 2. Program using system calls : create, open, read, write, close, stat, fstat, lseek 3. Program to implement inter process communication using pipes 4. Program to perform synchronization using semaphores 5. Program to capture packets : sniffer 6. Program using TCP sockets (Client and Server) 7. Program using UDP sockets (Client and Server) 8. Program using URL class to download web pages. | | | 60 |

| | | | |
|----------------------|--------------------------------------|-----------------|----------|
| Subject Title | Open Source Technologies –lab | Semester | V |
|----------------------|--------------------------------------|-----------------|----------|

| Subject Code | 16P5CAP10 | Specialization | NA |
|--|------------------|-----------------------|--------------------------|
| Type | Core | L:T:P:C | 0 : 0 : 5 : 2 |
| Objectives: | | | |
| To have practical understanding in web technologies. | | | |
| LIST OF EXPERIMENTS | | | NUMBER OF SESSION |
| <ol style="list-style-type: none"> 1. Web Page Creation using HTML tags 2. Students Feedbacks System. 3. Job Registrations. 4. Library Management System. 5. Banking Transaction System. 6. Simple Shopping Application. 7. Webpage Kit Counters using Session. 8. Airline Reservation System. | | | 60 |

ELECTIVE – I

| Subject Title | Principles of Programming Languages | Semester | III |
|--|---|---------------------------|----------------------|
| Subject Code | 16P3CAE01 | Specialization | NA |
| Type | Elective-I | L:T:P:C | 4 : 0 : 0 : 4 |
| <p>Objectives :</p> <p>The purpose of this course is to understand the fundamentals of any programming language and the introduction to object oriented programming which is essential.</p> | | | |
| Unit | Syllabus Contents | Number of Sessions | |
| I | <p>Language Design Issues : Why study Programming languages : A short history of programming languages – Development of Early Languages – Evolutions of Software Architectures – Applications Domains. The Impact of Programming Languages – Problem Solving – What is Programming Language – Software Design. Role of Programming Languages: What makes a Good Language – Language Paradigms – Language standardization – Internationalization. Programming Environments: Effects on Language design – Environment Frameworks – Job Control and Process Languages</p> | 12 | |
| II | <p>Data Types :Names – Variables – Concept of binding – Strong typing – Type compatibility – Scope – Scope and lifetime – Data type: Primitive, Character, String, User Defined, Array, Associate arrays, record, union, set and pointer type of data.</p> | 8 | |
| III | <p>Expressions, Control Statements & Sub Programs : Arithmetic expressions – Overloaded Operators – Relational and Boolean expressions – Assignment statement. Control Structures: Compound statements – Selection statements – Iterative statements – Unconditional branching. Sub programs: Fundamentals – design issues – local referencing environment – Parameter passing methods – Overloaded Subprograms – Design issues for functions – Accession nonlocal environments – User defined overloaded operators.</p> | 10 | |

| | | |
|-----------|--|-----------|
| IV | Oops : Object oriented programming – Design Issues – Overviews of Smalltalk – Support for OOP in C++ - Support for OOP in JAVA – Implementation of Object Oriented Constructs. | 10 |
| V | Concurrency : Introduction to sub program – Level Concurrency – Semaphores – Monitors – Message Passing – Statement level concurrency. Exception Handling: Introduction to exception handling in C++ and JAVA | 10 |

| Learning Resources | |
|---------------------------|---|
| Text Books | <ol style="list-style-type: none"> 1. Robert W. Sebesta – “Concepts of Programming Language” – Addison Wesley – 1999. 2. Terrance W. Pratt, Marvin V. Zelkowitz & T.V. Gopal, 4th Edition, Pearson Prentice Hall, 2008. |
| Reference Books | <ol style="list-style-type: none"> 1. Horowitz.E – “Fundamentals of Programming Language” – Galgotia Publications – 2000. 2. Pratt T.W. & Zelhowitz .M.V – “Programming Languages – Design and Implementation” – PHI – 2001. |
| Web Sites / Links | <ol style="list-style-type: none"> 1. www.cs.ox.ac.uk 2. www.sanfoundry.com/ 3. www.stroustrup.com 4. www.iith.ac.in 5. home.deib.polimi.it |

Content Beyond the Syllabus:

1. Functional Programming Languages
2. Programming languages in robotics

| | | | |
|----------------------|-----------------------|-----------------------|----------------------|
| Subject Title | Soft Computing | Semester | III |
| Subject Code | 16P3CAE02 | Specialization | NA |
| Type | Elective-I | L:T:P:C | 4 : 0 : 0 : 4 |

Objectives:

To deal with the design of hybrid intelligent systems which, in contrast to classical hard computing techniques, are tolerant to imprecision, uncertainty, partial truth, and approximation.

| Unit | Syllabus Contents | Number of Sessions |
|------------|--|--------------------|
| I | Fundamentals of Neural Networks: Basic Concepts of Neural Network- Model of an Artificial Neuron-Neural Network Architectures-Characteristics of Neural Networks-Learning Methods-Taxonomy of Neural Network Architectures- History of Neural Network Research-Early Neural Network Architectures-some applications domain. | 10 |
| II | Backpropagation Networks: Architecture of Backpropagation Network- Backpropagation Learning –illustrations-applications-Effect of Tuning Parameters of the Backpropagation Neural Network-Selection of various parameters in Backpropagation rk-Variations of Standard Backpropagation algorithms. | 10 |
| III | Adaptive Resonance Theory (ART) : Introduction-classical ART networks-simplified ART architecture- ART1- Architecture of ART1-special features of ART1-ART1 algorithm.ART2- Architecture of ART2- ART2 algorithm - .Applications. | 10 |
| IV | Fuzzy logic: Fuzzy Set Theory- Fuzzy Sets-Fuzzy Relations. Fuzzy Systems: Fuzzy Logic-Fuzzy Rule based system - Defuzzification Methods- Applications. Fuzzy Backpropagation Networks: LR-Type Fuzzy Numbers-Fuzzy Neuron-Fuzzy Backpropagation Architecture. | 10 |
| V | Genetic algorithms:- Fundamentals of Genetic algorithms-Basic concepts- creation of Offsprings-encoding-reproduction. Genetic modeling: Cross Over- Inversion and Deletion-Mutation Operator-Bit Wise Operators – PSO: Particle Swam Optimization. | 10 |

Learning Resources

| Learning Resources | |
|---------------------------|--|
| Text Books | |

| | |
|--------------------------|--|
| | <p>1. Rajasekaran. S and Vijayalakshmi Pai, Neural Networks, Fuzzy Logic and Genetic Algorithms, PHI, New Delhi-2005.</p> <p>(Unit I-Chapters: 2.1, 2.3-2.10, Unit-II-3.1-3.7, Unit-III-5.1-5.4, Unit-IV-6.3, 6.5, 7.3-7.6, 12.1-12.3,Unit-V-8.2,8.3,8.5,8.7,9.2,9.3,9.4,9,5)</p> |
| Reference Books | <p>1. Fakhreddine O. Karray, Clarence De Silva, Soft Computing and Intelligent Systems Design, Pearson, 2009.</p> <p>2. .Sivanandam. S. N and Deepa S. N, Principles of Soft Computing, Wiley India, 2008.</p> |
| Web Sites / Links | <p>1. www.myreaders.info</p> <p>2. www.springer.com</p> <p>3. www.sciencedirect.com</p> <p>4. www.elsevier.com</p> <p>5. www.cs.berkeley.edu</p> |

Content Beyond the Syllabus:

1. Applications of soft computing
2. Soft computing Tools

| Subject Title | Mobile Computing | Semester | III |
|---|--|---------------------------|----------------------|
| Subject Code | 16P3CAE03 | Specialization | NA |
| Type | Elective-I | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: | | | |
| To learn the latest techniques in wireless communication, Mobile IP network layer, Mobile transport layer, languages for mobile application and mobile operating systems. | | | |
| Unit | Syllabus Contents | Number of Sessions | |
| I | Introduction to Mobile computing: Mobile communication – Mobile computing – Mobile computing architecture – Mobile devices. Mobile computing technology: GSM, SMS, GPRS, CDMA and 3G. | 8 | |
| II | Wireless LAN: Introduction – Wireless LAN advantages – IEEE 802.11 standards – Wireless LAN architecture – Mobility in wireless LAN – Deploying wireless LAN – Mobile Ad Hoh networks and sensor networks – Wireless LAN security – WIFI versus 3G. | 12 | |
| III | Mobile IP Network Layer: IP and Mobile IP network layers – Packet delivery and Handover management – Location management – Registration – Tunneling and Encapsulation – Route optimization – Dynamic Host Configuration Protocol. | 10 | |
| IV | Mobile Transport Layer: Conventional TCP/IP Transport layer protocols – Indirect TCP – Snooping TCP Mobile TCP – Other methods of TCP – Layer transmission for mobile networks – TCP over 2.5G/3G Mobile networks. | 12 | |
| V | Mobile application languages and Operating Systems: J2ME – Palm OS – Windows CE –Symbian OS – Linux for Mobile devices. | 8 | |

| Learning Resources | |
|---------------------------|--|
| Text Books | <ol style="list-style-type: none"> 1. Computer Networks: A Systems Approach, 4th edition, by Larry L. Peterson, Bruce S. Davie, Publisher Elsevier/Morgan Kaufmann. 2. MPLS: Next Steps, by Bruce S. Davie, Adrian Farrel, Publisher: Morgan Kaufmann. |
| Reference Books | <ol style="list-style-type: none"> 1. Metro Ethernet, by Sam Halabi, Publisher: Cisco Press 2. Emerging Optical Network Technologies, by Krishna M. Sivalingham, Suresh Subramaniam, Publisher: Springer 3. Computer Networks, by A. S. Tanenbaum, Publisher: Prentice Hall; 4. Emerging Optical Network Technologies, by Krishna M. Sivalingham, Suresh Subramaniam, Publisher: Springer 5. Mesh Based Survivable Networks, by Wayne Grover, Publisher: Prentice Hall. |
| Web Sites / Links | <ol style="list-style-type: none"> 1. www.doc.ic.ac.uk 2. www.humanergology.com 3. www.ncbi.nlm.nih.gov 4. www.ijarcsse.com 5. https://www.interaction-design.org 6. www.oxfordreference.com |

Content Beyond the Syllabus:

1. Mobile Computing Applications
2. Mobile Computing Software tools

| Subject Title | Distributed Computing | Semester | IV |
|--|---|---------------------------|----------------------|
| Subject Code | 16P3CAE04 | Specialization | NA |
| Type | Elective-I | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: This subject brings the view of distributed computing with applications. | | | |
| Unit | Syllabus Contents | Number of Sessions | |
| I | Characterization of Distributed Systems: Introduction- Examples of Distributed Systems- Resource sharing and the Web- System models: Architectural models-Fundamental Models, Interprocess Communication: The API for the Internet Protocols, External data representation and marshalling, Client Server communication, Group Communication. | 10 | |
| II | Distributed objects and Remote Invocation: Communication between distributed objects, Remote Procedure call, Events and notifications. Operating System Support – The operating system layer-Protection-Processes and threads-Communication and invocation-Operating system architecture. | 10 | |
| III | Distributed File Systems:File service architecture-Sun network file system-The Andrew file system. Name services: Name services and DNS, Directory services, Time and Global states: clocks, events and process states synchronizing physical clocks-Logical time and logical clocks-Global states. | 10 | |
| IV | Coordination and Agreement: Distributed mutual exclusion- Election-Multicast communication. Transaction and concurrency control: Transaction, Nested transaction, Locks, Optimistic concurrency control, Timestamp ordering. | 10 | |
| V | Distributed Transactions: Flat and nested distributed transaction, Atomic commits protocols, concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. | 10 | |

| Learning Resources | |
|---------------------------|---|
| Text Books | <ol style="list-style-type: none"> 1. George Coulouris, Jean Dollimare, Tim Kindberg, Distributed Systems Concepts and Design, AWL, 4th Edition, 2005 2. Cloud computing, (A Practical Approach)- Anthony T.Velte, Toby J.Velte, Tata McGraw-Hill Edition 2010. |
| Reference Books | <ol style="list-style-type: none"> 1. Pradeep K. Sinha, Distributed Operating Systems: Concepts and Design Wiley-IEEE Press. 2. Andrew S. Tanenbaum, Maarten van Steen, Distributed Systems- Principles and Paradigms, Pearson Education, 2002. |
| Web Sites / Links | <ol style="list-style-type: none"> 1. https://en.wikipedia.org 2. www.elsevier.com 3. https://books.google.co.in 4. dl.acm.org/citation. 5. www.encyclopedia.com 6. www.scirp.org |

Content Beyond the Syllabus:

1. Distributed computing environment
2. DC in web services

ELECTIVE – II

| | | | |
|---|--|-----------------------|---------------------------|
| Subject Title | Advanced Software Engineering | Semester | IV |
| Subject Code | 16P3CAE05 | Specialization | NA |
| Type | Elective-II | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: | | | |
| To enrich the students by learn about Software Development Phases, Requirements and testing strategies. | | | |
| Unit | Syllabus Contents | | Number of Sessions |
| I | Introduction to Software Engineering – The Evolving Role of Software – Software – Software Myths – The Software Process: – A Generic View of Process – Software Engineering a layered technology – A Process Framework – Process Models: -Prescriptive Models – The Waterfall Models- Incremental Process Models, Evolutionary Process ModelsThe Unified Process. | | 10 |
| II | Requirements Engineering: - Requirements Engineering Tasks – Initiating the Requirements Engineering Process – Eliciting Requirements – Building the Analysis Model – Negotiating and Validating Requirements- Building the Analysis Model:- Requirements Analysis – Analysis Modeling Approaches. | | 10 |
| III | Data Modeling Concepts – Object Oriented Analysis – Scenario based Modeling - Flow oriented Modeling – Class Based Modeling – Creating a Behavioral Model. Design Engineering: – Design Concepts – The Design Model – Pattern-Based Software Design – Creating An Architectural Design. | | 10 |
| IV | Software Architecture – Architectural Styles and Patterns – Architectural design – Mapping Data Flow into a Software Architecture Modeling Component level Design – What is a Component – Designing Class-Based Components – Designing Conventional Components. | | 10 |
| V | Testing Strategies: - A Strategic approach to Software Testing – Test Strategies for Conventional Software – Test Strategies for Object oriented Software – Validation Testing – System Testing - Testing Tactics:- Software Testing Fundamentals – White Box Testing: – Basis Path Testing – Control Structure Testing-Black box | | 10 |

| | | |
|--|--|--|
| | Testing :- Object oriented Testing Methods – Testing Patterns- CASE studies for SRS. | |
|--|--|--|

| Learning Resources | |
|---------------------------|--|
| Text Books | <ol style="list-style-type: none"> 1. Roger S. Pressman, “Software Engineering a Practioner“s Approach”, Sixth Edition, McGraw-Hill Higher Education, 2006. |
| Reference Books | <ol style="list-style-type: none"> 1. Ian Somerville, “Software Engineering”, Seventh Edition, Pearson Education, 2005. 2. Richard Fairly, “Software Engineering Concepts”, TMGH, 2004. 3. Rajib Mall, “Fundamentals of Software Engineering”, PHI, Second Edition, 2000. 4. Carlo Ghezzi, Mehdi Jazayeri, Dino Mndrioli, “Fundamentals of Software Engineering “, Second Edition, PHI/Pearson Education Asia, 2000. |
| Web Sites / Links | <ol style="list-style-type: none"> 1. www.cs.umass.edu 2. https://books.google.co.in 3. www.win.tue.nl 4. www.rspa.com 5. www.ictts.org |

Content Beyond the Syllabus:

1. Uses of software engineering in different fields
2. Testing tools and terminologies

| | | | |
|--|--|---------------------------|----------------------|
| Subject Title | Artificial Intelligence and Expert Systems | Semester | IV |
| Subject Code | 16P4CAE06 | Specialization | NA |
| Type | Elective-II | L:T:P:C | 4 : 0 : 0 : 4 |
| <p>Objectives:</p> <p>Understand the basic knowledge representation, problem solving, and learning methods of Artificial Intelligence and role of expert systems.</p> | | | |
| Unit | Syllabus Contents | Number of Sessions | |
| I | Problems and Search: The AI problems – The underlying Assumption – AI Technique - The level of the Model – Criteria for Success – Problems, Problem Space, and Search: Defining the problem as a state space search – Production systems – problem characteristics – Production system characteristics – Issues in the design of Search Programmes. | 10 | |
| II | Heuristic Search Techniques: Generate and Test – Hill Climbing – Best First Search – Problem Reduction – constraint Satisfaction – Means ends Analysis. | 10 | |
| III | Knowledge Representation Issues: Representations and Mappings – Approaches to Knowledge Representation – Issues in Knowledge Representation – The Frame problem. | 10 | |
| IV | Using Predicate Logic: Representing Simple Facts in Logic – Representing Instance and ISA Relationships – Computable Functions and Predicates - Resolution Knowledge Representation using Rules: Procedural versus Declarative Knowledge – Logic programming – Forward versus Backward Reasoning – Weak slot –and- Filler Structures : semantic Nets – Frames – Strong Slot- and –Filler Structures : Conceptual Dependency – Scripts – CYC. | 10 | |

| | | |
|---------------------------|--|----|
| V | Expert systems: Introduction to Expert systems -Expert system Tools – Building an Expert System – Difficulties with Expert System development Pedagogy. | 10 |
| Learning Resources | | |
| Text Books | <ol style="list-style-type: none"> 1. Elaine Rich and Kevin Knight (2009). <i>Artificial Intelligence</i>, 3/e; New Delhi: Tata McGraw-Hill. 2. Donald A. Waterman (2003). <i>A Guide to Expert Systems</i>; New Delhi: Tech knowledge Series in Knowledge Engineering | |
| Reference Books | <ol style="list-style-type: none"> 1. Charnaik, E., C.K. Reiesbeck, and D.V. McDermott (2000). <i>Artificial Intelligence Programming</i>; New Jersey: Lawrence Erlbaum Associates. 2. Nils J. Nilsson (2001). <i>Principles of Artificial Intelligence</i>; New Delhi: Narosa Publishing . | |
| Web Sites / Links | <ol style="list-style-type: none"> 1. https://en.wikipedia.org 2. www.sanfoundry.com 3. www.webopedia.com 4. www.cs.grinnell.edu 5. www.sciencedirect.com | |

Content Beyond the Syllabus:

1. Scope of AI & expert systems
2. AI and expert system in Steel Industry

| Subject Title | Cryptography and Network Security | Semester | IV |
|---|---|---------------------------|----------------------|
| Subject Code | 16P4CAE07 | Specialization | NA |
| Type | Elective-II | L:T:P:C | 4 : 0 : 0 : 4 |
| <p>Objectives:</p> <p>This subject brings the view of networks and it's secure in two approaches</p> <ol style="list-style-type: none"> 1) To know about the addressing and protocol function in network 2) To know the secure techniques in the network | | | |
| Unit | Syllabus Contents | Number of Sessions | |
| I | Types of Physical Medium – Topologies – Wireless Networking: Wireless Protocols. Data Link Layer: Layered Data Link Protocols – SLIP and PPP-MAC and ARP. Network Layer: Routing Risks-Addressing-Fragmentation-Security. | 10 | |
| II | Internet Protocol: IP Addressing-ICMP-Security options. Transport Layer: Common Protocols-Transport Layer Functions-Gateways. TCP: Connection Oriented Protocols-TCP Connections-UDP. Session Layer: Session State Machine-Session and Stacks. SSL: SSL Functionality-Certificates. SSH: SSH and Security-SSH Protocols. STMP: Email Goals- Common Servers. HTTP: HTTP Goals-URL. | 12 | |
| III | Security: Importance-Threat Models-Concepts-Common Mitigation Methods. Network theory: Standards Bodies-Network Stacks-Multiple Stacks-Layers and Protocols-Common Tools. Cryptography: Securing Information-Necessary Elements-Authentication and Keys-Cryptography and Randomness-Hashes-Ciphers-Encryption-Steganography. | 10 | |
| IV | Classical Encryption Techniques-Block Ciphers and the Data Encryption Standards- Symmetric Ciphers. Principles of Public Key Cryptosystems and RSA Algorithm-Key Management. | 10 | |
| V | Message Authentication and Hash Function-Digital Signatures and Authentication Protocols-Email Security—Web Security-Intrusion-Firewall. | 8 | |
| Learning Resources | | | |

| | |
|---------------------------------|---|
| <p>Text Books</p> | <ol style="list-style-type: none"> 1. Neal Krawetz, Introduction Network Security, India Edition, Thomson Delmar Learning,2007(Unit-I:5.1,5.4,7.2,8.3,9,10,11.2,11.3,11.5,11.9, unit-II: 12.1,12.2,12.4,14.1,14.2,14.3,15.1,15.2,15.7,16.2,16.3, 19.2,19.3,20.1, 20.2,22.2, 23.1,23.2, UnitIII:1.1,1.2,1.3,1.4,3.1,3.2,3.3,3.4,3.5,4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8) 2. William Stallings, Cryptography and Network Security, Prentice-Hall of India,4th edition,2007, (Unit-IV: 2,3,6,9,10, Unit-V: 11,13,15,17,18,20) |
| <p>Reference Books</p> | <ol style="list-style-type: none"> 1. .K.Pachghare, Cryptography and Information Security, PHI Learning Private Limited 2009. 2. Andrew S. Tanenbaum, Computer Networks, PHI 4th edition . 2009. |
| <p>Web Sites / Links</p> | <ol style="list-style-type: none"> 1. williamstallings.com 2. www.sanfoundry.com 3. www.amazon.in 4. www.uptu.ac.in 5. www.ibm.com 6. www.cs.iit.edu |

Content Beyond the Syllabus:

1. Authentication applications
2. Web communication

| Subject Title | E-commerce | Semester | III |
|--|---|---------------------------|--------------------|
| Subject Code | 16P4CAE08 | Specialization | NA |
| Type | Elective | L:T:P:C | 4 : 0 :0: 4 |
| Objectives: To learn about current marketing trend using E-commerce techniques in Internet and Extranet and payment systems. | | | |
| Unit | Syllabus Contents | Number of Sessions | |
| I | What is E-Commerce? – Advantages and Limitations of ECommerce – The Role of Strategy in E-Commerce – Value Chains in E-Commerce – Integrating E-Commerce – Managerial Implications – The Internet and the World Wide Web: The Internet Today – In the Beginning – Unique Benefits of the internet – Searching Online - Bulletin Board Systems (BBSs) and Pay Services –Some Web Fundamentals – The Language of the Internet – Managerial Implications. . | 12Hrs | |
| II | Launching a Business on the Internet: The Lifecycle Approach – The Business Planning and Strategizing Phase – Hardware, software, Security, and the Setup Phase – The Design Phase – The Marketing Phase – The Fulfillment Phase – The Maintenance and Enhancement Phase – Designing Web Sites: What does a Web Site Do – The Lifecycle of Site Building – How to Build a Web Site – Web Navigation Design – Design Criteria – Hiring a Web Designer – Website Evaluation and Usability Testing: Anatomy of a Site – What’s the Big Fuss Over Cookies – Makes a Web Site Usable – Web Site Content and Traffic Management. | 10 Hrs | |
| III | Payment Systems: From Barter to Money – Requirements for Internet-based Payments – Electronic Payment Media – Issues and Implications – E-Security: Security in Cyberspace – Designing for Security – how Much risk Can You Afford – The Virus: Computer Enemy Number One – Security Protection and Recovery – How to Secure Your System. | 8Hrs | |
| IV | Marketing on the Internet: The Pros and Cons of Online Shopping – Internet Marketing Techniques – The E-Cycle of Internet Marketing – Marketing Your Presence – Attracting Customers to Your Site – Tracking Customers – Customer Service – managing Implications – Web-Based Business-to-Business E-Commerce: B2B E-Commerce – B2B Models – B2B Tools-EDI – Beyond B2B: A2Z – Management Implications. | 10 Hrs | |
| V | Intranets and Extranets: Intranets: The Basics – The Technical Infrastructure – Planning an Intranet – E-Mail and the Intranet – Extranets – Management Implications – Legal and Ethical Issues, Legal Issues - Ethical Issues- Management Implications- CASE Studies. | 10 Hrs | |

Learning Resources

| | |
|--------------------------|---|
| Text Books | 1. Elias M.Awad, "Electronic Commerce, PHI, 2006. (Chapters:1,2,3,5,6,8,9,11,12,13, 14,15) |
| Reference Books | 1. Kamalesh K.Bajaj, Debjani Neg, "E-Commerce the Cutting Edge of Business", TMH, 2000. 2. S. Jaiswal, "Doing Business on the Internet E-Commerce", Galgotia, 2002. |
| Web Sites / Links | 1. www.referenceforbusiness.com › Encyclopedia of Management › De-Ele 2. www.referenceforbusiness.com › ... › Eco-Ent 3. cyber.law.harvard.edu/olds/ecommerce/library.html 4. https://www.humanrights.gov.au/working-paper-e-commerce-reference-... |

Content Beyond the Syllabus:

1. E-commerce business models
2. E-commerce applications

ELECTIVE – III

| Subject Title | XML and Web Services | Semester | v |
|---|--|---------------------------|----------------------|
| Subject Code | 16P5CA09 | Specialization | NA |
| Type | Elective-III | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: | | | |
| To learn about markup languages and web service architecture. | | | |
| Unit | Syllabus Contents | Number of Sessions | |
| I | Xml Technology Family XML – benefits – Advantages of XML over HTML – EDI – Databases – XML based standards – DTD – XML Schemas – X – Files – XML processing – DOM – SAX – presentation technologies – XSL – XFORMS – XHTML – voice XML – Transformation – XSLT – XLINK – XPATH – XQ | 10 | |
| II | Architecting Web Services Business motivations for web services – B2B – B2C – Technical motivations – limitations of CORBA and DCOM – Service – oriented Architecture (SOA) – Architecting web service. | 8 | |
| III | Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in the runtime. web Services Building Block Transport protocols for web services – messaging with web services – protocols – SOAP – describing web services – | 12 | |
| IV | WSDL – Anatomy of WSDL – manipulating WSDL – web service policy – Discovering web services – UDDI – Anatomy of UDDI – Web service inspection – Ad – Hoc Discovery – Securing web services. | 10 | |
| V | Implementing Xml In E – Business B2B – B2C Applications – Different types of B2B interaction – Components of e – business XML systems – ebXML – Rosetta Net Applied XML in vertical industry – web services for mobile devices. | 10 | |

| Learning Resources | |
|---------------------------|---|
| Text Books | <ol style="list-style-type: none"> 1. Ron Schmelzer et al, “XML and Web Services”, Pearson Education, 2002. Sandeep Chatterjee and James Webber, “Developing Enterprise Web Services: An Architect's Guide”, Prentice Hall, 2004. |
| Reference Books | <ol style="list-style-type: none"> 1. Frank P.Coyle, “XML, Web Services and the Data Revolution”, Pearson Education, 2002. 2. Keith Ballinger, “.NET Web Services Architecture and Implementation”, Pearson Education,2003.Henry Bequet and Meeraj Kunnumpurath, “Beginning Java Web Services”, Apress, 2004. 3. Russ Basiura and Mike Batongbacal, “Professional ASP .NET Web Services”, Apress, 2003 |
| Web Sites / Links | <ol style="list-style-type: none"> 1. stackoverflow.com 2. www.webreference.com/ |

Content Beyond the Syllabus:

1. XML and web services in android
2. Used of XML in web technology

| Subject Title | Wireless Application Protocol | Semester | V |
|--|---|---------------------------|----------------------|
| Subject Code | 16P5CAE10 | Specialization | NA |
| Type | Elective-III | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: | | | |
| To know about various types of wireless applications and markup languages. | | | |
| Unit | Syllabus Contents | Number of Sessions | |
| I | Introduction – Key Services for the Mobile Internet – Business Opportunities. Making the Internet “Mobile”: Challenges and Pitfalls – The Origins of WAP – WAP Architecture – Components of the WAP Standard – Network Infrastructure services Supporting WAP Clients. | 10 | |
| II | The Wireless Markup Language: Overview – The WML Document Model – WML Authoring – URLs Identify Content – Markup Basics. | 10 | |
| III | WML Basics – Basic Content – Events, Tasks and Bindings – Variables – Controls – Sending Information – Application Security – Document Type Declaration – Errors and Browser Limitations. | 10 | |
| IV | User Interface Design: Making wireless Application easy to use: Web Site Design: Computer Terminals versus Mobile Terminals – Designing a usable WAP Site – Structured Usability Methods – User Interface Design Guidelines. | 10 | |
| V | Tailoring Content to the Client-Push Messaging: Overview of WAP Push – Push Access Protocol – WAP Push Addressing – Push Message – MIME media types for Push Messages – Push Proxy Gateway – Push Over – the – Air Protocol – Push Initiator Authentication and Trusted Content.. | 10 | |

| Learning Resources | |
|---------------------------|--|
| Text Books | 1. Sandeep Singhal, Thomas Bridgman, Lalitha Suryanarayana, Daniel Mauney, Jari Alvinen, David Bevis, Jim Chan., “The Wireless Application Protocol – Writing Application for the mobile internet”, Pearson Education, 2010.(UNIT-I: Chapter - 1 to 5, UNIT-II: Chapter - 6, UNIT-III: Chapter - 7, UNIT-IV: Chapter - 10, UNIT-V: Chapter – 11 & 12). |
| Reference Books | 1. Charless Arehare, Nirmal Chidambaram, and others, “Professional WAP”, 2. Wrox, Press Ltd., Shroff publ. And Dist – Pvt. Ltd., 2001. |
| Web Sites / Links | 1. computer.howstuffworks.com 2. dictionary.reference.com 3. www.amtexsystems.com |

Content Beyond the Syllabus:

1. Applications for WAP
2. WAP in mobile commerce

| | | | |
|----------------------|--------------------------------|-----------------------|----------------------|
| Subject Title | Middleware Technologies | Semester | V |
| Subject Code | 16P5CAE11 | Specialization | NA |
| Type | Elective-III | L:T:P:C | 4 : 0 : 0 : 4 |

Objectives:

The objective of this technology is to learn about advanced features of middleware.

| Unit | Syllabus Contents | Number of Sessions |
|-------------|--|---------------------------|
| I | Introduction to client server computing: Evolution of corporate computing models from centralized to distributed computing, client server models. Benefits of client server computing, pitfalls of client server programming | 10 |
| II | CORBA with Java: Review of Java concept like RMI, RMI API, JDBC. Client/Server CORBA-style, The object web: CORBA with Java. | 10 |
| III | Introducing C# and the .NET Platform; Understanding .NET Assemblies; Object –Oriented Programming with C#; Callback Interfaces, Delegates, and Events. | 10 |
| IV | Building c# applications: Type Reflection, Late Binding, and Attribute-Based Programming; Object Serialization and the .NET Remoting Layer; Data Access with ADO.NET; XML Web Services. | 10 |
| V | Core CORBA / Java: Two types of Client/ Server invocations-static, dynamic. The static CORBA, first CORBA program, ORBlets with Applets, Dynamic CORBA-The portable count, the dynamic count multi count. | 10 |

| Learning Resources | |
|---------------------------|--|
| Text Books | <ol style="list-style-type: none"> 1. Client/Server programming with Java and CORBA Robert Orfali and Dan Harkey, John Wiley & Sons ,SPD 2nd Edition , 2010. 2. Java programming with CORBA 3rd Edition, G.Brose, A Vogel and K.Duddy, Wiley-dreamtech, India John wiley and sons, 2003. |
| Reference Books | <ol style="list-style-type: none"> 1. Qusay H. Mahmoud, “Middleware for Communications”, John Wiley and Sons,2004. 2. Gerald Brose, Andreas Vogel, Keith Duddy, “Java™ Programming with CORBATM: Advanced Techniques for Building Distributed Applications”, Wiley, 3rd edition,January, 2004. |
| Web Sites / Links | <ol style="list-style-type: none"> 1. www.webopedia.com 2. middlewaretech.com 3. www.microsoft.com |

Content Beyond the Syllabus:

1. Middleware technologies in oracle
2. Applications of MT

| | | | |
|---|---|-----------------------|---------------------------|
| Subject Title | Big Data Analysis | Semester | V |
| Subject Code | 16P5CAE12 | Specialization | NA |
| Type | Elective-III | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: | | | |
| <ul style="list-style-type: none"> • To understand the applications using Map Reduce Concepts. • To learn to use various techniques for mining data stream. • To understand the various search methods and visualization techniques. • To learn to analyze the big data using intelligent techniques. | | | |
| Unit | Syllabus Contents | | Number of Sessions |
| I | INTRODUCTION TO BIG DATA Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error. | | 10 |
| II | MINING DATA STREAMS Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions. | | 10 |
| III | HADOOP: History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS- Basics-Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures- Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features. | | 10 |
| IV | HADOOP ENVIRONMENT: Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration-Security in Hadoop - Administering Hadoop – HDFS - Monitoring-Maintenance-Hadoop benchmarks- Hadoop in the cloud. | | 10 |

| | | |
|---|---|-----------|
| V | FRAMEWORKS : Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications. | 10 |
|---|---|-----------|

Learning Resources

| | |
|---|--|
| Text Books & Reference Books | <ol style="list-style-type: none"> 1. Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007. 2. Tom White “ Hadoop: The Definitive Guide” Third Edition, O’reilly Media, 2012. 3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data”, McGrawHill Publishing, 2012 4. Anand Rajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2012. 5. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012. 6. Glenn J. Myatt, “Making Sense of Data”, John Wiley & Sons, 2007 7. Pete Warden, “Big Data Glossary”, O’Reilly, 2011. 8. Jiawei Han, Micheline Kamber “Data Mining Concepts and Techniques”, Second Edition, Elsevier, Reprinted 2008. 9. Da Ruan, Guoqing Chen, Etienne E. Kerre, Geert Wets, Intelligent Data Mining, Springer, 2007 10. Paul Zikopoulos , Dirk deRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corrigan , Harness the Power of Big Data The IBM Big Data Platform, Tata McGraw Hill Publications, 2012. 11. Michael Minelli (Author), Michele Chambers (Author), Ambiga Dhiraj (Author) , Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley Publications, 2013. 12. Zikopoulos, Paul, Chris Eaton, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Tata McGraw Hill Publications, 2011. |
| Web Sites / Links | <ol style="list-style-type: none"> 1. www.edureka.co/bigdata-hadoop-training 2. www.pentaho.com/product/big-data-analytics 3. www.datameer.com |

Content Beyond the Syllabus:

1. Big data analysis techniques.

2. Design efficient algorithms for mining the data from large volume.

ELECTIVE – IV

| Subject Title | Digital Image Processing | Semester | V |
|---|--|---------------------------|----------------------|
| Subject Code | 16P5CAE13 | Specialization | NA |
| Type | Elective-IV | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: | | | |
| To impart the best concepts of image processing and also their qualities and methods. | | | |
| Unit | Syllabus Contents | Number of Sessions | |
| I | Introduction: What is Digital Image Processing? – Examples of Fields that Use Digital Image Processing – Fundamental Steps in Digital Image Processing – Components of an Image processing System – Digital Image Fundamentals: Elements of Visual Perception – Light and Electro Magnetic Spectrum – Image sensing and Acquisition – Image Sampling and Quantization – Some Basic Relationships between Pixels. | 10 | |
| II | The Image, its Mathematical Background: Overview – Linear Integral Transforms. Data Structures for Image Analysis: Level of Image Data Representation – Traditional Image Data Structures – Hierarchical Data structures. Image Pre-processing: Pixel Brightness Transformations - Geometric transformations – Local pre-processing: Image smoothing, Edge Detectors – Image Restoration. | 10 | |
| III | Segmentation : Thresholding – Edge Based Segmentation : Edge Image Thresholding, Border tracing - Region Based Segmentation – Matching – Shape Representation and Description: Region Identification – Contour Based Shape Representation and Description- Chain codes, Simple Geometric Border Representation - Region Based Shape Representation and Description, Simple Scalar Region Descriptors. | 10 | |
| IV | Object recognition: Knowledge Representation – Statistical Pattern Recognition – Neural Nets – Fuzzy Systems- Mathematical Morphology – Basic Morphological concepts – Binary Dilation and Erosion. | 10 | |
| V | Image Data Compression: Image Data Properties – Discrete Image Transforms in Image Data Compression – Predictive Compression Methods – | 10 | |

| | |
|---|--|
| Vector Quantization – Hierarchical and Progressive Compression Methods – Comparison of Compression Methods – Coding –JPEG Image Compression. | |
|---|--|

| Learning Resources | |
|---------------------------|---|
| Text Books | <ol style="list-style-type: none"> 1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, Prentice Hall, Third Edition, 2008. (Unit-1: Chapter 1-1.1, 1.3, 1.4, 1.5, Chapter 2 -2.1, 2.2, 2.3, 2.4, 2.5). 2. Sonka, Hlavac, Boyle, Digital Image Processing and Computer Vision, Cengage Learning, 2009 (Unit -II: Chapter 3 – 3.1, 3.2 ,Chapter-4, Chapter-5,5.1, 5.2,5.3, 5.3.1, 5.3.2, 5.4 Unit-III: Chapter 6 -6.1, 6.2, 6.2.1, 6.2.3., 6.3, 6.4, Chapter 8 – 8.1, 8.2,8.2.1,8.2.2, 8.3, 8.3.1 Unit-IV- 4 – Chapter 9,9.1,9.2, 9.3,9.7, Chapter 13-13.1, 13.3 Unit-5: Chapter 14- 14.1, 14.2, 14.3, 14.4, 14.5,14.6, 14.8, 14.9,14.9.1) |
| Reference Books | <ol style="list-style-type: none"> 1. Anil.K.Jain, Fundamentals of Digital Image Processing, Prentice-Hall, 1989. 2. Chanda & Majumdar, Digital Image Processing and Analysis, Prentice Hall ,3rd Edition. 3. Richard Fairly, “Software Engineering Concepts”, TMGH, 2004. 4. Rajib Mall, “Fundamentals of Software Engineering”, PHI, Second Edition, 2000. 5. Carlo Ghezzi, Mehdi Jazayeri, Dino Mndrioli, “Fundamentals of Software Engineering “, Second Edition, PHI/Pearson Education Asia, 2000 |
| Web Sites / Links | <ol style="list-style-type: none"> 1. www.imageprocessing place.com 2. www.mathworks.com 3. www.neurotechnology .com |

Content Beyond the Syllabus:

1. Digital Image processing in remote sensing
2. Digital image processing in Agriculture

| | | | |
|----------------------|-------------------------|-----------------|----------|
| Subject Title | Embedded Systems | Semester | V |
|----------------------|-------------------------|-----------------|----------|

| Subject Code | 16P5CAE14 | Specialization | NA |
|--|--|-----------------------|---------------------------|
| Type | Elective-IV | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: | | | |
| The main objective is to provide the fundamental concepts of embedded system and its applications. | | | |
| Unit | Syllabus Contents | | Number of Sessions |
| I | Introduction to Embedded Systems – Categories of embedded Systems – specialties of embedded systems – requirements of embedded systems – challenges and issues in embedded software development – recent trends in embedded systems – Architecture of embedded systems : Hardware architecture – software architecture – application software – communication software – Embedded systems on a Chip (SoC) and the use of VLSI designed circuits. | | 10 |
| II | Processor and memory organization – Devices and buses for Device Networks – Device drivers and Interrupt servicing mechanism – program modeling concepts in single and multiprocessor systems software – development process. | | 10 |
| III | Software Engineering Practices in the embedded software development process – Inter-process communication and synchronization of process, tasks and threads – Hardware – software co-design in an embedded system. | | 10 |
| IV | Hardware software co-design and program modeling – Embedded hardware design and development – embedded firmware design and development – Real-time operating system (RTOS) based embedded system design. | | 10 |
| V | Introduction to embedded system design with vx works and MicroC/OS-II RTOS – Integration and Testing of embedded hardware and firmware – embedded system development environment – embedded product development life cycle (EDLC). | | 10 |
| Learning Resources | | | |

| | |
|--------------------------|---|
| Text Books | <ol style="list-style-type: none"> 1. Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw – Hill, Twelfth Reprint 2007. (Unit –I : Chapter 1, Unit – II: Chapter 2,3,4 & 6, Unit – III : Chapter 7,8 & 12) 2. Introduction to Embedded systems – SHIBU K V TATA McGraw-Hill 2009. (Unit – IV : Chapter – 8,9&10, Unit – V : Chapter 11, 12, 13 &15) |
| Reference Books | <ol style="list-style-type: none"> 1. Embedded System Design, ARNOLD S.BERGER, South Asian Edition – 2005. 2. Embedded System Design, Frank Vahid/tony givargis – reprint – 2009. |
| Web Sites / Links | <ol style="list-style-type: none"> 1. www.sciencedirect.com 2. www.embedded.com 3. www.futureelectronics.com |

Content Beyond the Syllabus:

1. Embedded system applications
2. Embedded system simulation tools

| Subject Title | Enterprise Resource Planning | Semester | V |
|--|---|-----------------------|---------------------------|
| Subject Code | 16P5CAE15 | Specialization | NA |
| Type | Elective-IV | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: | | | |
| The main objective is to provide the Enterprises and its maintenance in effective manner using various ERP packages. | | | |
| Unit | Syllabus Contents | | Number of Sessions |
| I | Introduction to ERP: Enterprise An Overview-Introduction to ERP-Basic ERP concepts-Risks of ERP- Benefits of ERP.ERP and Technology: ERP and Related Technologies-Business Intelligence,Business Process Reengineering (BPR)-Data Warehousing,-Data Mining-O LAP- SCM. | | 10 |
| II | ERP Implementation: Implementation challenges-ERP implementation strategies- ERP implementation lifecycle- Implementation Methodology-Vendors and Consultants-Contracts with Vendors-Consultants and Employees-Training and education-Project Management and Monitoring-Success and failure factors of an ERP implementation. | | 10 |
| III | The Business modules:Business modules of an ERP Package-Finance-Manufacturing-Human Resources-Plant Maintenance-Materials Management-Quality Management-Sales and Distribution and service. | | 10 |
| IV | The ERP Market: ERP market Place and market place dynamics- SAP AG-Oracle corporation-People soft-JD Edwards- QAD Inc.-SSA global. | | 10 |
| V | ERP present and future:Turbo Charge the ERP System- EAI- ERP and E-business- ERP and Internet and WWW- Future Directions and trends in ERP. | | 10 |

| Learning Resources | |
|---------------------------|---|
| Text Books | <ol style="list-style-type: none"> 1. Alexis Leon, “ERP Demystified”, Second Edition, Tata McGraw Hill, New Delhi, 2008. |
| Reference Books | <ol style="list-style-type: none"> 1. Alexis Leon, “ERP Demystified”, Tata McGraw Hill, New Delhi, 2000. 2. Ashim Raj Singla, ”Enterprise Resource Planning “,2008 , Cengage Learning India Pvt.Limited ,NewDelhi. |
| Web Sites / Links | <ol style="list-style-type: none"> 1. www.imc.com 2. www.webopedia.com 3. www.umsl.edu 4. www.oracle.com 5. www.informit.com |

Content Beyond the Syllabus:

1. ERP software packages
2. ERP services

| Subject Title | Management Information System | Semester | V |
|--|---|---------------------------|----------------------|
| Subject Code | 16P5CAE16 | Specialization | NA |
| Type | Elective-IV | L:T:P:C | 4 : 0 : 0 : 4 |
| Objectives: | | | |
| The main objective is to provide the fundamental concepts of information system and the process of management. | | | |
| Unit | Syllabus Contents | Number of Sessions | |
| I | Fundamentals of information systems: Concept of Information –Concept of System, Sub-system, system approach – Information system – Tools for information System - Meaning and Definition of MIS - MIS design, Development, Implementation and Maintenance. | 10 | |
| II | Information Technology: Concepts – Architecture – Computer Hardware & Trends in computer Hardware & Computer peripherals – Computer software – system software: OS, DAMS – Application software –spread sheet – graphic packages- Database management – File management –Database models, Database management system. | 10 | |
| III | Telecommunications and Networks: Trends in Telecommunication– Telecommunication Network Model – Types of telecommunication networks – Telecommunication Media – Processors – Network Topologies – Network Architectures and protocols. | 10 | |
| IV | Information system applications: Functional Business Systems - Accounting, Finance, Manufacturing and Systems, Marketing - Human resource Information System. | 10 | |
| V | Strategic and managerial implication of Information system – Managing information system resources . Decision support system: Executive Information System – Artificial Information system –Expert Systems. | 10 | |

Learning Resources

| | |
|--------------------------|---|
| Text Books | 1. Jame O'Brien, "Management Information System", Tata McGraw-Hill Publishing Company Ltd 2007(Sixth Reprint). |
| Reference Books | <ol style="list-style-type: none"> 1. Woman S Jawadekar," Management Information System ", The McGraw-Hill Companies. Eight reprint 2008 2. Kenneth C.Laudon & Jane P.Laudon ," Management Information System ",Prentice Hall of India(P)Ltd 2007. 3. D.P.Goyal, "Management Information System ", Macmillan Publishers India Limited, 2010. |
| Web Sites / Links | <ol style="list-style-type: none"> 1. www.wifinotes.com 2. www.ctparts.com 3. www.indianmba.com 4. www.techopedia.com |

Content Beyond the Syllabus:

1. Management information system case study
2. MIS in banking sector