SEMESTER 1

12XW11 ENGLISH FOR PROFESSIONAL SKILLS

3 0 0 3

READING COMPREHENSION: Developing Reading Skills like Skimming and Scanning for information, Critical Reading, Inferential, Cognition, and analytical Skills- appropriate reading texts to be used from general, scientific, and literary genres. (10)

PRINCIPLES OF CLEAR WRITING: The fundamental aspects of formal writing like objectivity, conciseness, clarity, simplicity, coherence, parallelism, unity, cohesion and accuracy to be focused Writing in different ways to create an emphasis – samples from news items, creative articles and reports to be used. (4)

TECHNICAL WRITING: Technical Style, Mechanics, Critical Evaluation of different types of technical texts and different genres of technical writing. – Format and different types of formal reports – Technical Papers. (4)

CORRESPONDENCE: Memos, Principles of Official, Social, and E-mail Correspondence to be focused. (4)

FOCUS ON SOFT SKILLS: Intra and Interpersonal Communication, Telephone Etiquette, Body language and Interview Techniques. (5)

PRACTICALS: Listening exercises using Language Laboratory, Making short speeches, Group Discussions and Role-Plays. (18)

Total L:45

TEXT BOOK

1. Teaching Material prepared by the Faculty, Department of English, PSG College of Technology, Coimbatore.

REFERENCES

1. Meenakshi Raman and Sangeetha Sharma," Technical Communication", Oxford University Press, New Delhi, 2009.
2. Dorothy E Zemach and Lynn Stafford-Yilmaz, "Writers at Work**:** The Essay", Cambridge University Press, Cambridge, 2008.
3. Jill Singleton, "Writers at Work: The Paragraph", Cambridge University Press, Cambridge, 2005.
4. Garry Adams and Terry Peck, "Useful Exercises for IELTS", Adams & Austen Press, Sydney, 2001.
5. IMS Learning Resources, "Communication Skills Builder", IMS Publications, Mumbai, 2008.
6. Aysha Viswamohan, "English for Technical Communication", Tata McGraw Hill, New Delhi, 2008.
7. Mark Ibboston, "Cambridge English for Engineering", Cambridge University Press, Cambridge, 2011.
8. Suresh Kumar E and Sreehari P, "A Handbook for English Language Laboratories", Osmania University, Hyderabad, 2011.

12XW12 CALCULUS AND ITS APPLICATIONS

3 2 0 4

BASIC CONCEPTS: Functions – limit, continuity, jump discontinuity, piecewise continuity, periodic, differentiable, integrable, absolutely integrable. Fundamental theorem of calculus (statement only). Sequences – increasing, decreasing, bounded, function limit properties. (No Proof) Series – convergence and divergence – alternating series test, absolute convergence – ratio test, power series. (10+7)

FUNCTIONS OF TWO VARIABLES: Models, partial derivative and its geometrical interpretation. Taylor series about a point - Maxima, minima - Constrained maxima and minima – Lagrange multiplier method. (8+5)

INTEGRAL CALCULUS: Evaluation of multiple integrals, Change the order of integration, Application of multiple integrals to find area and volume - Beta and Gamma Integrals- Evaluation of definite integrals in terms of Beta and Gamma functions. (9+6)

ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER: Modeling, Geometrical meaning, Exact differential equations, Integrating factors, Linear differential equations, Bernouli equations- Applications to engineering problems. (8+5)

LINEAR DIFFERENTIAL EQUATIONS OF SECOND AND HIGHER ORDER: Homogeneous linear equations of second order and higher order equations with constant coefficients. Euler-Cauchy equation, Non-homogeneous equations, Solution by variation of parameter, - Applications to engineering problems. (10+7)

Total L:45+T:30 = 75

TEXT BOOKS

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, New York, 2011.
2. Thomas L Harman, James B Dabney and Norman J Richert, "Advanced Engineering Mathematics with Matlab", Thomson Brooks/Cole, California, 2000.

REFERENCES

1. James Stewart, "Essential Calculus", Thomson Brooks/Cole, California, 2011
2. George B, Thomas Jr. and Ross L Finney, "Calculus and Analytical Geometry ", Addison Wesley, New Delhi, 2003.
3. Ray Wylie C and Louis C Barrett," Advanced Engineering Mathematics", McGraw Hill, New Delhi, 2003.
4. Riley K F and Hobson M P, "Essential Mathematical Methods for the Physical Sciences", Cambridge University Press, New York, 2011.
5. Roland E Thomas and Albert J Rosa, "The Analysis and Design of Linear Circuits", John Wiley & Sons, New York, 2011.
6. Michael D Greenberg, "Advanced Engineering Mathematics", Pearson Education, New Delhi, 2009.

12XW13 MATERIAL SCIENCE

4 0 0 4

LASERS AND FIBER OPTICS: Principle of Laser: spontaneous and stimulated emission, types of laser: He-Ne, CO_2 and Nd:YAG laser. Applications: Laser diodes, holography, cutting, drilling, welding**.** Principle of Fiber optics. Modes of propagation. Classification based on materials, refractive index profile, modes. Splicing. Losses in optical fiber. Fiber optical communication system, Light sources and Detectors. Fiber optic sensors – temperature, displacement and strain. (12)

CONDUCTORS AND APPLICATIONS : Drude Lorentz theory of electrical conduction, Band theory of solids. Factors affecting resistivity of metals – temperature, alloying, magnetic field and strain. Applications of conductors – Strain gauge, conducting material, and resistance thermometer. (12)

SEMICONDUCTORS AND DEVICES: Elemental and compound semiconductors. Intrinsic and extrinsic semiconductors - Properties. Hall effect - Hall coefficient in extrinsic semiconductors, experimental determination of Hall coefficient. Application of Semiconductors –Solar Cells, LED and LCD. Introduction to semiconductor memory devices: Random Access Memory (RAM), Read only Memory (ROM), DRAM CCD. (12)

MAGNETIC MATERIALS AND MEMORY DEVICES: Origin of magnetism, Classification, Ferro magnetic materials – Properties. Domain theory of ferromagnetism. Hysteresis. Hard and soft magnetic materials. Ferrite – structure and properties. Applications – optical, magnetic and magneto optical memory devices. (12)

ADVANCED MATERIALS AND APPLICATIONS: Nano materials - Synthesis - PVD and ball milling techniques. properties, applications. Shape Memory alloys (SMA) – Characteristics, properties of NiTi alloy, application in MEMS. Superconductivity- types of superconductors - High Tc superconductors, Application of superconductors -SQUID, Levitation and cryotron. (12)

Total L:60

TEXT BOOKS

1. William D Callister and David G. Rethwisch, " Fundamentals of Materials Science and Engineering: An Integrated Approach", John Wiley & sons, New York, 2011.
2. Rajendran and Marikani, "Materials Science", Tata McGraw Hill, New Delhi, 2006

REFERENCES

1. Leonid V Azaroff and James J Brophy, "Electronic Processes in Materials", McGraw Hill, New York, 1991.
2. Raghavan V, "Materials Science and Engineering - A First Course", Prentice Hall, New Delhi, 2006.
3. Sze S M, "Semiconductor Devices: Physics and Technology", John Wiley & Sons, New York, 2012.

12XW14 ANALOG AND DIGITAL ELECTRONICS

4 0 0 4

SEMICONDUCTOR DEVICES AND CIRCUITS: (Qualitative treatment only) Fundamental aspects of semiconductors - PN junction diode -Zener diode - Rectifiers - Zener voltage regulators - Filters - Bipolar Junction Transistors - Transistor Amplifiers - Field Effect Transistor. (7)

NUMBER SYSTEM AND CODES: Binary - Octal - Hexadecimal - BCD - excess three - Gray codes - Error correcting and detecting codes. (7)

DIGITAL CIRCUITS AND GATES: AND, OR, NOT, NAND and NOR gates - exclusive OR gates. Positive and negative logic systems - Digital integrated circuits-Characteristics -TTL and MOS logic circuits - Comparison. (6)

BOOLEAN ALGEBRA AND KARNAUGH MAPS: Boolean relations - Laws and theorems - Simplifications - Karnaugh maps and simplifications - Don't care conditions - NAND-NAND realizations. (7)

COMBINATIONAL LOGIC: Design and Implementation of Half and Full adders - Subtractors - Parallel adders - Carry look ahead addition - Encoders and decoders - Multiplexers and De-multiplexers. (8)

SEQUENTIAL LOGIC: R-S, J-K, D and T type Flip-Flops - Binary counters: Ripple and synchronous types - UP/DOWN counters - Decade counters - Shift registers - Ring counters. (7)

OPERATIONAL AMPLIFIERS: Definition of terms - Inverting and non-inverting amplifiers, inverting summing amplifier, integrators and differentiators. (9)

A/D AND D/A CONVERTORS: DACs: weighted and binary ladder types - ADCs: counter, dual slope, successive approximation types. (9)

Total L:60

TEXT BOOKS

1. Donald P Leach, Albert Paul Malvino and Goutam saha, "Digital Principles & Applications", Tata McGraw Hill, New Delhi, 2011.
2. Allen Mottershead, "Electronic devices and circuits – An Introduction", Prentice Hall, New Delhi, 2009.

REFERENCES

1. Gothmann H, "Digital Electronics: An Introduction to Theory and Practice", Prentice Hall, New Delhi, 2001.
2. Paul Horowitz and Winfield Hill, "The Art of Electronics", Cambridge University Press, Cambridge, 2001.
3. Hamacher C V, Vranesic Z G and Zaky S G, "Computer Organization", McGraw Hill, New York, 2002.

12XW15 C PROGRAMMING

3 0 0 3

PROBLEM SOLVING: Introduction to Problem Solving- Program development- Analyzing and Defining the Problem- Modular Design – Algorithm - Flow Chart - What is a programming language-Types of programming language- Program Development Environment. (3)

C LANGUAGE: Introduction to C Language - C character set - Identifiers and Keywords - Data Types - Constants - Variables - Arrays - Declarations - Expressions - Statements - Symbolic constants - Operators and Expressions - Library Functions - Data Input and Output Functions. (6)

CONTROL STATEMENTS: While Statement - Do While Statement – For Loop – Nested Loop - If Else - Switch - Break - Continue - Comma Operator – Goto Statement - (4)

FUNCTIONS: Defining Function - Accessing a Function - Passing Arguments to Functions - Specifying Arguments Data Types - Function Prototypes - Storage Classes - Auto - Static - Extern and Register Variables. (6)

ARRAYS: Defining Array – Processing array - Passing array to a function - Multi dimensional array - Array and strings. (4)

POINTERS: Declarations - Pointers to a function - Pointers and one dimensional arrays - Operating a pointer - Pointer and multi dimensional arrays - arrays of pointers - passing functions to other functions. (7)

STRUCTURES AND UNIONS: Definition of Structure and Union - Processing a structure – Bit field representations - Structures and pointers - Passing structure to functions - Self referential structures – Nested structure. (6)

FILES: File Structure concepts introduction - Definitions, concept of record, file operations: Storing, creating, retrieving, updating Sequential, relative, indexed and random access mode, Files with binary mode(Low level), performance of Sequential Files – Operations on Files – Types of Files, Various input and output functions on Files. (5)

Enumerated Data Type – Typedef - Preprocessor Directives - Command Line Arguments. (4)

Total L:45

TEXT BOOKS

1. Kernighan B W and Ritchie D M, “C Programming Language (ANSI C)”, Prentice Hall, New Delhi, 2009.
2. Deitel H M and Deitel P J, “C How to Program**”,** Prentice Hall, New Delhi**,** 2009.

REFERENCES

1. Herbert Schildt, “C The Complete Reference", Tata McGraw Hill, New Delhi, 2010.
2. Michael Schneider G, Steven W, Weingart and David M Perlman, “An Introduction to Programming and Problem Solving with Pascal“, Wiley, New Delhi, 2011.
3. Gottfried Byron,” Programming With C”, Tata McGraw Hill, New Delhi, 2010.

12XW16 ENGINEERING GRAPHICS AND GEOMETRIC MODELLING

2 0 3 4

INTRODUCTION: BIS specifications - lines, lettering, and dimensioning. Projection –types. (4)

FIRST ANGLE PROJECTION: Introduction- Projection of points, lines, planes, and solids –parallel, perpendicular and inclined to planes. (8)

ISOMETRIC PROJECTION: Introduction- prismatic and cylindrical components. (2)

INTERACTIVE GRAPHICS: Parametric modelling –1D, 2D and 3D geometry – transformations - display – points, lines using software. (4)

CURVES: Types- parametric curves generation- displaying - evaluating points on curves. (4)

SURFACES: Types- parametric surface generation- displaying - evaluating points on surfaces. (5)

SOLIDS: Generation of part models using Computer Aided Geometric Modelling software. (3)

TEXT BOOKS

1. "A Primer on Engineering Drawing using Pro Engineer", Department of Production Engineering and CAD/CAM Centre, PSG College of Technology, Coimbatore, 2012.
2. Michael E. Mortensen, "Geometric Modeling (Digitized)", Industrial Press, California, 2011.

REFERENCES

1. David F Rogers, Alan Adams J., "Mathematical Elements in Computer Graphics (Digitized)", McGraw Hill, New York, 2007.
2. David Solomon, "Computer Graphics and Geometric Modeling", Springer, New York, 1999.
3. Michael E Mortenson, "Geometric Modeling(Digitized)", Industrial Press, California, 2011.
4. Martti Mantyla, "An Introduction to Solid Modeling (Digitized)", Computer Science Press, New York, 2007.

LAB

Engineering Graphics using CAD

1. Introduction to CAD Software.
2. Exercise on first angle projection of
   a. Points b. Lines
3. Exercise on projection of
   a. Planes b. Solids
4. Exercise on conversion of isometric to orthographic projection.
5. Exercise on orthographic to isometric projection.
6. Exercise on Sectioning of regular solids.
7. Exercise on Perspective projection of simple solids.

Geometric Modeling using a graphical programming language

8. Modeling and displaying a point and line using orthographic projection and performing simple geometric transformation.
9. Modeling and displaying of parametrically represented analytical curves
   a. Circle b. Ellipse
10. Modeling and displaying of parametrically represented synthetic curves
    a. Bezier Curve b. B-spline
11. Modeling and displaying of parametrically represented NURBS curve.
12. Modeling and displaying of parametrically represented synthetic surface.
    a. Planar surface b. Ruled surface
13. Modeling and displaying of Bezier surface.
14. Modeling and displaying of B-Spline surface .

Total L:30+P:45=75

12XW17 PROGRAMMING LAB (PASCAL AND C)

1 0 4 3

PASCAL: Basic Data Types and Declaration. Assignment, Input and Output, Compound Statement, Iterative Statements, Conditional Statements, Functions and Procedures, Structured Data Types-Sets Records – Files and Pointers.

PASCAL LAB

1. Simple Programs Using Algebraic Expressions, Built-in functions.
2. Familiarizing conditional, Control and Repetition statements.
3. Usage of one dimensional and multidimensional arrays
4. Functions involving Call by Value.
5. Procedures involving value parameters and variable parameters.
6. Recursive programs
7. Defining sets, Enumerated data types and Sub range usages in a program.
8. Defining and handling simple records, Nested records and Disjoint records along with the usage of with option.
9. Creating and Processing of data files.

C LAB

1. Simple programs to understand the concepts of data types.
2. Familiarizing conditional, control and repetition statements
3. Usage of single and double dimensional arrays including storage operation
4. Implementation of functions, recursive functions
5. Defining and handling structures, array of structures and union
6. Implementation of pointers, operation on pointers dynamic storage allocation
7. Creating and processing data files.

Total L:15+P:60=75

12XW18 MATERIAL SCIENCE AND DIGITAL ELECTRONICS LAB

0 0 4 2

MATERIAL SCIENCE LAB

1. Resistivity of an Alloy – Carey Foster's Bridge
2. Band Gap of Thermistor – Post Office Box
3. Thermal Conductivity of Metallic Wire – Wiedmann Franz law
4. Temperature co-efficient of Resistance – Post Office Box
5. Efficiency of Solar Cell
6. Band Gap Determination – Reverse Saturation Current
7. Photodiode Characteristics
8. Determination of Wavelength of laser source using grating

DIGITAL ELECTRONICS LAB

1. Study of basic logic gates and realisation of logic gates using universal gates.
2. Multiplexer and demultiplexer.
3. Half and full adder / subtractor.
4. Encoder and decoder.
5. Binary decade counter.
6. BCD to seven segment decoder.
7. Study of D/A converter.
8. Crystal Oscillator using logic gates

Total P:60

SEMESTER 2

12XW21 PROBABILITY AND STATISTICS

3 2 0 4

PROBABILITY AND CONCEPT OF RANDOM VARIABLE: Introduction - Sample space and events - Axiomatic approach to probability – Basic theorems. Conditional Probability - Law of multiplication - Law of total probability and Bayes' Theorem - Independence. (7+4)

RANDOM VARIABLES: Discrete and continuous random variables - probability mass function and density function - distribution function - Expectation and variance. Discrete distributions: Binomial, Poisson and Geometric - Continuous distributions: Uniform, Normal, Exponential and Weibull - Joint probability distributions - marginal and conditional distributions - statistical independence , Conditional expectation. (12+8)

LIMIT THEOREMS: Moments and moment generating functions- Sums of independent random variables - Limit theorems: Markov and Chebyshev inequalities, Law of Large numbers, Central Limit Theorem. (6+4)

STATISTICAL INFERENCE: Sampling distribution - Estimation: Point estimation, interval estimation - Criteria of a good estimator –Interval estimation of mean, proportion, and variance (single sample and two samples) - Maximum likelihood estimator. Hypothesis Testing: General concepts - Errors in Hypothesis testing - One-and two-tailed tests - Tests concerning mean, proportion, and variance - Tests for Goodness of fit and independence of attributes. (11+7)

CORRELATION AND REGRESSION: introduction - Estimation using the regression line - Correlation analysis - Limitations, errors, and caveats of using regression and correlation analyses - Multiple regression and correlation analysis - Inferences about population parameters – Modeling techniques. (6+5)

ANALYSIS OF VARIANCE: Introduction to design of experiments, Analysis of variance - Completely Randomized Design and Randomized Block Design. (3+2)

Total: L:45 + T:30 =75

TEXT BOOKS

1. Saeed Ghahramani, “Fundamentals of Probability with Stochastic Processes”, Prentice Hall, New Delhi, 2005.
2. Trivedi K.S, “Probability and Statistics with Reliability, Queueing and Computer Science Applications”, Prentice Hall, New Delhi, 2008.
3. Jay L Devore, “Probability and Statistics for Engineering and Sciences”, Cengage Learning, New Delhi, 2012.

REFERENCES

1. Richard I. Levin. David S. Rubin, “Statistics for Management”, Pearson Education, New Delhi, 2007.
2. Sheldon M.Ross, “Introduction to Probability Models”, Academic Press, California, 2009.
3. Richard A. Johnson, “Probability and Statistics for Engineers and Scientists”, Prentice Hall, 2010.
4. Douglas C Montgomery and George C Runges, “Applied Statistics and Probability for Engineers”, John Wiley &Sons, New York, 2006.
5. Roy D.Yates and David J Goodman, “ Probability and Stochastic Processes – A friendly Introduction for Electrical and Computer Engineers”, John Wiley & Sons, USA, 2005
6. Ronald E. Walpole, Raymond H. Meyers, Sharon L. Meyers, “Probability and Statistics for Engineers and Scientists”, Pearson Education, New Delhi, 2007.

12XW22 APPLIED LINEAR ALGEBRA

3 0 2 4

LINEAR SYSTEMS: System of linear equations - Consistent and inconsistent systems - Geometric interpretation of linear system in 2 and 3 unknowns - Row reduction and Echelon forms – Vector equation – Matrix equation Ax=b - LU decomposition - Applications of linear systems. (6)

VECTOR SPACES: Euclidean n-space, General vector spaces, Subspaces, Linear independence, Basis and dimension, Row space, Column space. and Null space, Rank and nullity – Change of basis – Similarity - Isomorphism. (10)

LINEAR TRANSFORMATIONS: Introduction, Properties-Kernel and range, Linear Transformation from R^n to R^m, Matrices of linear transformations. (9)

INNER PRODUCT SPACES: Inner products, Length and Angle in inner product spaces - Orthonormal bases, Gram Schmidt process - Orthogonal matrices, QR decomposition - Best Approximation and Least-squares. (10)

EIGEN VALUES AND EIGEN VECTORS: Eigen values and Eigen vectors - Diagonalization, Symmetric Matrices, Orthogonal Diagonalization – Singular Value Decomposition – Eigen values and linear transformations - Discrete Dynamical systems. (10)

TEXT BOOKS

1. Howard Anton and Chris Rorres, “Elementary Linear Algebra” John Wiley & Sons, New York, 2010.
2. David C Lay, “Linear Algebra and its Applications “, Addison Wesley, Boston, 2011.

REFERENCES

1. Stephen Andrilli and David Hecker, “Elementary Linear Algebra”, Academic Press, California, 2010
2. Otto Bretscher, “Linear Algebra with Applications”, Prentice Hall, New Delhi, 2008.
3. Gilbert Strang, “Linear Algebra and its Applications “, Thomson Brooks/Cole, California, 2006.
4. Gareth Williams, “Linear Algebra with Applications”, Narosa, New Delhi, 2008.

LAB

Software MATLAB, MAPLE, and MATHEMATICA

1. Solving system of Linear equations by direct methods and Iterative methods.
2. Finding the rank of the given matrix.
3. Finding if the given set of vectors is linear independent or dependent and finding the relationship between the vectors if the set is linearly dependent.
4. Finding images of Linear transformation from R^n to R^m

5. Finding the norm of the given vector and angle and distance between two vectors.
6. Constructing an orthonormal basis from the given basis using Gram -Schmidt Process
7. Finding Least-squares solution of a inconsistent system and fitting least-squares line and parabola
8. Finding Eigen values and Eigen vectors of the given matrix and diagonalize the given matrix if possible.
9. Finding Singular Value decomposition and LU- decomposition of mxn matrices
10. Finding Dominant Eigen value using Power method.

Total L:45+P:30=75

12XW23 DATA STRUCTURES AND ALGORITHMS

4 0 0 4

INTRODUCTION: Software Development process – Abstraction - Data structures - Abstract data Types - Primitive data structures - Analysis of algorithms - Best, worst and average case time complexities –notation (6)

STRINGS: Implementation - operations - String applications. **SETS**: Operations on sets - implementation of sets. **RECORDS:** implementation of variant records. (7)

ARRAYS: Operations - implementation of one, two, three and multi dimension arrays – Sparse and dense matrices – Applications; **STACKS:** primitive operations - sequential implementation - Applications: Subroutine handling - Recursion – Expression Processing, Parentheses matching. (10)

QUEUES: Primitive operations - sequential implementation - Priority Queues - Dequeues - Applications: Image component labeling; Machine shop simulation. (7)

LISTS: Primitive Operations - Singly linked lists, doubly linked lists, Circular lists, Multiply linked lists - Applications: Addition of Polynomials; Sparse Matrix representation and Operations. – Linked Stacks - Linked queues - Linked Priority queues - Dynamic Storage Management. (14)

TREES: Terminologies - implementation - **BINARY TREE:** Properties - sequential and linked representation - common binary tree operations - traversals - Expression trees - Infix, Postfix and Prefix expressions - Threaded trees - Tournament trees - Heaps, Max heap, Min heap - Applications: Huffman codes; Placement of signal boosters. (10)

TABLE: Introduction – Operations – Implementation – Hash table – Hash Function--Collision – successful and unsuccessful search -Resolution handling. (6)

Total L:60

TEXT BOOKS

1. Aaron M Tanenbaum, Moshe J Augenstein and Yedidyah Langsam, "Data structures using C and C++", Pearson Education, New Delhi, 2009.
2. Sahni Sartaj, "Data Structures, Algorithms and Applications in C++", Universities Press, Hyderabad, 2005.

REFERENCES

1. Nell Dale, “C++ Plus Data Structures”, Jones & Bartlett, Massachusetts, 2011.
2. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Pearson Education, New Delhi, 2007.
3. Robert L Kruse, Bruce P Leung and Clovin L Tondo, “Data Structures and Program Design in C”, Pearson Education, New Delhi, 2009.
4. Angela B Shiflet, “Elementary Data Structures with Pascal”, West Publishing, New York, 1990.

12XW24 OBJECT ORIENTED PROGRAMMING

4 0 0 4

PRINCIPLES OF OBJECT ORIENTED PROGRAMMING: Software crisis Software Evolution - Procedure Oriented Programming - Object Oriented Programming Paradigm - Basic Concepts and Benefits of OOP - Object Oriented Programming Language - Application of OOP - Structure of C++ - Tokens, Expressions and Control Structures - Operators in C++ - Manipulators. (8)

FUNCTIONS IN C++: Function Prototyping - Call by Reference - Return by reference - Inline functions - Default, Const Arguments - Function - Overloading - Friend and Virtual Functions - Classes and Objects - Member

functions - Nesting of Member functions - Private member functions - Memory allocation for Objects - Static data members - Static Member Functions - Arrays of Objects - Objects as Function Arguments - Friend Functions - Returning Objects - Const Member functions - Pointers to Members. (13)

CONSTRUCTORS: Parameterized Constructors - Multiple Constructors in a Class - Constructors with Default Arguments - Dynamic Initialization of Objects - Copy and Dynamic Constructors – Destructors overloading . (6)

OPERATOR OVERLOADING: Overloading Unary and Binary Operators - Overloading Binary Operators using Friend functions – Operator Type conversion (6)

INHERITANCE: Defining Derived Classes - Single Inheritance - Making a Private Member Inheritable - Multiple Inheritance - Hierarchical Inheritance - Hybrid Inheritance - Virtual Base Classes - Abstract Classes - Constructors in Derived Classes - Member Classes - Nesting of Classes – Composition – Aggregation (11)

POLYMORPHISM: Basics of polymorphism – Types of polymorphism - Compile and Run Time Polymorphism - Virtual function – Object Slicing – Virtual Destructor – Dynamic binding (6)

TEMPLATES & EXCEPTION HANDLING: Introduction to Templates, Generic Functions and Generic Classes – Exception Handling – Examples. (5)

STREAMS: String I/O -Character I/O - Object I/O - I/O with multiple Objects - File pointers - Disk I/O with member functions . (5)

Total L:60

TEXT BOOKS

1. Bjarne Stroustrup, “The C++ Programming Language”, Pearson Education, New Delhi, 2012.
2. Stanley B Lippman, Josee Lajoie and Barbara E Moo, “The C++ Primer”, Pearson Education, New Delhi, 2009.

REFERENCES

1. Harvey M Deitel,and Paul J Deitel, “C++ How to Program”, Prentice Hall, New Delhi, 2008
2. Herbert Schildt, “C++ - The Complete Reference", Tata McGraw Hill, New Delhi, 2012.

12XW25 COMPUTER ORGANIZATION

4 0 0 4

DATA AND INSTRUCTION FORMATS: Data types - fixed point and floating point number representation - representation of signed numbers - alphanumeric data representation. (4)

REGISTER TRANSFER AND MICRO OPERATIONS: Register transfer language - inter register transfer - arithmetic micro operations - logic micro operations - shift micro operations - control functions. (7)

BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction codes- Computer registers - Computer Instructions - Timing & Control - Instruction Cycle - hardwired and micro programmed control unit- Design of hardwired control unit - Memory Reference Instructions - Input - Output and Interrupts - Complete Computer Description - Design of Basic Computer. (11)

CENTRAL PROCESSING UNIT: Processor bus organization - stack organization - instruction formats - three address, two address, single address and zero address instruction formats - addressing modes - data transfer and manipulation - RISC and CISC machine characteristics -Micro programmed control Unit - address sequencing. (7)

ARITHMETIC AND LOGIC UNIT: Addition/subtraction, multiplication and division with signed numbers. (7)

MEMORY AND INPUT-OUTPUT UNITS: Memory hierarchy - main memory: RAM and ROM address spaces - associative memory - virtual memory - cache memory – address mapping. (9)

PERIPHERAL DEVICES: I/O interface - I/O bus versus memory mapped I/O - example of I/O interface – DMA - Input-Output processor. (8)

MULTIPROCESSOR SYSTEM ORGANIZATION: Characteristics of Multiprocessors - interconnection structures - cross bar switch, time-shared common bus, multiport memory. (7)

Total L:60

TEXT BOOKS

1. Morris Mano, “Computer Systems Architecture", Pearson Education, New Delhi, 2007.
2. Hamacher V C, Vranesic Z G and Zaky S G, "Computer Organization (Digitized)", McGraw Hill, New Delhi, 2007.

REFERENCES

1. Rao P V S, "Perspectives in Computer Architecture", Prentice Hall, New Delhi, 2003.
2. John P Hayes, “Computer Architecture and Organization (Digitized)”, WCB/McGraw Hill, New York, 2007.

12XW26 OBJECT COMPUTING LAB

0 0 3 2

Exercises pertaining to the following outlines are to be experimented:

1. Arithmetic operations using array of objects and dynamic data members.
2. Creation of a class having read-only member function and processing the objects of that class.
3. Creation of a class which keeps track of the member of its instances. Usage of static data member, constructor and destructor to maintain updated information about active objects.
4. Illustration of a data structure using dynamic objects.
5. Usage of static member to count the number of instances of a class.
6. Illustration for the need of default arguments.
7. Usage of a function to perform the same operation on more than one data type.
8. Creation of a class with generic data member.
9. Overloading the operators to do arithmetic operations on objects.
10. Acquisition of the features of an existing class and creation of a new class with added features in it.
11. Implementation of run time polymorphism.
12. Overloading stream operators and creation of user manipulators.
13. Implementation of derived class which has direct access to both its own members and the public members of the base class.
14. Implementation of Streams to store and maintain Library system, with the features of Book Issue and Book Return.

Total P:45

12XW27 DATA STRUCTURES LAB

0 0 3 2

Implementation of the following problems:

1. Sparse & dense Matrix operations using arrays.
2. Library of string operations - representing strings using arrays.
3. Set operations.
4. Stacks using array representation.
5. Conversion of infix expression to postfix expression and evaluation.
6. Queues using array representation.
7. Linked Lists: Singly linked, Doubly linked and Circular lists and applications.
8. Linked Stacks and Queues.
9. Conversion and Manipulation of Expressions.
10. Binary trees and Threaded trees (with graphical representation).
11. Multi-precision Arithmetic Operations.
12. Implementation and analysis of Table and Hash Table with collision handling.

Total P:45

12XW28 DATA PROCESSING LAB

1 0 3 3

INTRODUCTION TO COBOL: Introduction to COBOL language fundamentals - Designing Structured Programs - Program Development Process - Designing COBOL Programs - Syntax and Margin Rules - COBOL Divisions and Coding - Declaring Variables - Working Storage Fields – Elementary and Group Data Items – Level Numbers – Conditional Names - Formatting Output. (4)

DESIGNING STRUCTURED PROGRAMS: Program Control - Sequence, Selection, Iteration and Case Structures - Paragraph Processing - Loops and Control - Conditional Loops - Declaring and Using Arrays - Multi-Dimensional Arrays - Indexing Arrays – Searching Arrays - Character Handling. (6)

BASIC FILE PROCESSING: OPEN, Record, and CLOSE Processing – Physical / Logical File Descriptions - Printing, and Displaying Output - Sequential File Processing – Sorting and Merging – Indexed File Processing – Screen Section. (5)

TEXT BOOK

1. Roy M K and Ghosh Dastidar D, "COBOL Programming", Tata McGraw Hill, New Delhi, 2008.

REFERENCES

1. Nancy Stern and Robert A.Stern, "Structured COBOL Programming", John Wiley & Sons, New York, 2007.
2. Andrew S Philippakis, Leonard J Kazmier, "Comprehensive COBOL", Tata McGraw Hill, New Delhi, 1991.

Programs are to be developed on the following Topics:

1. Simple program using Working-Storage section.
2. Programs using Sequential, Relative and Indexed Organisation of File
3. Programs using various types of PERFORM verbs.
4. Table handling using OCCURS Clause.
5. Programs using SORT and MERGE verbs.
6. Implement the SORT and MERGE Verb.
7. Programs using REDEFINE and RENAME Clause.
8. Program using Condition name.
9. Programs using COBOL SUBROUTINES.
10. Develop a Pay-Roll system for an organisation with reasonable assumptions.

Total L:15+P:45=60

SEMESTER 3

12XW31 DISCRETE STRUCTURES

3 2 0 4

LOGIC AND PROOF: Logic - Propositional Equivalences - Normal forms –Predicates and Quantifiers – Nested Quantifiers – Methods of Proof - Mathematical reasoning**:** Proof strategy – Mathematical Induction – Programme correctness. (10+7)

RELATIONS AND FUNCTIONS: Relations and their properties – Representing relations – Closures of relations – Partial orderings. Functions-Definitions – Composition of functions – Inverse functions – Binary and n-ary operations – Characteristic functions – Hashing function. (6+4)

COUNTING: Permutation and Combination – Generalized Permutation and Combination – Generating Permutation and Combination - Advanced counting techniques - Recurrence relation, Solving recurrence relations using characteristic roots. (7+5)

FORMAL LANGUAGES: Four classes of grammars (Phrase Structure, Context sensitive, Context Free, Regular) - Context free languages: generation trees - ambiguity. (3+2)

FINITE AUTOMATA: Finite State Automata (DFA) - Non-deterministic Finite State Automata (NDFA) - Conversion of NDFA to DFA - Equivalence of regular grammar and finite automata. (6+4)

PUSH DOWN AUTOMATA: Acceptance by final state and empty store, Equivalence of acceptance by final state and empty store, Equivalence of PDA's and CFL's. (7+5)

TURING MACHINES: Construction of simple Turing Machines - Universal Turing Machines - Halting problem. (6+3)

Total L:45+T:30=75

TEXT BOOKS

1. Kenneth H Rosen, “Discrete Mathematics and its Applications”, Tata McGraw Hill, New Delhi, 2007.
2. John C Martin, "Introduction to Languages and the Theory of Computation", Tata McGraw Hill, New Delhi, 2010.

REFERENCES

1. Tremblay J P and Manohar R, “Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill, New Delhi, 2001.
2. John E Hopcroft, Rajeev Motwani and Jeffrey D Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson Education, New Delhi, 2007.
3. Mishra K L P, Chandrasekaran N, ”Theory of Computer Science: Automata Languages and Computation”, Prentice Hall, New Delhi, 2008.

12XW32 DATABASE MANAGEMENT SYSTEM

4 0 0 4

BASIC CONCEPTS: Introduction to databases – Conventional file processing – Purpose of database system – Characteristics of database approach – Advantages of using DBMS – Database concept and architecture – Data Abstraction – Data Models – Instances and Schema – Data Independence – Schema Architecture – Components of a DBMS – Database Languages – Database Manager – Database Administrator – Database Users. (9)

DATA MODELING: Introduction – Data associations – Entities, attributes, relationships – Type role and structural constraints – Weak and Strong entity types – Design of Entity Relationship data models (ERD) – Generalization – Aggregation – Conversion of ERD into tables – Applications – Introduction to Network data model and Hierarchical data model. (9)

FILE ORGANIZATION: Storage device characteristics – Constituents of a file – Operations on file – Serial files – Sequential files – Index sequential files – Direct files – Binary and Secondary Key Retrieval – Indexing using Tree Structures. (8)

RELATIONAL MODEL: Introduction to Relational Data Model – Basic concepts – Enforcing data Integrity constraints – Relational Algebra Operations – Extended Relational Algebra Operations (4)

RELATIONAL DATABASE MANIPULATION: Introduction to Structured Query Language (SQL) – SQL Commands for defining Database, Constructing database, Manipulations on database – Basic data retrieval operations – Advanced Queries in SQL – Functions in SQL – Aggregation – Categorization – Updates in SQL – Views in SQL – Different types of views – PL/SQL Basics – Procedures – Functions – Triggers. (14)

DATA BASE DESIGN THEORY: Data base design process – Relational Database Design – Relation Schema – Anomalies in a database – Functional dependencies – Axioms – Normal forms based on primary keys – Second Normal form, Third Normal form, Boyce – Codd Normal form – Examples – Multi-valued dependencies – Fourth Normal form – Reduction of an E-R schema to Tables – Practical database design tuning. (10)

DATABASE SECURITY, INTEGRITY CONTROL: Security and Integrity threats – Defense mechanisms – Transaction and concurrency control mechanisms. (6)

Total L:60

TEXT BOOKS

1. Silberschatz A., Korth H and Sudarshan S., “Database System Concepts”, Tata McGraw Hill, New Delhi, 2011.
2. Elmasri R and Navathe S.B, “Fundamentals of Database Systems”, Pearson Education, New Delhi, 2009.

REFERENCES

1. Date C J, Kannan A, Swamynathan S, “An Introduction to Database Systems”, Pearson Education, New Delhi, 2009.
2. Raghu Ramakrishnan and Johannes Gehrke, “Database Management System (Digitized)”, Tata McGraw Hill, New Delhi 2007.
3. Graeme C Simsion, “Data Modeling Essentials”, Dreamtech, New Delhi, 2006.

12XW33 OPTIMIZATION TECHNIQUES

3 0 2 4

INTRODUCTION : Statement of optimization problems – classification of optimization problems – classical optimization techniques - Single variable optimization - Multi variable optimization with equality constraints – solution by the method of Lagrange multipliers – Multivariable optimization with inequality constraints – Khun –Tucker conditions. (3)

LINEAR PROGRAMMING : Graphical method for two dimensional problems – central problems of Linear Programming – Definitions – Simplex – Algorithm – Phase I and Phase II of Simplex Method – Revised Simplex Method. (8)

Simplex Multipliers – Dual and Primal – Dual Simplex Method – Sensitivity Analysis – Transportation problem and its solution – Assignment problem and its solution by Hungarian method – Karmakar’s method – statement, Conversion of the Linear Programming problem into the required form, Algorithm. (9)

NON LINEAR PROGRAMMING (ONE DIMENSIONAL MINIMIZATION): Introduction – Unrestricted search – Exhaustive search – Interval halving method – Fibonacci method. (5)

NON LINEAR PROGRAMMING (UNCONSTRAINED OPTIMIZATION): Introduction – Random search method – Uni variate method – Pattern search methods – Hooke and Jeeves method, Powell’s method- Simplex method – Gradient of a function – steepest descent method – Conjugate gradient method. (8)

DYNAMIC PROGRAMMING: Introduction – multistage decision processes – Principles of optimality – Computation procedures. (6)

SIMULATION: Introduction to Simulation – Simulation study – Types of Simulation – Limitations of Simulation – Areas of Simulation – Simulation of Queues, Networks and Inventory models. (6)

Total L:45+P:30=75

TEXT BOOKS

1. Hamdy A Taha, “Operations Research – An introduction”, Prentice Hall, New Delhi, 2010.
2. Singiresu S Rao, “Engineering Optimization Theory and Practice”, John Wiley & Sons, New Jersey, 2009.

REFERENCES

1. Kambo N S, “Mathematical Programming Techniques”, Affiliated East – West Publishing, New Delhi, 2008.
2. Hillier and Lieberman, “Introduction to Operations Research”, Tata McGraw Hill, New Delhi, 2009.
3. Jerry Banks, Barry L Nelson, ”Discrete Event System Simulation”, Prentice Hall, New Delhi, 2010.

LAB

1. Solving L.P.P using Simplex, Two phase Dual Simplex and Revised Simplex methods.
2. Finding initial basic feasible solution by North-West corner rule, Matrix minimum method and Vogel’s approximation method and also perform optimality test by Modi method.
3. Solving Nonlinear programming problems.
4. Solving Dynamic programming problems.
5. Solving Simulation problems.

12XW34 ADVANCED DATA STRUCTURES

4 0 0 4

INTRODUCTION: Algorithm – analysis of algorithms – best case and worst case complexities, analysis of some algorithms using simple data structures, Amortized time complexity. (6)

SORTING: Insertion sort, Selection sort, Shell sort, Bubble sort, Heap sort, Radix sort - Algorithms and their time complexity. (6)

BINARY SEARCH TREES: Searching – Insertion and deletion of elements – Analysis. (3)

AVL TREES: Definition – Height – searching – insertion and deletion of elements, AVL rotations – Analysis. (4)

RED BLACK TREES: Definition – searching – insertion and deletion of elements – algorithms and their time complexities. (4)

SPLAY TREES: Definition, splay steps, searching, insertion and deletion, Amortized analysis. (2)

MULTIWAY SEARCH TREES: Indexed Sequential Access – m-way search trees – B-Tree – searching, insertion and deletion - B+ trees - Tries. (5)

GRAPHS: Definition – representations (Adjacency matrix, packed adjacency list and linked adjacency list) – network representation – Graph search methods (Breadth first and depth first traversals). (5)

DIVIDE AND CONQUER: Method – examples – Merge sort, Quick sort, Binary Search. (6)

GREEDY METHOD: Optimization problems – method – examples – Minimum cost spanning tree (Kruskal's and prim's algorithms), Topological sorting, optimal storage on tapes. (4)

DYNAMIC PROGRAMMING: Method – examples – All pairs shortest path problem – Traveling salesman problem. (4)

BACK TRACKING: Method – Examples – Eight queen's problem, Hamiltonian Cycles. (4)

BRANCH & BOUND: Method – Examples – 0/1 Knapsack, Traveling Salesman problem. (4)

NP-HARD, NP-COMPLETE CLASSES: Basic concepts – Non deterministic algorithms – satisfiability problem – NP-hard and NP-complete Problems – Cooks theorem (informal proof). (3)

Total L:60

TEXT BOOKS

1. Thomas H Cormen, Charles E Leiserson and Ronald L Rivest, "Introduction to Algorithms", Prentice Hall, New Delhi, 2005.
2. Alfred V Aho, John E Hopcraft,Jeffrey D and Ullman, "Data structures and Algorithms", Pearson Eductation, New Delhi, 2009.

REFERENCES

1. Sahni Sartaj, "Data Structures, Algorithms and Application in C++", Universities Press, Hyderabad, 2005.
2. Ellis Horowitz and Sahni Sartaj and Dinesh Mehta, "Fundamental of Computer Algorithms", Galgotia, New Delhi, 2006.
3. Robert L Kruse, Clovis L Tondo, Bruce P Leung and shashi Mogalla, "Data Structures and Program design in C", Pearson Education, New Delhi, 2009.
4. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education, New Delhi, 2009.

12XW35 MICROPROCESSOR SYSTEMS AND PROGRAMMING

4 0 0 4

INTRODUCTION TO MICROPROCESSORS: Evolution of Microprocessors - Microprocessor based systems - Avantages and limitations. (7)

INTEL 8086/88 PROCESSOR: Block diagram of 8086 - Addressing modes – Instruction format - Instructions - assembler directives – Construction of Machine code. (8)

ASSEMBLY LANGUAGE PROGRAMMING: Programs for multi precision addition, subtraction-block moves-array processing-string processing-procedures and macros. (6)

INTERRUPT SYSTEMS: Advantages and disadvantages of interrupts - Interrupt systems of 80x86 processors – Programmable Interrupt Controller. (7)

ADVANCED MICROPROCESSORS: Comparison of 286,386 processors with 8086-memory paging mechanisms-features of 486 and Pentium processors. (6)

PROTECTED MODE PROGRAMMING: Protected mode - descriptor tables-operation-programming . (7)

PENTIUM PROCESSOR : Special Pentium Registers – Super scalar Architecture – Pipelining – Branch Prediction. (6)

MEMORY DESIGN: Design of Memory sections for 8086 and 8088 Microprocessors. (6)

BASIC I/O INTERFACE: I/O port address decoding-useful I/O hardware - I/O devices - Programming Peripheral Interface – Direct Memory Access. (7)

Total L:60

TEXT BOOKS

1. Barry B Brey, "The Intel Microprocessors - 8086/88, and 80186, 80286, 80386, and 80486", Prentice Hall, New Delhi, 2009.
2. Douglus V Hall, "Microprocessors and Interfacing", Tata McGraw Hill, New Delhi, 2005.

REFERENCES

1. James L Antonakos, “The Intel microprocessor family: hardware and software principles and application”, Thomson Delmar, California, 2006.
2. Walter A. Triebel, Avtar Sing, “8088 and 8086 Microprocessors Programming”, Pearson Education, New Delhi, 2008.
3. Michael L Schmit, "Pentium Processor optimization Tools", AP Professional, Boston, 1995.
4. Walter A Triebel, Kenneth J Ayala, “The 8088 and 8086 Microprocessors Programming, Interfacing, Software, Hardware and Applications”, Pearson Education, New Delhi, 2007.

12XW36 RDBMS LAB

0 0 3 2

SQL – ORACLE, SQL SERVER

1. Working with DDL and DML commands of SQL for creation and manipulation of single, multiple tables.
2. Working with PL/SQL- Triggers and stored procedures.
3. Developing a Package using a database.

Note: Problem Sheets will be provided.

Total P:45

12XW37 ADVANCED DATA STRUCTURES LAB

0 0 3 2

Implementation of the following problems:

1. Sorting algorithms: Insertion sort, Selection sort and Heap sort.
2. Binary search Trees and its operations with graphical display.
3. Demonstration of AVL Rotations.
4. B Trees.
5. An appropriate illustration using graphs and graph traversals.
6. Divide and Conquer versions of Merge sort, Quick sort and binary search.
7. Greedy method implementation of Topological sort, Minimum cost spanning tree.

8. Dynamic Programming implementation of Traveling Salesperson problem.
9. Eight queen's problem backtracking.
10. Knapsack using LC branch and bound.

Total P:45

12XW38 ASSEMBLY LANGUAGE PROGRAMMING LAB

0 0 3 2

1. Study of Assembler (Turbo) and Assembler Directives.
2. Study of INT 21H functions for input and output.
3. Multi-precision addition and subtraction.
4. Packing and unpacking of BCD digits.
5. Conversion of BCD numbers into ASCII characters and vice versa.
6. Delay loop implementation.
7. Arrangement of numbers in ascending and descending order.
8. Checking whether a given character string is a PALINDROME.
9. Usage of MACROS - Examples.
10. BCD to Binary conversion and vice versa.
11. To check whether a given string is a substring of another.
12. Implementation of LEFT (), RIGHT (), SUBSTR () functions.
13. To display the contents of the given memory locations.
14. Encryption and decryption of a message.
15. To find the Minimum and the Maximum number of a given array.

Total P:45

SEMESTER 4

12XW41 ACCOUNTING AND FINANCIAL MANAGEMENT

4 0 0 4

COST ACCOUNTING: Cost classification - significance of overhead Cost - Preparation of Cost sheet - Concept of cost volume profit analysis - Concept of variance - Principles of Job Costing, batch costing and Process costing - Operating Costing - Modern techniques/concepts of Cost Control/ Cost Management. (14)

FINANCIAL ACCOUNTING: Double Entry Book keeping concepts - Journalisation of Business Transactions - Subsidiary Books - Preparation of Profit and Loss Account and Balance sheet from Trial balance - Simple problems - Methods of depreciation. (16)

FINANCIAL RATIO ANALYSIS: Uses and Nature - preparation of Liquidity Ratios - coverage Ratios and profitability Ratios from profit & Loss Account and Balance sheet - common size Income statement and common size Balance sheet. (11)

GOALS AND FUNCTIONS OF FINANCIAL MANAGEMENT: Finance function - Importance of Corporation finance - objectives of Financial Management - organisation of the finance function - concept of time value of money. (6)

PRINCIPLES OF CAPTIAL BUDGETING: Kinds of capital Budgeting Decisions - Evaluation of proposals from the given cash inflows - Net present value versus Internal rate of return method problems. (6)

WORKING CAPITAL MANAGEMENT: Definition and importance of working capital - factors affecting working capital - Inventory management - simple problems - Receivables Management - cash Budget Preparation - Estimate of overall working capital requirements - Various sources of financing . (7)

Total L:60

TEXT BOOKS

1. Khan M Y and Jain P K, "Cost Accounting and Financial Management", Tata McGraw Hill, New Delhi, 2008.
2. Gupta R L and Radhaswamy M, "Advanced Accountancy", Sultan Chand & Sons, New Delhi, 2009.

REFERENCES

1. Sharma R K and Shashi K Gupta, "Management Accounting - Principles and Practice", Kalyani Publishers, Ludhiana, 2011.
2. Kuchal S C, "Financial Management", Chaitanya Publishing House, Allahabad, 2006.

12XW42 DATA COMMUNICATION NETWORKS

4 0 0 4

BASIC CONCEPTS: Introduction to Network Applications – Categories of Networks – Layered Architecture - The OSI Model – Functions of the Layers. (7)

SIGNALS AND ENCODING: Analog Signals – Digital Signals – Bit rate and Baud rate – Maximum bandwidth and Significant Bandwidth - Analog to Digital Encoding – Pulse Amplitude Modulation – Pulse Coded Modulation – Digital to Digital Encoding: Unipolar – Polar – Bipolar – Digital to Analog Encoding – Amplitude Shift Keying – Frequency Shift Keying – Phase Shift Keying – QAM – MODEMS, DSL technology. (10)

CONNECTING DEVICES: Repeaters, Hubs, Bridges, Switches, Routers, Backbone networks – Virtual LANs. (6)

SWITCHING: Circuit Switching - Space Division Switches – Time Division Switches - Space and Time Division Switch Combinations – Packet switching – Datagram Approach – Virtual Circuit Approach – Connection oriented Vs Connectionless Services. (7)

ERROR DETECTION AND CORRECTION : Transmission Impairments - Types of Errors – Single bit – Multiple bit – Burst Error – Detection – Vertical redundancy Check – Longitudinal Redundancy Check – Cyclic redundancy Check – Error Correction – Single bit Error Correction – Hamming Code. (7)

DATA LINK CONTROL AND PROTOCOLS: Line Discipline – Flow Control – Error control - Stop and Wait - Sliding Window – Synchronous Protocols – High Level Data Link Control, PPP. (7)

MULTIPLE ACCESS: Random access – Controlled access – Channelization – Local Area networks Topologies – Traditional Ethernet – Fast Ethernet, Gigabit Ethernet, Wireless LANS – IEEE 802.11 – Bluetooth. (8)

ADVANCED NETWORK ARCHITECTURES: Introduction to ATM – ISDN – MPLS: Fundamentals of labels – Label stack – VC merging – Label distribution protocol – Explicit routing for traffic engineering. (8)

Total L:60

TEXT BOOKS

1. Behrouz A Forouzan, "Data Communication and Networking", Tata McGraw Hill, New Delhi, 2012.
2. William Stallings, “Data and Computer Communication”, Prentice Hall, New Delhi, 2009.

REFERENCES

1. Andrew S Tanenbaum, “Computer Networks”, Pearson Education, New Delhi, 2010.
2. Keshav S, “An Engineering Approach to Computer Networking”, Pearson Education, New Delhi, 2008.
3. Fred Halsall and Lingana Gouda Kulkarni, "Computer Networking and the Internet", Pearson Education, New Delhi, 2009.
4. Michael Duck and Richard Read, "Data Communications and Computer Networks: For Computer Scientists and Engineers", Pearson Education, New Delhi, 2011.

12XW43 TRANSFORMS AND THREE DIMENSIONAL GEOMETRY

3 2 0 4

TRANSFORM METHODS: Concept of Transformation – Examples for Transformation. (2+1)

LAPLACE TRANSFORM: Definition – Transforms of standard functions – Transform of unit step function – Dirac - Delta function - Transforms of derivatives and integrals – Transforms of Periodic functions – Inverse Laplace

transform – Convolution theorem – Solving ordinary linear differential equations with constant coefficient by Laplace transform technique. Transfer functions, applications to engineering problems. (12+7)

FOURIER SERIES : Periodic waveforms, even and odd functions, orthogonality relations, Fourier series - Dirchlet's conditions, statement of Fourier Theorem, Fourier Co-effecients – change of scale , Half range series, Parseval's theorem – average power of a signal, RMS value, applications – frequency response of a linear system. (9+6)

FOURIER TRANSFORM: Fourier integrals – Fourier transform – Infinite Fourier sine and Cosine transform – Transforms of standard functions – properties, Convolution theorem (Concept & Statement) – relation with Laplace transform. (8+6)

DISCRETE FOURIER TRANSFORM: – Discrete convolution – Periodic sequence and circular convolution – Decimation- in-time and decimation-in-frequency algorithms – Computation of inverse DFT. (8+6)

3D GEOMETRY: Direction cosines and ratios, equation of planes, straight lines, shortest distance between two skew lines, circle and sphere. (6+4)

Total L:45+T:30=75

TEXT BOOKS

1. Anthony Croft, Robert Davison, Martin Hargreaves, "Engineering Mathematics - A Foundation for Electronic, Electrical, Communications & Systems Engineers", Pearson Education, New Delhi, 2009.
2. William H McCrea, "Analytical Geometry of Three Dimensions", Dover Publications, New York, 2011.

REFERENCES

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, New York, 2011.
2. Thomas L. Harman, James Dabney and Norman Richert, "Advanced Engineering with MATLAB", Thomson Brooks/Cole, California, 2000.
3. Michael D. Greenberg, "Advanced Engineering Mathematics", Pearson Education, New Delhi, 2009.

12XW44 OPERATING SYSTEMS

3 0 2 4

INTRODUCTION: Abstract view of an operating system - Operating Systems Objectives and Functions – Evolution of Operating Systems - Dual-mode operation - Protecting I/O, memory, CPU, Kernels and micro-kernels – system calls- Structure of Operating System – Components of Computers – various components of operating systems. (5)

PROCESS DESCRIPTION AND CONTROL: Job/process concepts - Process Creation – Process Termination - Process states – Process Description – Process Control. (5)

PROCESS AND THREADS: Relationship between process and threads – Thread State – Thread Synchronization – Types of Thread – Multithreading model (3)

PROCESS SCHEDULING: Scheduling basics - CPU-I/O interleaving - (non-)preemption - context switching - Types of Scheduling – Scheduling Criteria – Scheduling Algorithms. (4)

PROCESS SYNCHRONIZATION AND DEADLOCK: Concurrent Process – Principles of Concurrency – Race Condition - Mutual Exclusion – Critical section problems – Software support – Hardware Support – Operating System Support – Deadlock: Deadlock Prevention, Avoidance and Detection and recovery. (4)

MEMORY MANAGEMENT: Memory hierarchy – Linking and Loading the process – Memory Management requirement - Fixed partitioning - Dynamic partitioning – Buddy Systems – Simple paging – Multilevel paging – Inverted paging – Simple Segmentation – segmentation and paging. (8)

VIRTUAL MEMORY MANAGEMENT: Need for Virtual Memory management – Demand Paging – Copy on write - Page Fault handling – Demand Segmentation – Combined demand segmentation and paging - Thrashing- working set model. (4)

FILE SYSTEM MANAGEMENT: Files – Access methods - File System Architecture – Functions of File Management –Directory and disk structure – file sharing – File system implementation – directory implementation - File Allocation – free space management. (5)

I/O MANAGEMENT AND DISK SCHEDULING: Organization of I/O function – Evolution of I/O function – Types of I/O devices – Logical Structure of I/O functions – I/O Buffering – Disk I/O – Disk Scheduling algorithms – Disk Cache.

(5)

CASE STUDIES: UNIX, Linux, Windows NT. (2)

TEXT BOOKS

1. Silberschatz A, Galvin P B and Gagne G, “Operating System Concepts Essentials”, John Wiley & Sons, New York, 2011.
2. William Stallings, “Operating Systems”, Pearson Education, New Delhi, 2009.
3. Andrew S Tanenbaum, "Modern Operating System", Prentice Hall, New Delhi, 2008

REFERENCES

1. Elmasri E, Carrick A G and Levine D, “Operating Systems: A Spiral Approach”, Tata McGraw Hill, New Delhi, 2010.
2. McHoes A M and Flynn I M, “Understanding Operating Systems”, Thomson Brooks/Cole, California, 2011.
3. Dhamdhere D M, “Operating Systems: A Concept-based Approach”, Tata McGraw-Hill, New Delhi, 2006.
4. Uresh Vahalia, “Unix Internals”, Pearson Education, New Delhi, 2006.
5. Diaz C, “Introduction to Unix/Linux”, Thomson Brooks/Cole, California, 2007.

LAB

1. Practicing UNIX Commands
2. Writing SHELL Scripts
3. Writing programs using UNIX System Calls
4. Process Creation and Execution
5. Thread Creation and Execution
6. Process / Thread Synchronization using semaphore
7. Developing Application using Inter Process communication (using sharedmemory, pipes or message queues)
8. Implementation of Memory Management Schemes
9. Implementation of file allocation technique (Linked, Indexed, Contiguous)

Total L:45+P:30=75

12XW45 SOFTWARE ENGINEERING TECHNIQUES

3 0 0 3

INTRODUCTION: System - System Development - types of systems – people involved in the systems development – need for software Engineering - objectives & benefits of Software Engineering - Factors that influence Quality & Productivity – Quality attributes of a software product. (3)

THE SOFTWARE PROCESS: A generic view of process - Process Framework – Process Patterns – Process Assessment – Process Technology – Product & Process. Process Models - The Waterfall Model – Incremental Process Model – Evolutionary Process model – Specialized Process Models & The Unified Process**.** (3)

SOFTWARE PLANNING: Software Project Estimation - different techniques of project cost estimation Decomposition technique - COCOMO & PUTNAM models. (3)

SOFTWARE ENGINEERING PRACTICES – Core Principles – Communication Practices – Planning Practices – Modeling Practices –Construction Practices – Deployment (3)

REQUIREMENTS ENGINEERING: Requirements Engineering tasks – Initiating Requirements Engineering Process – Eliciting Requirements – Negotiating Requirements – Validating Requirements. (3)

BUILDING THE ANALYSIS MODEL: Requirements Analysis – Analysis Modeling approaches – Data Modeling concepts: Data Dictionary – ERD, Flow Oriented Modeling: Data Flow Diagram – Creating a Behavioral Model – State Transition Diagram. (6)

DESIGN ENGINEERING: Design Process & Design Quality – Design Concepts – The Design Model: Data Design Elements – Architectural Design Elements – Interface Design Elements – Component level Design Elements – Deployment level Design Elements. Design Tools: HIPO diagram - Structure Chart - Decision Tree - Decision Table - Structured Flowchart - Structured English – Pseudo code – Nassi-Shneiderman Diagram. (10)

SOFTWARE TESTING & DEBUGGING: Testing Strategies – Testing Tactics – Testing Methodologies and Debugging Methods – study of automated Testing tools. (7)

SOFTWARE IMPLEMENTATION: System Documentation Manuals - Document review - Software Training - Post Implementation Review - Maintenance issues. (3)

CASE STUDIES (4)

Total L:45

TEXT BOOKS

1. Pressman R S, "Software Engineering - A Practitioner's Approach", Tata McGraw Hill, New Delhi, 2010.
2. Pankaj Jalote, "Integrated Approach to Software Engineering", Springer, New York, 2010.

REFERENCES

1. Shari Lawrence Pfleeger and Joanne M Atlee, "Software Engineering Theory and Practice", Pearson Education, New Delhi, 2009.
2. Ian Sommerville, "Software Engineering", Pearson Education, New Delhi, 2009

12XW46 COMPUTER NETWORKS LAB

0 0 3 2

1. Read a 4 bit binary number and hence find the 7 bit Hamming code to facilitate a single bit error correction.
2. Introduce single bit error to the 7 bit Hamming code generated in Problem-1, and hence correct it. Also, verify that 2-bit errors are always detected, but not corrected.
3. Read a Binary string corresponding to the Message to be transmitted, and another binary string, corresponding to generator Polynomial and hence generate the CRC check sum. Also deduct errors if any at the receiver.
4. Read a binary string corresponding to an HDLC frame, and bit-stuff, if needed, and identify the frame to be transmitted.
5. Implementation of stop and wait, sliding window protocol.
6. Configure a VLAN
7. Configure a Trunk
8. Inter VLAN Communication
9. VTP.
10. Spanning tree protocol.

Total P:45

12XW47 MATHEMATICAL COMPUTING LAB

0 0 3 2

1. Construct basic waveforms and interpret their properties.
2. Solve Differentiation, integration and differential equations.
3. Evaluate Laplace transform and its inverse.
4. Solve initial value problems using Laplace transform techniques.
5. Evaluate Harmonics of Fourier series and its expression.
6. Find Infinite Fourier transform and inverse.
7. Find Infinite Fourier sine and cosine transform.
8. Sampling of Continuous function.
9. Find Convolution of Discrete Fourier transform.
10. Fast Fourier transform – Decimation- in-time and decimation-in-frequency algorithms and inverse.
11. Construct planes, lines, skew lines, circle and sphere in 3D geometry.

Total P:45

12XW48 JAVA PROGRAMMING LAB

2 0 2 3

JAVA PROGRAMMING: Introduction - Data Types - Operators - Declarations - Control Structures - Arrays and Strings - Input/Ouput.-Java Classes - Fundamentals - Methods - Constructors - Scope rules - this keyword - object based vs oriented programming.- -Inheritance-Reusability - Composing class - Method overloading - Abstract classes - Virtual Functions. (5)

PACKAGES AND INTERFACES: Packages - Access protection - Importing packages - Interface - Defining and Implementing Interface - Applying Interface - Variables in Interfaces. (5)

EXCEPTION HANDLING: Fundamentals - Exception types - Uncaught Exception - Using Try and Catch - Multiple catch clauses - Nested Try statements - Throw - Throws - Java Built-in Exception - Creating your own subclasses. (5)

MULTI THREADED PROGRAMMING: Java thread model - Priorities - Synchronization - Messaging - Thread class and runnable Interface - Main thread - Creating the Thread - Synchronization - Interthread Communication - Deadlock. (6)

I/O, APPLETS: I/O basics - Stream - Stream Classes - Predefined stream - Reading/Writing console input - Applet fundamentals - Native methods.- GUI Components - Applets - Java Scripts – Swing. (6)

NEW FEATURES IN J2SE V5.0: Generics – Enhanced for Loop – Autobox – Auto unboxing – Enums – Var args – Static import – Annotations – Collections Frameworks – List – Vector – Set – Array - Maps (3)

TEXT BOOKS

1. Herbert Schildt, "JAVA - The Complete Reference", Tata McGraw Hill, New Delhi, 2011.
2. Horstmann and Cornell, “Core Java”, Prentice Hall, New Delhi, 2008.

REFERENCES

1. Harvey M Deitel and Paul J Deitel, "JAVA: How to Program", Prentice Hall, New Delhi, 2011.
2. William Stanek and Peter Norton, "Peter Norton's Guide to Java Programming",Tech Media, Mumbai, 1997.
3. Mark Grand, "JAVA Language Reference", O'Reilly, California, 1997.
4. Jamie Jaworski “ Java Developer’s Guide”, Macmillan, London, 1996
5. Ivor Horton, “ Beginning Java 2 JDK 5 Edition”, Wiley Dreamtech, Bangalore, 2007
6. Herbert Schildt ,“Java 2 V.5.O (Tiger) New Features”, Tata McGraw Hill, New Delhi, 2004

LAB

1. To create runtime polymorphism using abstract class, interface
2. To create callback feature using interface.
3. To create a program for interface inheritance
4. To implement a user defined package
5. To implement a user defined checked exception and unchecked exception
6. To create threads, thread groups
7. To create inter-thread communication using shared memory, piper stream.
8. To implement socket connections (UDP, TCP).

Total L:30+P:30=60

SEMESTER 5

12XW51 UNIX ARCHITECTURE AND PROGRAMMING

4 0 0 4

INTRODUCTION TO UNIX : File System – Essential Commands - General Purpose Utilities - Bourne Shell - SimpleFilters - Advanced filters - Process - Communication and Scheduling - Programming with Shell – File System Architecture. (19)

FILE SYSTEM STRUCTURE: Kernel architecture - Kernel data structure - Buffer Cache - Structure of Buffer pool - Scenarios for buffer retrieval - Reading and Writing disk blocks - Advantages and Disadvantages of buffer cache - Inode - Structure of regular file - Conversion of a pathname to an inode - Inode assignment to a new file - allocation of disk blocks. (20)

PROCESS SYSTEM : Process states and transitions - Context of a process - Saving the context of a process - Manipulating Process address space - Process creation and termination – Signals – Awaiting Process Termination - System Boot and INIT process - Process Scheduling – Functions of a Clock Interrupt Handler. (13)

MEMORY MANAGEMENT: Swapping - allocation of swap space – Swapping Processes Out – Swapping Processes in - Demand Paging - Data structures of demand paging - Page stealer Process - Page faults. (8)

Total L:60

TEXT BOOKS

1. Sumithabha Das, "Unix System V.4 - Concepts and Applications", Tata McGraw Hill, New Delhi, 2008 .

2. Maurice J Bach, "Design of the UNIX Operating System", Prentice Hall, New Delhi, 2007.

REFERENCES

1. Sumitabha Das, “Your Unix the Ultimate Guide “, Tata McGraw Hill, New Delhi, 2012.
2. Richard F Gilberg, Behrouz A Forouzan,”Unix and Shell Programming - A Text Book (Digitized)”, Thomson Brooks/Cole, California, 2009.
3. Stephen G Kochan, "Exploring The Unix", Tech Publications, Singapore, 1998.
4. Uresh Vahalia, "UNIX Internals: The New Frontiers", Pearson Education, New Delhi, 2008.
5. Keith Haviland, Dina Gray, “Unix System Programming (Digitized)”, Addison Wesley, Boston, 2007.

12XW52 COMPUTER GRAPHICS AND VISUALIZATION

3 0 2 4

GRAPHICS INPUT - OUTPUT DEVICES: Raster scan Displays - Random scan displays - Direct view storage tubes - Flat panel displays - Mouse - Track Ball - Joy Stick - Digitizers - Touch panels - LCD. GRAPHICAL USER INTERFACE AND INTERACTIVE INPUT METHODS: The user dialog - Input of graphical data - Input function - Interactive picture construction techniques - Virtual reality environments. (2)

TWO DIMENSIONAL GRAPHICS: Basic transformations - Matrix representation and homogeneous coordinates - Composite transformations - Line drawing algorithms: DDA and Bresenham's algorithms - Circle generation algorithms: Mid point circle algorithm - Point clipping - Line clipping: Cohen Sutherland algorithm - Polygon clipping: Sutherland Hodgeman algorithm - Line covering. (7)

RASTER GRAPHICS: Fundamentals: generating a raster image, representing a raster image, scan converting a line drawing, displaying characters, speed of scan conversion, natural images - Solid area scan conversion: Scan conversion of polygons, Y-X algorithm, properties of scan conversion algorithms - Interactive raster graphics: painting model, moving parts of an image, feed back images. (7)

CURVES AND SURFACES: Parametric representation of curves - Bezier curves – B-Spline curves - Parametric representation of surfaces - Bezier surfaces - Curved surfaces - Ruled surfaces - Quadric surfaces – Concatenation of two curve segments – Order of Continuity. (7)

IMAGE PROCESSING FUNDAMENTALS: Sampling and Quantization, Image Enhancement - Histogram Processing, Filtering, Edge Detection, Image Transforms. (8)

THREE DIMENSIONAL GRAPHICS: 3D transformations - Viewing 3D graphical data - Orthographic, oblique, perspective projections - Hidden lines and hidden surface removal. (6)

FRACTAL-GEOMETRY METHODS: Tiling the plane - Recursively defined curves - Koch curves - C curves - Dragons - Space filling curves - Fractals - Grammar based models - Graftals - Turtle graphics - Ray tracing. (5)

OPENGL: Architecture, The OpenGL API, Primitives and Attributes, Color, Viewing, Control Functions, Programming Event-Driven Input, Transformations, *OpenGL Extensions.* (3)

Note: Algorithms in the Computer Graphics have to be implemented by using C++/ OpenGL.

TEXT BOOKS

1. Donald Hearn and Pauline Baker M, “Computer Graphics", Pearson Education, New Delhi, 2008.
2. William M. Newmann, Robert F Sproull, “Principles of Interactive Computer Graphics”, Tata McGraw Hill, New Delhi, 2010.

REFERENCES

1. Rankin John R, "Computer Graphics Software Construction (Digitized)", Prentice Hall, New Delhi, 2007.
2. Foley James D, Vandam Andries and Hughes John F, "Computer Graphics: Principles and Practice", Addison Wesley, New York, 2004.
3. Rafael C Gonzalez., and Richard Eugene Woods, “Digital Image Processing”, Prentice Hall, New Delhi, 2009.
4. Anil K Jain, “Fundamentals of Digital Image Processing”, Prentice Hall, New Delhi, 2005.
5. Angel, “Interactive Computer Graphics - A top down approach with OpenGL”, Addison Wesley, Boston, 2008.
6. Francis S. Hill, Stephen M. Kelley , “Computer Graphics”, Prentice Hall, New Delhi, 2006.

LAB

1. Implementation of Simple transformations.
2. Implementation of Line drawing algorithms.
3. Windowing and Line Clipping.
4. Polygon clipping.
5. Implementation of an Analog Clock.
6. Polygon filling algorithms.
7. Merging of a circle and square.
8. Fractal drawing.
9. Analysis of an image.

Total L:45+P:30=75

12XW53 ENTERPRISE COMPUTING

3 0 2 4

INTRODUCTION: Driving forces – major issues in information technology – Host application and non-distributed computing. Approaches to client server computing – application development – cost – implementation – advantages and disadvantages, obstacles of client server technology – open systems and standards. (8)

CLIENT/SERVER COMPUTING : Types of UI, CSS, Validation, operating system services for client – server types – server side scripting – operating system services for server – client and server software requirements (10)

MIDDLEWARE: Architecture – classification of middleware – database middleware – drivers, connection, statements – communication middleware – transaction middleware – isolation – interfacing. (10)

DISTRIBUTED MULTI-TIER COMPUTING: Basis of distributed computing – decomposition approaches – layers and tiers – component based software development for enterprise – enterprise architectural overview – java enterprise system (9)

Enterprise Web Communication – Java servlets – HTTP Servlet, generic servlets, Java server pages – elements of JSP – JSTL. (8)

TEXT BOOKS

1. Robert Orfali, Dan Harkey and Jeri Edwards, “Client / Server survival Guide”, Wiley, New Delhi, 2009.
2. Travis Dewire D, “Second - generation Client / Server Computing”, Tata McGraw Hill, New Delhi, 2004.

REFERENCES

1. Patrick Smith and Steve Guengesich, “Client / Server Computing”, Prentice Hall, New Delhi, 2002.
2. James E. Goldman, Phillip T. Rawles and Julie R. Mariga, “Client/Server Information Systems: A business oriented approach” John Wiley & Sons, New York, 1999.
3. Paul J Perrone, Venkata S.R. Krishna R and Chayanti, “Building Java Enterprise Systems with J2EE", Tech media, Mumbai, 2003.
4. George Reese, “Database programming, with JDBC and Java", O’Reilly, California, 2000.
5. Dustin R. Callaway - "Inside Servlets " Pearson Education, New Delhi, 2009.
6. Jason Hunter, "Java Servlet Programming" - O' Reilly, California, 2001.
7. Bill McCarty and Luke Cassady Dorion - "Java Distributed Objects (Digitized)", Tech Media, Mumbai, 2011.

LAB

1. Develop a host application and install it in another system.
2. Convert the developed application to two, three and multi tiered application using the latest front and back end technologies.
3. Migrate the application to distributed environment.
4. Demonstrate the communication between the tiers using interfaces.

Note: Problem Sheet will be provided in addition to the above for practicing latest technologies.

Total L:45+P:30=75

12XW54 TCP/IP NETWORKS AND APPLICATIONS

3 0 0 3

REVIEW OF NETWORK ARCHITECTURE: Introduction – Internetworking concepts – TCP/IP Reference Model – Comparison with OSI reference model. (2)

INTERNET ADDRESSES: Classes of IP Address – Special Addresses – Concept of Subnetting and Supernetting. Classless addressing – IPV6. (3)

INTERNET PROTOCOL (IP): Introduction – Purpose – IP format – Address Resolution – ARP – RARP - BOOTP, DHCP – ICMP- IGMP (6)

ROUTING : IP forwarding – Core Routers – Peer backbones – AS – Vector Distance Routing – Linkstate Routing – Path Vector Routing – RIP, OSPF, BGP – Multicast – Multicast Routing Protocols. (5)

TCP: Introduction – Segment format – Reserved and available port numbers - Establishing and Closing TCP connection – TCP performance measurements. (3)

UDP: Introduction – packet format – pseudo header – checksum computation – multiplexing, demultiplexing and ports – Reserved and available port numbers. (2)

CONGESTION CONTROL AND QUALITY OF SERVICE: Congestion – Congestion control – Quality of Service – Techniques to improve QOS – Integrated Services – Voice and Video over IP. (5)

APPLICATION LAYER: DNS – TELNET – FTP – SMTP - SNMP - HTTP. (7)

MOBILE IP: Introduction – Mobile IP Characteristics – Addressing Details – Agent discovery – Agent registration – 2X problem – Communication with Foreign Agent and Home Network. (3)

VPN: Need for VPN-Addressing and Routing – Application Gateway – Network Address Translation (NAT) – Multi Address NAT – Port Mapped NAT – Interaction between NAT and ICMP- Application. (4)

INTERNET SECURITY: Introduction to Cryptography – Private and Public key - Internet Security – Internet Security (IPSec) – Firewalls and Internet Access – Packet Level Filters – Firewall Architecture. (5)

Total L:45

TEXT BOOKS

1. Behrouz A Forouzan, “TCP/ IP Protocol Suite”, McGraw Hill, New Delhi, 2008.

REFERENCES

1. Kevin R Fall, Richard Stevens W**, "**TCP/IP Illustrated, Volume 1: The Protocols”, Pearson Education, New Jersey, 2012.
2. James F. Kurose, Keith Ross**, “**Computer Networking: A Top-Down Approach” , Addison Wesley, Boston, 2012
3. Douglas Comer, “Internetworking with TCP/IP”, Prentice Hall, New Delhi, 2006.
4. William Stallings, "Data and Computer Communicationss", Prentice Hall, New Delhi, 2009.

12XW55 OBJECT ORIENTED ANALYSIS AND DESIGN

3 0 2 4

SOFTWARE DEVELOPMENT BEST PRACTICES: The Rational Unified Process – Static Structure Process description – Dynamic Structure – Iterative Development – An Architecture centric process, a use-case driven process – Process workflows. (22)

UML: The importance of modeling - Basic structural modeling – Advanced Structural modeling – Basic behavioral modeling – Advanced behavioral modeling – Architectural modeling. (23)

TEXT BOOKS

1. Philippe Krucheten, "The Rational Unified Process – An Introduction ", Pearson Education, Boston, 2004.
2. Grady Booch, James Rumbaugh and Ivar Jacobson, "The Unified Modelling Language User Guide", Pearson Education, New Delhi, 2009.

REFERENCES

1. Martin Fowler, "UML Distilled ", Pearson Education, New Delhi, 2009.
2. John Hunt, "The Unified Process for Practitioners", Springer, New York, 2001.

UML LAB

1. Activity diagram for order processing
2. State diagram for ATM use.
3. State diagram for CPU execution
4. Collaboration diagram for database browser
5. Deployment diagram for TCP/IP layout
6. Class diagram for electronic shopping cart
7. Use case diagram for credit card processing
8. Package diagram for web server connection
9. Sequence diagram for database broachers
10. Interaction diagram for grocery shopping

Total L:45+P:30=75

12XW56 WINDOWS PROGRAMMING LAB

1 **0 3 3**

INTRODUCTION: Windows Architecture - Event driven programming - WinMain() function; Messages and events **-** Message Map - Window Messages - Keyboard Messages - Mouse Messages - WM_COMMAND - SendMessage(). (3)

RESOURCES: Icons - Menus - Cursors - Toolbars. (2)

DIALOG BOXES: Introduction - Dialog Bars - Property Sheets – Wizards; Controls**:** Push Buttons - Check Boxes - Radio Buttons - Edit Controls - List Boxes - Combo Boxes - Tree Controls - Spin Buttons - Progress Bars. (3)

GRAPHICAL DEVICE INTERFACE: Fundamentals - GDI Objects - Bitmaps - Drawing functions - Text functions. (2)

FILE PROCESSING: Archiving - C++ Serialization - CDocument - Common Dialogs; Document/view architecture**:** Document Classes - View Classes - Multiple Views. (2)

INTRODUCTION TO .NET PROGRAMMING: Common Language Runtime - .NET Framework Class Library - Microsoft Intermediate Languages - Jitters - Unmanaged code - Win Forms - Text Box - Buttons - Message Box - List Box - Handling Events. (3)

TEXT BOOKS

1. Jeff Prosise, "Programming Windows with MFC", Microsoft Press, California, 2003.
2. Herbert Schildt, "MFC Programming from the Ground up", Tata McGraw Hill, New Delhi, 2008.

REFERENCES

1. Jeffrey Ritcher, "CLR via C#", Microsoft Press, California, 2010.
2. Anthony Northrup, "MCAD/MCSD Self-Paced Training Kit: Developing Web Applications with Microsoft Visual Basic .NET and Microsoft Visual C# .NET", Microsoft Press, California, 2004.
3. John E Swanke, "VC++ MFC Extensions by Example", Group West, California, 1999.

LAB

1. Create a Simple Window - a simple MFC program with only CFrameWnd and CWinApp classes.
2. Handling Message Maps.

3. Create event handlers and monitor events.
4. Add controls and handlers to a form at run time.
5. Create and configure form menus and context menus in an application.
6. Simple Paintbrush Application.
7. File Handling - un-buffered, binary, text files.
8. Dialog Box Handling.
9. SDI and MDI applications
10. Applications using .Net

Total L:15+P:45=60

12XW57 TCP/IP APPLICATIONS LAB

0 0 3 2

1. Introduction to a network simulator like NS-2.
2. Using a simulator configure a router.
3. Static and default routing.
4. Configure and test RIP and OSPF.
5. Create a TCP socket between a server and a client and authenticate the user.
6. Implement a Package using the concepts of socket programming.

Total P:45

12XW58 UNIX SHELL AND SYSTEM PROGRAMMING LAB

0 0 3 2

1. Simple Bash shell Programs with basic Unix Commands – Essential Commands, General Purpose Utilities, Filters, Process and Communication.
2. Bash Shell Programs using advanced programming concepts.
3. Low level File, Process and IPC System Calls using C.
4. Implement a package using Shell Programming / System Calls

Note: Separate Problem Sheets will be provided for Shell and System Calls.

Total P:45

SEMESTER 6

12XW61 PRINCIPLES OF COMPILER DESIGN

4 0 0 4

ASSEMBLERS: General Design procedures – Design of an Assembler – data structures – format of databases – algorithm – flow chart – PASS structures – modular functions. (8)

MACRO LANGUAGE AND MACRO PROCESSORS: Macro instructions, features of a macro facility – implementation. (8)

LOADERS: Loader schemes – compile and go loaders, general load scheme – absolute loaders – direct linking loaders and their design. Other loading schemes: linking loaders, overlays, dynamic binders. (8)

COMPILERS: Introduction – Structure of a compiler – phases of a compiler - compiler writing tools. (3)

LEXICAL ANALYSIS: Role of a lexical analyzer – finite automata –regular expressions to finite automata – minimizing the number of states of a deterministic finite automata – implementation of a lexical analyzer. (8)

PARSING TECHNIQUES: Context free grammars – derivations and parse trees – ambiguity – capabilities of context free grammars. Top down and bottom up parsing – handles – shift reduce parsing – operator precedence parsing – recursive descent parsing – predictive parsing. (10)

Automatic Parsing Techniques – LR parsers – canonical collection of LR (0) items – construction of SLR parsing tables. (4)

INTERMEDIATE CODE GENERATION: Postfix notation, Quadruples, triples, indirect triples – Representing information in a symbol table – introduction to code optimization – basic blocks – DAG representation – error detection and recovery - code generation. (11)

Total L:60

TEXT BOOKS

1. John J Donovan, "Systems Programming", Tata McGraw Hil, New Delhi, 2009.
2. Dhamdhere D M, "Systems Programming", Tata McGraw Hill, New Delhi, 2012.

REFERENCES

1. Aho A V, Sethi R and Ullman J D, "Compilers: Principles, Techniques and Tools (Digitized)", Pearson/Addison Wesley, California, 2011.
2. Dhamdhere D M, "Compiler Construction Principles and Practice", Macmillan, New Delhi, 2008.
3. Allen I Holub "Compiler Design in C (Digitized)", Prentice Hall, New Delhi, 2010.

12XW62 MACHINE LEARNING

3 0 0 3

INTRODUCTION: Machine learning - supervised and unsupervised learning – Classification – Regression – Generative models – Discriminative models - Model selection and generalization. (3)

INSTANCE BASED LEARNING : k-Nearest neighbor – Classification and regression using k.NN (2)

PROBABILISTIC LEARNING : Bayesian decision theory- Classification- losses and risks – Discriminant functions – Logistic regression (5)

PARAMETRIC METHODS: Maximum likelihood estimation - Evaluating an estimator – Bayes estimator- Multivariate methods – Estimation of missing values - Multivariate classification and regression. (4)

DIMENSIONALITY REDUCTION: Subset selection - Principal component analysis - Factor analysis - Linear discriminant analysis (6)

CLUSTERING: Expectation maximization (EM) - K means clustering - Hierarchical clustering – Choosing the number of clusters. (6)

DECISION TREES: Univariate trees – Rule extraction from trees – Pruning trees - Multivariate trees. (5)

SUPPORT VECTOR MACHINES : Classification - Regression (7)

GRAPHICAL MODELS: Bayesian networks – Hidden Markov models : Discrete Markov process – Finding the state sequence – Model selection. (7)

Total L:45

TEXT BOOKS

1. Christopher M Bishop, "Pattern Recognition and Machine Learning ", Springer, New York, 2007.
2. Richard O Duda, Peter E Hart and David G Stork, "Pattern Classification(Digitized)", John Wiley & Sons, New York, 2007.

REFERENCES

1. David Barber, " Machine Learning: A Probabilistic Approach", http://www.idiap.ch/~barber, 2006.

2. Alpaydin Ethem, " Introduction to Machine Learning ", Massachusetts Institute of Technology Press, Cambridge, 2004.
3. Tom Mitchell, "Machine Learning", Tata McGraw Hill, New Delhi, 1997.
4. Trevor Hastie, Robert Tibshirani and Jerome Friedman, "The Elements of Statistics Learning", Springer, New York, 2011

12XW63 DISTRIBUTED ENTERPRISE COMPUTING

3 0 0 3

MULTI-TIER ENTERPRISE COMPUTING: Middleware services **–** development and deployment **-** Enterprise Java Beans – types – lifecycle – entities – POJO – POJI – Java persistent query language - accessing ejbs using JSP – XML processing APIs (10)

DISTRIBUTED ENTERPRISE COMMUNICATION: RMI – CORBA – DCOM – Java Messaging Service – Message oriented middleware services – publish/subscribe messaging – AJAX – JSON (10)

JAVA WEB SERVICES: Web service standards – Describing and publishing – JAX-WS – SOAP (8)

DISTRIBUTED ENTERPRISE SYSTEMS: Services using EJB: Naming Services, Directory and Trading services, Activation Services, Transaction Services, Security Services (7)

FRAMEWORKS: Struts - Java Server Faces – Spring – Hibernate – Ruby on Rails (10)

Total L:45

TEXT BOOKS

1. Rima Patel Sriganesh, Gerald Brose and Micah Silverman, Mastering Enterprise JavaBeans 3.0", Wiley, New Delhi, 2006.
2. Rod Johnson, Juergen Hoeller, Alef Arendsen, Thomas Risberg and Colin Sampaleanu, "Professional Java Development with the Spring Framework", Wiely, New Delhi, 2008.

REFERENCES

1. Sam Ruby, Dave Thomas, David Heinemeier Hansson, "Agile Web Development with Rails (Pragmatic Programmers)", Pragmatic Bookshelf, Lewisville, 2011.
2. Dave Minter and Jeff Linwood, ""Beginning Hibernate: From Novice to Professional", Apress, New York, 2010.
3. Ted Husted, Cedric Dumoulin, George Franciscus, David Winterfeldt, and Craig R McClanahan, "Struts in Action: Building Web Applications with the Leading Java Framework", Manning Publications, Greenwich, 2006.
4. Craig Walls and Ryan Breidenbach, "Spring in Action", Dreamteach, New Delhi, 2008.
5. Mike Keith and Merrick Schincariol, "Pro EJB 3: Java Persistence API (Experts Voice in Java)", APress, California, 2006.

12XW64 SOFTWARE TESTING

3 0 2 4

INTRODUCTION: Quality and the quality system - Standards and procedures - Technical activities - Components - Continuous Improvement - Software Tasks - Management responsibility - Quality System. (6)

DEVELOPING A TEST APPROACH: Addressing Software system business risk - Defining a software system testing strategy - Developing software system testing tactics - Testing tools. (4)

TESTING A SOFTWARE USING A LIFE CYCLE METHODOLOGY: Requirements phase testing - Design phase testing - Program phase testing - Desk debugging and program peer view test tools - Evaluating test results - Installation phase testing - Acceptance testing. (10)

TESTING METHODOLOGY FOR SOFTWARE MAINTENANCE: Testing the correctness of the installing a software change - Testing the validity of a software cost estimate - Testing the progress of the software system - Inspecting test plan and test cases - Software Inspection - Costs and Benefits - Overview - The Inspection Process. (8)

ASSESSING CLIENT-SERVER AND LAN RISKS: A testing strategy for a rapid prototyping - Testing techniques - Testing tools. (3)

TESTING METHODLOGIES : Testing Rapid Application Development – Testing Adequacy of System Documentation – Testing Web based systems-Testing off the shelf Software – Testing in Multi platform environment – Testing Security – Testing Data warehouse (10)

TEST DOCUMENTATION: Reporting test results - Final test reporting - Evaluating test effectiveness - Use of testing metrics - Improving the test process. (4)

TEXT BOOKS

1. William Perry, "Effective Methods for Software Testing", Wiley, New Delhi, 2009.
2. Mark C Paulk, Charles V Weber and Mary B Chrissis, "The Capability Maturity Model", Carnegie Mellon University, Pennsylvania, 2004.

REFERENCES

1. John Watkins, “Testing IT : An off the shelf Software Testing Process”, Cambridge Press, Cambridge, 2010.
2. John Watkins, “Agile Testing : How to succeed in an extreme Testing environment”, Cambridge Press, Cambridge, 2009
3. Mordechai Menachem, "Software Configuration Management Guide Book", Tata McGraw Hill, New Delhi, 2000.
4. Pankas Jalote, “CMM in Practice”, Addison Wesley, Indiana, 2004.

LAB

1. Exercise for code review process.
2. Implement Testing Techniques : White box testing, Basis Path, Looping, Black box methods.
3. Test the package for functional regression testing.
4. Prepare test plan, test cases for developed package.
5. Design test cases using Rational test manager.
6. Use Rational robot for functional testing for developed package.
7. Use Configuration management tool for recording test artifacts.
8. Test the package for load test using load runner.
9. Test the package for coverage analysis using pure coverage.
10. Test the package for reliability testing using Rational test factory.
11. Test the package for memory management using Rational purify.

Total L:45+P:30=75

12XW66 PRINCIPLES OF COMPILER DESIGN LAB

0 0 3 2

1. Study of Programming Systems Assembler, Macro Processor, Editor, Debugger.
2. Study of basic features of DOS and UNIX internals.
3. Design and Implementation of a Text Editor.
4. Design and Implementation of a simple Assembler.
5. Design and Implementation of a Macro Processor.
6. Implementation of Transition diagram to strip off comment statements from a given source file.
7. Development of a Lexical Analyzer.
8. Design and Implementation of a Symbol Table Manager.
9. Implementation of the following Parsing algorithms.
   a. Recursive descent Parser b. Shift reduce Parser.
10. Implementation of a Syntax Directed Translation Engine to
    a. Simulate a Desk Calculator b. Generation of Postfix code.

Total P:45

12XW67 MACHINE LEARNING LAB

0 0 3 2

LAB

1. Download the datasets from UCI machine learning repository / www.kaggle.com for classification and clustering
2. Implement the following Classification algorithms for the above datasets
    a. Naïve Bayes Algorithm
    b. Decision tree
    c. SVM
    d. K nearest neighbor
3. Do ten fold cross validation experiments and statistical validation using t-test and ANOVA
4. Implement different clustering techniques

Total P:45

12XW68 DISTRIBUTED ENTERPRISE COMPUTING LAB

0 0 3 2

Programs to demonstrate

1. Session beans.
2. Entity and Message Driven Beans.
3. RMI communication between two applications.
4. Web Service with its client.
5. Conversion of entity bean to web service.
6. Java Transaction API.
7. Application using any one of the frameworks.

Total P:45

SEMESTER 7

12XW01 PROJECT WORK I

0 0 0 12

SEMESTER 8

12XW81 DIGITAL MANUFACTURING

3 0 0 3

INTRODUCTION: Motivation for a digital representation of systems in engineering, Product life cycle and the role of digital manufacturing in reducing product cost, technologies for creating products in a digital environment. (3)

SOLID MODELING AND COMPUTER AIDED DESIGN: Solid modeling, Solid Representation - Boundary Representation (B-rep) - Constructive Solid Geometry (CSG) - Sweep Representation - Analytic Solid Modeling (ASM), assembly of solid models - Hierarchical Relationships - top down and bottom up approaches - standards for data exchange, IGES, STEP, VRML. (8)

FINITE ELEMENT ANALYSIS AND COMPUTER AIDED ENGINEERING: introduction to applications of finite element method in engineering, concept of element and discretisation of domain into finite elements, shape functions, meshing, assembly of elements and solutions, understanding preprocessors, solvers and post processors in a commercially available FEA software. (13)

COMPUTER NUMERICAL CONTROL: Basic definitions on CNC and units of a CNC machine, processing of CAD data for a CNC driven machine using interfaces and other hardware, creation of output files from a solid model for a CNC machine for further processing. (9)

PRODUCT VISUALISATION AND PLM: Concepts of Virtual reality and interfaces for creating interactive systems for product design and other industrial applications, Digital mockup and visualisation - Introduction to Product lifecycle management, Technologies used in the development of PLM solutions, ERP systems and cases for enterprise application integration. (12)

Total L:45

TEXT BOOKS

1. Michael E Mortensen, "Geometric Modeling", Industrial Press, New York, 2006.
2. David Salomon, "Computer Graphics and Geometric Modeling", Springer, New York, 1999.

REFERENCES

1. Ibrahim Zeid, "Mastering CAD CAM", Tata McGraw Hill, New Delhi, 2008.
2. Vera B Anand, "Computer Graphics and Geometric Modeling for Engineers", John Wiley & Sons, New York, 1999.
3. John Stark, "Global Product - Strategy, Product Life Cycle Management and the Billion Customer Question", Springer, New York, 2007.
4. William R Sherman and Alan B Craig, "Understanding Virtual Reality: Interface Application and Design", Morgan Kaufmann, California, 2003.

12XW82 SOFT COMPUTING

4 0 0 4

ARTIFICIAL INTELLIGENCE AND SOFT COMPUTING: Subject of AI – Problem solving by intelligent search – Breadth First Search, Depth First Search, Iterative Deepening, Hill Climbing, Iterative Deepening, A*, Best First Search. (9)

GENETIC ALGORITHM: Basic Concepts – Encoding – Binary, Permutation, Tree, Value – Fitness Function – Reproduction – Roulette Wheel, Boltzmann, Tournament, Rank, Elitism – Operators - Crossover – Single point, Two point, Multi point, Uniform, Matrix, Partially Matched, Order and Cycle – Mutation – Flip, Swap, Inverse – Application. (11)

FUZZY SET THEORY: Basic Definitions and Terminologies – Set theory operations – Membership function formulation and parameterization – Fuzzy rules and reasoning – Extension principle and fuzzy relations, Fuzzy if then rules, Fuzzy reasoning – Fuzzy Inference Systems – Mamdani fuzzy model, Sugeno Fuzzy models, Tsukamoto fuzzy models. (17)

NEURAL NETWORKS – Fundamentals – Neural Network Architecture – Learning methods - Simple neural nets – McCulloch Pitts – Linear separability – Hebb Net – Perceptron – Standard Back Propagation Network – Radial Basis Function Network - Pattern Association – Hebb rule – Hetero associative memory – Auto associative memory – Iterative Associative net – Discrete Hopfield Net – Bidirectional Associative Memory – Competitive net – Kohonen Self Organizing Map – Adaptive Resonance Theory. (23)

Total L:60

TEXT BOOKS

1. Amit Konar, "Artificial Intelligence and Soft Computing", CRC Press, New York, 2008.
2. Nils J Nilsson, "Artificial Intelligence: A New Synthesis", Morgan Kaufmann, California, 1998.

REFERENCES

1. Rajasekaran S, Vijayalaskhmi Pai G A, "Neural Networks, Fuzzy Logic and Genetic Algorithms", Prentice Hall, New Delhi, 2006.
2. David E Goldberg, "Genetic Algorithms in search, optimization and machine learning", Pearson Education, New Delhi, 2007.
3. Jang J S R, Sun C T and Mizutani E, "Neuro-fuzzy and Soft Computing", Prentice Hall, New Delhi, 1997.

4. Laurene Fausett, “Fundamentals of Neural Networks”, Pearson Education, New Delhi, 2011.

12XW83 SOFTWARE PROJECT MANAGEMENT AND QUALITY ASSURANCE

3 0 0 3

INTRODUCTION: Software Projects various other types of projects - Problems with software projects - an overview of project planning - Project evaluation - Project Analysis and technical planning - Project estimates - Preparation of Estimates - COCOMO model - Function Point Analysis - Putnam Model - Non-development overheads. (8)

ACTIVITY PLANNING: Project schedules - Sequencing and scheduling projects - Network planning models - Shortening project duration - Identifying critical activities. (8)

RISK MANAGEMENT: Resource allocation - Monitoring and Control - Managing people and organizing teams - Planning for small projects - Handling large projects - Divide and Conquer - Software Project survival. (8)

SOFTWARE CONFIGURATION MANAGEMENT: Basic functions, responsibilities, standards, configuration Management, Prototyping - Models of prototyping. (8)

SOFTWARE QUALITY ASSURANCE: Quality and the quality system - standards and procedures - Technical activities - components - Continuous Improvement - Software Tasks - Management responsibility - Quality System - Contract Review - Document Control - Product identification and trace ability. (9)

Case study using Project management tools. (4)

Total L:45

TEXT BOOKS

1. Mike Cotterell and Bob Hughes, "Software Project Management - Inclination", Tata McGraw Hill, New Delhi, 2008.
2. Robert K Wysocki, Robert Beck Jr and David B Crane, "Effective Project Management", John Wiley & Sons New York, 2011.

REFERENCES

1. Steve McConnell, "Software Project Survival Guide", Microsoft Press, California, 2009.
2. Gerald M Weinberg, "Quality Software Management:Systems Thinking“, Dorset House, New York, 2011.
3. Gerald M. Weinberg," Quality Software Management:First Order Measurement”, Dorset House, New York, 2007.
4. Pressman R S, "Software Engineering - A Practitioner's Approach", Tata McGraw Hill, New Delhi, 2010.
5. Darrel Ince, "An Introduction to S/W Quality Assurance and its Implementation", Tata McGraw Hill, New Delhi, 2006.

12XW84 APPLIED GRAPH THEORY

4 0 0 4

BASIC CONCEPTS: Graphs - directed and undirected, subgraphs, graph models, degree of a vertex, degree sequence, Havel-Hakimi theorem, Hand-shaking lemma. Connectivity, walk, path, distance, diameter. Isomorphic graphs. Common classes of graphs – regular, complete, petersen, cycle, path, tree, k-partite, planar, hypercube, Spanning trees – Matrix tree theorem, graph decomposition. (8)

CONNECTIVITY: Vertex and edge connectivity, Vertex and edge cuts, relationship between vertex and edge connectivity, bounds for connectivity. Harary’s construction of k-connected graphs. (10)

EULERIAN AND HAMILTONIAN GRAPHS: Eulerian graphs, Route inspection problem, Hamiltonian graphs, Gray codes and Hypercubes, Travelling sales person problem. (10)

MATCHING, VERTEX-COLORING AND DOMINATION: Matching (unweighted), Perfect matching, Hall's theorem, assignment problem, augmenting path algorithm. Vertex-coloring – bounds, assignment of frequencies, fast register allocation, scheduling problem. Dominating set, domination number, bounds, connected dominating set in Ad Hoc Networks.

(14)

PLANAR GRAPHS: Properties, triangulation of polygons using vertex coloring, construction of Voronoi diagrams, Delaunay triangulations. (10)

RANDOM GRAPHS: Random graph – Definitions of G(n, p) and G(n, M) models, power law degree distribution, Web graph models, applications to social networks. (8)

Total L:60

TEXT BOOKS

1. Anthony Bonato, "A Course on Web Graphs", American Mathematical Society, Providence, 2008.
2. Haynes T W, Hedetniemi and Slater P J, "Fundamentals of Domination in Graphs", Marcel Dekker, New York, 1998.
3. Jonathan Gross and Jay Yellen, "Graph Theory and its Applications", CRC Press, New York, 2005.

REFERENCES

1. Douglas B West, "Graph Theory", Prentice Hall, New Delhi, 2009.
2. Bela Bollobas, "Random Graphs", Cambridge University Press, Cambridge, 2004.

12XW86 DIGITAL MANUFACTURING LAB

0 0 3 2

LAB

1. Reverse engineering and CAD modeling
    a. Generate data clouds for components with complex profiles like PC mouse etc.
    b. The data clouds generated are to be transferred to CAD software and the original component to be created with aesthetics.
    c. Create a CAD model of this with dimensions
2. Creation of assembled product
    a. Model the various components involved in a complex product using a CAD software
    b. Identify the relationship that exists between them and assemble the components in a systematic manner by imposing suitable constraints.
3. Use of CAE software for functional studies (thermal, structural, dynamic)
    a. Model the given component in CAD software and transfer the same to CAE software thro' standard data exchange formats.
    b. Alternatively, model the given component in the CAE software directly.
    c. Based on the service conditions in which the component is going to perform its function, suitable functional studies like thermal analysis static and/or dynamic analysis (or) coupled field analysis is to be carried out in the CAE software to predict its behavior under actual operating/service conditions.
4. Preparation of a customized bill of materials from this assembly
5. Use of CAM software for generation of NC codes
    a. Model a complex surface from the given data cloud as (1).
    b. Plan a suitable raw material size and tool sizes needed to manufacture the punch/dies for the surface generated.
    c. Generate NC codes for the punch and die separately for the three stages of machining v.s. (i) rough (ii) semi finish (iii) finish
6. Preparation of an e-catalogue:
    a. Use (4) and provide a solution to help the user identify the part with part number and vice versa.
7. Creation of a work flow for design review:
    a. Distribute the design process where in the author submits a design and a team reviews it and promotes the same.

8. Virtual reality - 1 :
   a. Introduction.
9. Virtual reality - 2:
   a. Create a virtual environment from several areas of engineering (1) products (2) civil structures (3) animations for advertising.
10. Use (1) to (9) to come up with an innovative design of experiment.

Total P:45

12XW87 SOFT COMPUTING LAB

0 0 3 2

Develop the following packages:

1. Define an application and implement using Fuzzy Logic.
2. Define an application and implement using Genetic Algorithm.
3. Define an application and implement using any type of Neural Network.
4. On any one of the application, suggest an improvement using any other technique.

Note: The applications should be based on Research Publications.

Total P:45

12XW88 OPEN SOURCE SOFTWARE LAB

1 0 3 3

INTRODUCTION: Introduction to Open sources - Need of Open Sources - Advantages of Open Sources - Applications of Open Sources. (1)

OPEN SOURCE OPERATING SYSTEMS: LINUX: Introduction - general overview - kernel mode and user mode – process scheduling - development with Linux. (2)

OPEN SOURCE DATABASE: MySQL: Introduction - setting up user accounts – starting - terminating and writing your own SQL programs. (3)

OPEN SOURCE PROGRAMMING LANGUAGES: PHP: Introduction – variables – constants - data types – operators – statements – functions – arrays - classes and objects, PYTHON: Syntax and style - Python objects – numbers – sequences – strings - lists and tuples - dictionaries - conditionals and loops, RUBY: The Ruby Language - OOP with Ruby - Text Processing and Scripting. (7)

OPEN SOURCE TOOLS AND TECHNOLOGIES: WEB SERVER: Apache web server - working with web server - MDA**:** Introduction to MDA - Meta object facility – UML - MDA Applications. (2)

TEXT BOOKS

1. Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, John Wiley & Sons, New York, 2008.
2. Steve Suchring, “MySQL Bible”, Wiley, New Delhi, 2002.

REFERENCES

1. Rasmus Lerdorf, Levin Tatroe, “Programming PHP”, O’Reilly, California, 2006.
2. Wesley J Chun, “Core Python ApplicationsProgramming”, Prentice Hall, New Delhi, 2012.
3. Peter Wainwright, “Professional Apache”, Wrox, New Delhi, 2002.

4. Dave Thomas, Chad Fowler B001K8RU90, and Andy Hunt, “Programming Ruby: The Pragmatic Programmer Guide”, Pragmatic Bookshelf, Lewisville, 2009.

LAB

1. Package using Linux, MySQL, and PHP.
2. Application development using Python.
3. Simple exercises in Ruby language.
4. Design Case Studies in UML.

Total L:15+P:45=60

SEMESTER 9

12XW91 PRINCIPLES OF MANAGEMENT AND BEHAVIOURAL SCIENCES

3 0 0 3

PRINCIPLES OF MANAGEMENT: Meaning, Definition and Significance of Management, Basic Functions of Management – Planning, Organizing, Staffing, Directing and Controlling. Organizational Environment – Social, Economic, Technological and Political. Corporate Social Responsibility - Case discussion (8)

INDUSTRIAL AND BUSINESS ORGANIZATION: Growth of Industries (Small Scale, Medium Scale and Large Scale Industries). Forms of Business Organizations. Resource Management – Internal and External Sources. (7)

ORGANIZATIONAL BEHAVIOUR: Significance of OB, Impact of culture on organization. Role of leadership and leadership styles. Personality and Motivational Theories. Attitudes, Values and Perceptions at work - Case discussion (7)

GROUP BEHAVIOUR: Group dynamics, Group formation and development, group structure and group cohesiveness. Informal organization – Sociometry – Interaction analysis - Exercises (8)

GLOBALISATION: Issues for global competitiveness, proactive and reactive forces of globalization. Cross cultural management – Management of work force diversity. (5)

HUMAN RESOURCE MANAGEMENT: Objectives and Functions, Selection and Placement, Training and Development – Conflict management – Stress management - Human resource management in global environment - Human resource information system(HRIS) - Case discussion. (10)

Total L:45

TEXT BOOKS

1. Harold Koontz, Heinz Weihrich and Ramachandra Aryasri, “Principles of Management”, Tata McGraw Hill, New Delhi, 2004.
2. Mamoria C B, “Personnel Management”, Sultan Chand & Sons, New Delhi, 2005.

REFERENCES

1. John W Newstrom and Keith Davis, “Organizational Behavior”, Tata McGraw Hill, New Delhi, 2002.
2. Stephen P Robbins, ”Organisational behavior”, Prentice Hall, New Delhi, 2010.
3. Khanna O P, “Industrial Engineering & Management”, Dhanpat Rai Publications, New Delhi, 2010.

12XW92 WEB SERVICES

3 0 0 3

INTRODUCTION: Review of Distributed Computing - COM & RPC Models - Web Services Vs RPC - Strengths and Weakness - Evolution of Web Services – Architecture – Service Oriented Architecture. (5)

XML: Introduction to XML - Comparison with HTML - XML documents - Well-formed XML document - Markup and character data - Prolog and XML declaration - Processing Instructions - XML elements - Types of elements - CDATA sections - XML Namespace. (3)

VALID XML DOCUMENT: Document Type Declarations and Document Type Definitions (DTDs) - Internal and External DTDs - Validating XML documents using DTD - Entities and Attributes - General and Parameter Entities. (3)

XML SCHEMAS: Validating XML documents using XML Schema - Comparison with DTD - Creation of Simple Types - Specifying attribute constraints and defaults - Creation of Complex type - Specifying different types of content using Complex type - Specifying data types and restrictions in Schema. (3)

JSON: Introduction to JSON - JSON Data Structure - JSON Object, Text - Comparison with XML - Validating JSON using JSON Schema - JSON Lint - Creating / Parsing JSON Messages with JavaScript. (4)

SOAP: SOAP Message Exchange Model - Relation to XML - SOAP Envelope - Header - Body - Fault - SOAP Encoding - Using SOAP in HTTP - Using SOAP for RPC - Security considerations. (6)

WSDL & UDDI: WSDL Document structure - Types , Messages , Port Types , Bindings , Ports , Services - SOAP Binding - HTTP GET and POST Binding. (6)

UDDI: Introduction - UDDI Data structure - Business Entity - Business Service - Binding Template - tModel - Technical Overview -UDDI API - Inquiry API , Publication API - Security. (5)

RESTful Services: Introduction - Resource Oriented Architecture - Resources - URIs - Statelessness - Representations - Queries - Web Linking. (5)

Designing Read-only Services - Designing Read-Write Services - Resource Oriented Services vs SOAP based Services. (5)

Total L:45

TEXT BOOKS

1. Eric Newcomer, “Understanding Web Services : XML , WSDL , SOAP and UDDI”, Pearson Education, Boston, 2004.
2. Frank P Coyle, “XML, Web Services, and the Data Revolution”, Pearson Education, Boston, 2002.

REFERENCES

1. Leonard Richardson and Sam Ruby, “RESTful Web Services”, O'Reilly, California, 2007.
2. William R Stanek, “XML Pocket Consultant” , Microsoft Press, California, 2011.
3. Eric Newcomer and Greg Lomow, “Understanding SOA with web services”, Pearson Education, New Delhi,2009.

12XW93 INTELLIGENT INFORMATION RETRIEVAL

3 0 0 3

INTRODUCTION: Overview of IR Systems - Historical Perspectives - Goals of IR - The impact of the web on IR - The role of artificial intelligence (AI) in IR (2)

RETRIEVAL MODELS : Similarity measures and ranking – Boolean matching – Vector Space models - ranked retrieval – text similarity measure – TF- IDF (term frequency – Inverse document frequency) weighting- Cosine similarity - Basic tokenizing - stop-word Removal and Stemming-indexing; Inverted indices-Efficient processing with sparse vectors - Probability models –Relevance feed back (9)

QUERY PROCESSING: Basic query processing- query operations --query expansion; query languages- data structure and file organization of IR - Automatic indexing and indexing models. (4)

EVALUATION: Experimental Evaluation of IR: Recall, Precision and F- measure- R-Precision-MAP-NDCG; Evaluation of benchmark text collections (2)

TEXT REPRESENTATION: Statistical characteristics of text -Word Statistics; Zipf's law; Porter Stemmer; morphology; index term selection; using thesauri. Meta data and markup languages (SGML, HTML, XML) (2)

Information filtering Techniques: information filtering - Collaborative filtering and content-based filtering- Applications of information filtering- Recommender systems. (6)

Text Categorization and Clustering: Categorization algorithms – Rocchio: Naïve Bayes; decision trees – nearest neighbor – LSI -Clustering algorithms: Agglomerative clustering – k-means – expectation maximization (EM)- Dimension reduction-LSI. (8)

Web Search : IR systems on WWW – Search engines; spidering; meta crawlers; directed spidering – link analysis (hubs and authorities, Google page rank) - Shopping agents - Heterogeneous information resources - intelligent information resources- intelligent web agents- Web mining and applications (9)

I**nformation Extraction and Integration**: Extracting data from text; XML ; Semantic web – collecting and integrating specialized information on the web; (3)

Total L:45

TEXT BOOKS

1. Christopher D Manning, Prabhakar Raghavan and Hinrich Schütze, "Introduction to Information Retrieval", Cambridge University Press, Cambridge, 2008.
2. Ricardo Baeza-Yates and Berthier Ribeiro-Neto, "Modern Information Retrieval", Pearson Education, New Delhi, 2004.

REFERENCES

1. Grossman D A, Frieder O, "Information Retrieval: Algorithms and Heuristics", Springer, New York, 2004.
2. Van Rijsbergen C J, " Information Retrieval", Butterworths, London, 1979.
3. Croft B, Metzler D and Strohman T, Information Retrieval in Practice, Pearson Education, New Delhi, 2009.
4. Gerald J Kowalski, and Mark T MayBury, "Information Storage and Retrieval systems:Theory and Implementation", Springer, New York, 2009.
5. Francesco Ricci, Lior Rokach, Bracha Shapira and Paul B Kantor, "Recommender Systems – Handbook", Springer, New York, 2010.

12XW96 INTELLIGENT INFORMATION RETRIEVAL LAB

0 0 3 2

PROGRAMS

1. Different retrieval models namely Boolean, Vector space and Probability based retrieval.
2. Query refinement techniques
3. Evaluation of the retrieval algorithms.
4. Dimension Reduction techniques
5. Classification and Clustering techniques
6. Recommender systems- Collaborative and Content Based Filtering
7. Information Extraction techniques
8. IR on structured data bases.
9. Web based retrieval - Link based retrieval, combining content and link information
10. Web mining - Usage mining, Structure mining, Content mining

Total P:45

12XW97 WEB SERVICES LAB

0 0 3 2

1. Validation of XML document using DTD and Schema.
2. Simple case studies to understand JSON
3. Developing a case-study to test web services technology.
4. Developing and deploying web services using .NET, J2EE.
5. Simple exercise to create RESTful services.

Total P:45

12XW98 SOFTWARE PATTERNS LAB

2 0 3 4

INTRODUCTION TO PATTERNS: Reusable object oriented software – Motivation - Best design practices of object oriented software - Benefits of patterns – Definition – Types - Pattern description - How design patterns solve design problems - Pattern Language - IDIOMS. (2)

DESIGN PATTERNS: Creational pattern: Abstract factory – Builder - Factory method – Prototype – Singleton, Structural patterns: Adapter – Bridge – Composite – Decorator – Façade – Flyweight - Proxy, Behavioral patterns: Command – Interpreter - Iterator, Mediator - Memento – Observer - State – Strategy - Template method – Visitor - Chain of Responsibility, Case Studies. (15)

ARCHITECTURAL PATTERNS: From Mud to Structure: Layers - Pipes and Filters - Blackboard, Interactive Systems: Model View Controller (MVC), Case studies. (3)

CODE REFACTORING: What is refactoring - Principles in refactoring - Bad smells in code - Composing methods - Moving features between objects - Organizing data - Simplifying conditional expressions - Making method calls simpler - Dealing with generalization. (10)

TEXT BOOKS

1. Erich Gamma, Richard Helm, Ralph Johnsons and John Vlissides, “Design Patterns: Elements of Reusable Object Oriented Software”, Pearson Education, New Delhi, 2004.
2. Frank Buschman, Regine Meunier, Hans Rohnert, Peter Sommerlad and Michael Stal, “Pattern-Oriented Software Architecture: A System of Patterns”, Wiley, New Delhi, 2008.

REFERENCES

1. Craig Larman, “ Applying UML and Patterns”, Pearson Education, New Delhi, 2011.
2. Martin Fowler, Kent Beck, William Opdyke, Don Roberts, “Refactoring: Improving the Design of Existing Code”, Addison Wesley, Massachusetts, 2011.
3. Sherif Yacoub, Hany Ammar, “Pattern-Oriented Analysis and Design: Composing Patterns to Design Software Systems”, Addison Wesley, Boston, 2004.
4. Partha Kuchana, “Software Architecture Design Patterns in Java”, Auerbach Publications, New York, 2004.
5. William J Brown, Raphael C Malveau Hays W McCormick and Thomas J Mowbray, “AntiPatterns: Refactoring Software, Architectures, and Projects in Crisis”, Wiley, New York, 1998.

LAB

1. ATM Simulation – Singleton pattern
2. Image Viewer Application – Bridge pattern
3. Address Book Maintenance – Prototype pattern
4. US, Canada Tax and Freight charges – Factory Method pattern
5. The Fast Food Franchise – Builder pattern
6. Computer Models with different architectures – Abstract Factory pattern
7. An Evaluation Application – Decorator pattern

Total L:30+P:45=75

SEMESTER 10

12XW02 PROJECT WORK II

0 0 0 12

ELECTIVES

12XWA1 MODELLING AND SIMULATION

3 0 2 4

PRINCIPLE OF COMPUTER MODELLING AND SIMULATION: Monte Carlo simulation. Nature of computer modeling and simulation. Limitations of simulation, areas of application. (3)

SYSTEM AND ENVIRONMENT: Components of a system - discrete and continuous systems. Models of a system - A variety of modelling approaches. (4)

RANDOM NUMBER GENERATION: Techniques for generating random numbers - Midsquare method - The midproduct method - Constant multiplier technique - Additive congruential method - Linear congruential method - Tauswarthe method - Tests for random numbers - The Kolmogorov_Smirnov test - The Chi-square test. (5)

RANDOM VARIABLE GENERATION: Inverse transform technique - Exponential distribution - Uniform distribution - Weibull distribution. Empirical continuous distribution - generating approximate normal variates - Erlang distribution. Empirical Discrete distribution - Discrete Uniform distribution - Poisson distribution - Geometric distribution - Acceptance - Rejection technique for Poisson distribution - Gamma distribution. (7)

DESIGN AND EVALUATION OF SIMULATION EXPERIMENTS: Input - Output analysis - variance reduction techniques - Antithetic variables - verification and validation of simulation models. (5)

DISCRETE EVENT SIMULATION :Concepts in discrete-event simulation, manual simulation using event scheduling, single channel queue, two server queue, simulation of inventory problem. (7)

SIMULATION LANGUAGES - GPSS - SIMSCRIPT - SIMULA - SIMPLE_1, Programming for Discrete event systems in GPSS, SIMPLE_1 and C. (9)

CASE STUDIES: Simulation of LAN - Manufacturing system - Hospital system. (5)

TEXT BOOKS

1. Jerry Banks and John S. Carson, "Discrete Event System Simulation", Prentice Hall, New Delhi, 2010.
2. Narsingh Deo, "System simulation with digital Computer", Prentice Hall, New Delhi, 2006.

REFERENCES

1. Francis Neelamkovil, "Computer Simulation and Modelling", John Wiley & sons, New York, 1987.
2. Ruth M Davis and Robert M.O'Keefe, "Simulation Modelling with Pascal", Prentice Hall, New Delhi, 1989.
3. Averil M Law , "Simulation Modelling and Analysis", Tata McGraw Hill, New Delhi, 2008.

LAB

1. Implement variance reduction.
2. Implement event scheduling.
3. Simulate inventory problem.
4. Simulate a manufacturing system.

Total L:45+P:30=75

12XWA2 ADVANCED DATABASE MANAGEMENT SYSTEMS

3 0 2 4

QUERY PROCESSING: Database Catalog - Query Processing Methodology - Query Evaluation - Query Interpretation - Equivalence of Expressions – Selection, Projection and Natural Join Operations - Estimation of Query Processing Cost - Estimation of access costs using Indices - Simple Iteration - Block-Oriented Iteration - Merge-Join Use of an Index - Hash Join - algorithm for executing query operations - Query Optimization - Structure of the Query Optimizer - Query Optimization Issues - Query Decomposition. (7)

OBJECT RELATIONAL DATABASES: Introduction to ORDBMS- Complex data types- Structured types and Inheritance-Nesting -un nesting of Relations – Query Processing in ORDBMS. **CASE STUDY:** Oracle – Object Oriented Database Design - Distributed queries – Partitioning Strategies – Procedural Replication – Performance Tuning. (6)

OBJECT ORIENTED DATABASES: Object oriented data model - Object Identity - Persistent Programming Languages - Type and Class Hierarchies and Inheritance - Complex Objects - Object Oriented Database Design - Query Processing in object oriented database-Comparison of Object Oriented and Object Relational databases. (4)

PARALLEL AND DISTRIBUTED DATA BASES: Architecture of parallel databases – Parallel query evaluation, Paralyzing individual operations, Parallel query optimization - Homogeneous and Heterogeneous databases - Architecture of distributed data bases - Storing data in distributed data bases, Distributed Transactions - Concurrency control in Distributed databases - Distributed query processing. (7)

ADVANCED DATABASES: XML and Internet databases - P2P databases, unstructured and structured P2P database system, and query processing - Temporal Databases - Spatial Databases - Multimedia Databases – Mobile Databases. (9)

DATABASE INTEGRATION: Data integration: schema directed data integration - Data exchange: Schema mapping and information preservation - automatic schema matching - Information Preserving XML Schema Embedding. (12)

TEXT BOOKS

1. Abraham Silberschatz, Henry F.Korth and S.Sudarshan, “Database System Concepts”, Tata McGraw Hill, New Delhi, 2010.
2. Michael Stonebraker and Paul Brown, “Object Relational DBMSs”, Morgan Kaufmann, California, 1999.

REFERENCES

1. Thomas Connolly and Carolyn Begg, “Database Systems”, Pearsons Education, New Delhi, 2010.
2. Tamer O Zsu M and Patrick Valduriez, “Principles of Distributed Database Systems”, Pearson Education, New Delhi, 2011.
3. Raghu Ramakrishnan and Johannes Gehrke, “Database Management Systems”, Tata McGraw Hill, New Delhi, 2004
4. Elmasri R and Navathe S B, “Fundamentals of Database Systems”, Pearson Education, New Delhi, 2009.
5. Gavin Powell, “Beginning XML Databases”, Wiley, Indiana, 2007.

LAB

Programming exercises are given in the following topics:

1. Query optimization
2. Object relational databases
3. Object oriented databases
4. Parallel/Distributed databases
5. Spatial databases
6. Temporal databases

7. XML databases

Total L:45+P:30=75

12XWA3 SOFTWARE METRICS

3 0 2 4

FUNDAMENTALS OF MEASUREMENT: Measurement in Software Engineering-Scope of Software Metrics - Measurement and Models-Measurement scales and scale types-Classifying software measures - Software Measurement validation - Software Metrics Data collection - Analyzing software measurement data. (10)

MEASURING INTERNAL PRODUCT ATTRIBUTES: Size and Structure - Measuring external product attributes. (5)

SOFTWARE RELIABILITY: Measurement and prediction - Parametric Reliability Growth models - The recalibration of software reliability growth predictions. (10)

RESOURCE MEASUREMENT: Productivity, teams and tools- Making process predictions - Good estimates - Models of effort and cost - Dealing with Problems of current estimation methods. (10)

MEASUREMENT AND MANAGEMENT: Planning - Measurement program - Measurement tools-Measurers - analysts - audience - Measurement in practice. (10)

TEXT BOOKS

1. Norman E Fenton and Shari Lawrence Pfleeger, "Software Metrics", Thomson Brooks/Cole, California, 2009.

REFERENCES

1. Stephen H Khan, "Metrics and Models in Software Quality Engineering", Pearson Education, New Delhi, 2008.
2. Dick B Simmons and Newton C Ellis, "Software Measurement", Prentice Hall, New Delhi, 2007.

LAB

1. Complete the time recording log and Defect Recording log.
2. PSP Programming assignment.
3. Assess the Quality of the Student's PSP Data and record your observations in the specified format.
4. Estimate the size of the program using PSP Techniques and record it in the specified format.
5. Design Review Exercise.
6. Code Review exercise.
7. Exercise for measuring process and product quality.
8. Development of Project Plan.
9. Measurement of the quality of Team's process and Product.

Total L:45+P:30=75

12XWA4 PARALLEL AND DISTRIBUTED COMPUTING

3 0 2 4

INTRODUCTION : Forms of Computing – Monolithic – Distributed – Parallel-Cooperative - Computational demands of parallel processing, Flynn's classification – Terminology. (5)

PARALLEL COMPUTER ARCHITECTURES: Classification – Inter connection networks – Vector computers – Shared memory parallel computers – Cache coherence – Distributed shared memory parallel computers – Message passing parallel computers – Cluster of workstations. (5)

PARALLEL PROGRAMMING MODELS: Shared memory model, Message passing model - Synchronous and Asynchronous message passing models, Leader-Election algorithm, Breadth-First Search. Shortest Paths, Broadcast and Converge cast, Data Parallel model. (7)

PARALLEL ALGORITHMS : Models of parallel computation including PRAM - CRCW, CREW, ERCW, EREW models, Design and analysis of Parallel algorithms: : Automatic vs. Manual Parallelization – Understand the Problem

and the Program – Partitioning – Communications – Synchronization – Data Dependencies – Load Balancing – Granularity – I/O – Limits and Costs of Parallel Programming – Performance Analysis and Tuning – Parallel Examples – Array Processing Matrix multiplication, Sorting, Searching, Merging, Minimum spanning tree, Prime numbers. (10)

DISTRIBUTED COMPUTING: Introduction to Distributed Programming - System *Models*- Architectural models - Client-server model, Peer-to-peer model- Variations of the above models - Distributed computing paradigms – *Inter process communication* - The API for the Internet protocols - External data representation and marshalling - Group communication - Case study: inter process communication in UNIX - Distributed file systems. (8)

DISTRIBUTED PROGRAMMING ALGORITHMS: Fundamental issues and concepts - Synchronization, Mutual Exclusion, Termination Detection, Clocks, Event ordering, Locking - Distributed Computing Tools & Technologies (CORBA, JavaRMI, Web Services). (5)

EMERGING AREAS OF PARALLEL AND DISTRIBUTED SYSTEMS: Grid computing, Peer-to-peer systems, Overlay networks, Edge computing and Ad-hoc networks. (5)

TEXT BOOKS

1. Quinn Michael J, "Designing Efficient Algorithms for Parallel Computers", Tata McGraw Hill, New Delhi, 1988.
2. Wilkinson B and Allen M, “Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers”, Prentice Hall, New Delhi, 2005.

REFERENCES

1. Hariri and Parashar, “Tools and Environments for Parallel and Distributed Computing”, John Wiley & Sons, New Jersey, 2004.
2. Jean Dollimore, Tim Kindberg and George Coulouris, “Distributed Systems: Concepts and Design”, Addison Wesley, Boston, 2011.
3. Selim G Akl, ”Parallel Computation: Models and Methods”, Prentice Hall, New Delhi, 1997.
4. Leighton F T, ”Introduction to Parallel Algorithms and Architectures: Arrays, Trees and Hyper Cubes”, Morgan Kaufmann, California, 1992.
5. Andrew S Tannenbaum and Maarten Van Steen,”Distributed Systems, Principles and Paradigm” Prentice Hall, New Delhi, 2007.
6. Vijay K Garg, ”Elements of Distributed Computing”, John Wiley & Sons, New York, 2002.

LAB

1. Analyze Parallel algorithms to predict performance.
2. Implement Dekker’s algorithm.
3. Implement Dinning philosopher algorithm.
4. Implement Array processing.
5. Implement Matrix Computation, Searching and Sorting algorithms using parallel processing.
6. Implement parallel algorithms using MPI.
7. Analyze the implementation of the above algorithms in a distributed environment.

Total L:45+P:30=75

12XWA5 DATA COMPRESSION

3 0 2 4

DATA COMPRESSION LEXICON: Introduction to Data Compression - Dawn Age - Coding - Modeling - Ziv and Lampel- Lossy Compression (4)

MINIMUM REDUNDANCY CODING (THE DAWN AGE): The Shannon - Fano Algorithm, The Huffman Algorithm - Into the Huffman Code: Counting the Symbols, Building the tree - Compression Code. (4)

ADAPTIVE HUFFMAN CODING: Adaptive Coding - Updating the Huffman Tree - The Code. (4)

ARITHMETIC HUFFMAN CODING: Arithmetic Coding - The Code. (6)

STATISTICAL MODELING: Higher-order Modeling - Finite Context Modeling - Adaptive Modeling – Highest - Order Modeling. (4)

DICTIONARY-BASED COMPRESSION: Static Vs Adaptive - Israeli roots – ARC. (4)

SLIDING WINDOW COMPRESSION: The Algorithm - LZSS Compression - The Code - Compression Code. (4)

LZ78 COMPRESSION: Compression – Decompression. (5)

SPEECH COMPRESSION: Digital Audio Concepts - Lossless Compression of Sound. (5)

VIDEO COMPRESSION: JPEG Compression - Implementing DCT - Complete Code Listing. (5)

TEXT BOOKS

1. Mark Nelson, "The Data Compression Book", BPB Publications, New Delhi, 2007.
2. Khalid Sayood, “Introduction to Data Compression”, Morgan Kaufmann, California, 2006.

REFERENCES

1. Yun Q Shi, Huifang Sun, “Image and Video Compression for Multimedia Engineering”, CRC Press, New York 2008.
2. David S Tanbman and Michael W Marcellin, “JPEG – 2000 Image Compression Fundamentals, Standards and Practice”, Kluwer Academic, Norwell, 2004.

LAB

1. Implement Shannon Fano algorithm and Huffman algorithm.
2. Design compression and decompression program using adaptive Huffman coding.
3. Implement arithmetic coding algorithm.
4. Design compression program using statistical modeling upto 3 order.
5. Design compression and decompression program using L277 algorithm.

Total L:45+P:30=75

12XWA6 ADVANCED COMPUTER GRAPHICS

3 0 2 4

GEOMETRICAL TRANSFORMATIONS: 2D Transformations- Homogeneous Coordination and metric representation – Composition of 2D transformations – Window to view port transport, Efficiency- Matrix representation of 3D transformations – Composition of 3D transformation – Transformation as a change in coordinate system. (3)

VIEWING IN 3D: Projections – specifying arbitrary 3D viewing – The Mathematics of planar geometric projections – implementing planar geometric projections, Coordinate systems. (3)

OBJECT HIERARCHY: Geometric modeling- Characteristics of retained – mode graphics packages – Defining and displaying structure – Modeling transformations, Hierarchical structure networks. (3)

INPUT DEVICES – INTERACTION TECHNIQUES AND INTERACTION TASKS: Interaction hardware – Basic interaction tasks – Composite interaction tasks. (3)

DIALOGUE DESIGN : The form and content of user-computer dialogues – User interface styles – Important design considerations – Modes and syntax – Visual design – The design methodology (3)

USER INTERFACE SOFTWARE: Basic interaction – handling models - window management systems – output handling in window systems – Input handling in windows systems – Interaction –technique toolkits – User-interface management systems. (3)

REPRESENTING CURVES AND SURFACES: Polygon meshing – parametric cubic curves, parametric bicubic surfaces, quadric surfaces. (3)

SOLID MODELLING: Representing solids – Regularized Boolean set operations – Primitive instancing – Sweep representations – Boundary representations – Spatial – Partitioning representations – Constructive solid geometry – Comparison of representation – User interfaces for solid modeling. (4)

VISIBLE SURFACE DETERMINATION : Function of two variables – Techniques for efficient visible surface algorithms – Algorithms for visible line determination – The z-buffer algorithm – List – priority Algorithm – Area subdivision algorithms – Algorithms for octrees – Algorithms for curved surfaces – Visible ray tracing. (3)

REALISM: Fundamental difficulties – Rendering techniques for line drawing – Rendering techniques for shaded images – Improved object models – Dynamics – steropsis – Improved displays – Interacting with our other senses – Aliasing and antialiasing. (3)

ACHROMATIC AND COLORED LIGHT: Achromatic light – Chromatic color – Color Models for Raster Graphics – Reproducing Color – Using Color in Computer Graphics. (3)

ILLUMINATIONS AND SHADING : Illumination models – Shading models for polygons – Surface detail – Shadows – Transparency – Inter object reflections – Physically based illumination models – Extended light sources – Spectral sampling – Improved camera model – Global Illumination algorithms – Recursive ray tracing – Radiosity methods – The rendering pipeline. (4)

IMAGE MANIPULATION AND SHADING: Image Basics - Filtering – Image Processing – Geometric transformations of Images – Multipass transformation – Image Composition – Mechanism for Image Storage – Special Effects with images (4)

ANIMATION : Conventional and Computer assisted Animation – Animation languages – Methods of controlling animation - Basic rules of animation – Problems peculiar to animation. (3)

TEXT BOOKS

1. Foley, Andries van Dam, Feiner and Hughes “Computer Graphics Principles & Practice”, Addison Wesley, New York, 2004.

REFERENCES

1. Donals Hearn and Pauline Baker M, “Computer Graphics”, Pearson Education, New Delhi, 2001.
2. Rankin John R, "Computer Graphics Software Construction", Prentice Hall, New Delhi, 1989.

LAB

Implement the following using the OpenGL library in VC++

1. Using glReeti function, draw
   a) A flurry b) A checkerboard
2. Write the window to view port mapping functions, and use it to draw the since curve in real world coordinates.
3. Using user defined line To and moveTo functions, plot the Fibonacci series.
4. Write the Canvas class and it’s supporting classes. Use the Canvas class to draw a simple meander.
5. Write functions to change the background and foreground colors.
6. Write a function to draw an n-sided polygon (using the basic Canvas class and line To and move To functions)
7. Write a program to draw the Sierpinski gasket.
8. Write a program to draw the graph of a given mathematical function f(x).
9. Write a program to read a data file that contains a collection of Polylines in the appropriate format and draw each polyline.
10. Write a parameterized function to display a house and call it a number of times by passing different values to form a village.
11. Write a program that displays a colored triangle and rectangle and rotates them at different angles along two axis.

Total L:45+P:30=75

12XWA7 REAL TIME AND EMBEDDED SYSTEMS

3 0 2 4

INTRODUCTION TO EMBEDDED SYSTEMS: Definition – Examples of Applications – Important characteristics of these applications – real-time system and definitions – real –time system – Common misconceptions – Overview of science of real-time systems and examples of research problems. (3)

HARDWARE FUNDAMENTALS: Microprocessors – Microcontroller - Direct Memory Access – Universal Asynchronous Receiver / Transmiter (UART) – Programmable. Array Logic (PAL) – Application Specific Integrated Circuit (ASIC) – Watch dog Timer. (5)

INTERRUPTS: Interrupt Basics – Saving and Restoring the content - Disabling Interrupts – The Shared–data Problem – Shared–Data bug – Solving Atomic and Critical sections – Interrupt Latency. (3)

EMBEDDED SOFTWARE ARCHITECTURE: Round - Robin-Round – Robin with interrupts, Example – characteristics – Function- Queue- Scheduling Architecture – Real Time Operating System Architecture. (5)

REAL TIME OPERATING SYSTEMS: Task state, Scheduler Task and Data – Reentrancy, Rules – Semaphores and Shared-data– RTOS Semaphores – Initializing semaphores - Reentrancy and Semaphores – Multiple semaphores - Semaphore problems – variants. (5)

REAL TIME OPERATING SYSTEM SERVICES: Message Queues, Mailboxes and Pipes – Time functions – Events – Memory management – Interrupt Routine in RTOS Environment. (3)

DESIGN USING RTOS: Design Principles – Short Interrupt Routines – RTOS Tasks – Tasks for Priority – Tasks for Encapsulation –Creating and Destroying tasks – Avoidance. (8)

SCHEDULING : Execution sequences – Preemption – Fixed versus Dynamic Priority, Priority Inversion – Scope of scheduler – Earliest deadline first – Periodic scheduling – Aperiodic servers – Handling overload – Inversion Handling – Fixed Priority. (6)

MEMORY MANAGEMENT: Example of Scoped Memory Usage – Estimating the size of scoped memory – Assignment rules – Nested Memory areas and Single Parent rule – Sharing Memory areas and Schedulable Objects – Temporary Memory – Code Patterns for Temporary Memory – Real Time Threads in Temporary Memory. (7)

TEXT BOOKS

1. David E Simon, “An Embedded Software Primer “, Pearson Education, New Delhi, 2001.
2. Peter C Dibble, “Real –Time Java Platform Programming”, BooksSurge, South Carolina, 2008.

REFERENCES

1. Jane W S Liu, “Real - time Systems”, Pearson Education, New Delhi, 2009.
2. Andrew Wellings, “Concurrent and Real Time Programming in Java”, John Wiley & Sons, New Jersey, 2004.
3. Gregory Bollella, Benjamin Brosgol, James Gosling, and Peter Dibble, “The Real Time Specification for Java”, Addison Wesley, Boston, 2000.
4. Albert M K Cheng, “Real-Time Systems Scheduling, Analysis and Verification”, John Wiley & Sons, New Jersey, 2003.

LAB

1. Design RTS program using Round Robin method.
2. Design RTS program with two threads which create deadlock.
3. Design RTS program using semaphore.
4. Design RTS program which uses message queue, mail box, pipe.
5. Design RTS program to create priority Inversion.

Total L:45+P:30=75

12XWA8 MOBILE COMPUTING

3 0 2 4

INTRODUCTION: Introduction to wireless networking, Advantages and disadvantages of wireless networking, Evolution of mobile communication generations- CDMA, FDMA, TDMA. Challenges in mobile computing – Vertical and horizontal applications of Wireless Networking–Wireless LAN and Wireless WAN. (4)

CELLULAR CONCEPT: Wireless transmission - Frequencies for radio transmission - Regulations - Signals , Antennas , Signal propagation ,Path loss of radio signals , Additional signal propagation effects - Multi-path propagation - Multiplexing - Space division multiplexing - Frequency division multiplexing -Time division multiplexing - Code division multiplexing - Spread spectrum - Direct sequence spread spectrum - Frequency hopping spread spectrum. (6)

GSM: Mobile services - System architecture -- Handover – GPRS – Mobile services – System Architecture. (6)

MOBILE DEVICES: Overview of mobile devices – input mechanism – Device classification – 3 G devices – 3 G Applications. (4)

MOBILE APPLICATIONS ARCHITECTURE: Wireless Internet – Wireless Internet Architecture – Smart Client – Smart Client Architecture – Messaging Architecture – Sample Applications. (6)

Building smart client applications – Mobile Operating systems – Client development process – Design, Development, implementation, testing and deployment phase. Thin client development process – design, development, implementation, testing and deployment phase. (8)

MOBILE INFORMATION MANAGEMENT: PIM architecture – Standardization – SyncML – vCalendar/iCalendar – vCard – Mobile device Management Software – Features. (6)

WIRELESS INTERNET TECHNOLOGY: World Wide Web – WAP - Architecture - Wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment, Wireless markup language (WML), WML script. (5)

TEXT BOOKS

1. Martyn Mallick, “Mobile and Wireless design essentials”, Wiley, New Delhi, 2008**.**
2. Jochen Schiller, “Mobile Communications”, Pearson Education, New Delhi, 2009.

REFERENCES

1. Steve Mann and Scoot Schibli, “The Wireless Application Protocol”, John Wiley & Sons, New York, 2000.
2. Steve Mann, “Programming Applications with the Wireless Application Protocol”, John Wiley & Sons, New York, 2000.
3. Rifaat A Dayem, “Mobile Data & Wireless Lan Technologies”, Prentice Hall, New Delhi, 1997.

LAB

Developing Mobile based applications using J2ME, Windows CE , Symbian OS , Android OS.

Suggested Applications:

1. Online Shopping Cart
2. Airline Reservation System
3. WAP Portal Site
4. M-Commerce applications
5. Location based Services
6. Mobile games

Total L:45+P:30=75

12XWA9 REQUIREMENTS ENGINEERING

3 0 2 4

REQUIREMENTS ENGINEERING PROCESS: Introduction - Process Models - Process support - Process Improvement - Requirements Elicitation and Analysis Requirements Validation - Requirements Reviews - Prototyping - Model Validation Requirements Testing. (11)

REQUIREMENTS MANAGEMENT: Requirements Identification - storage Change Management – Traceability. (10)

REQUIREMENTS ENGINEERING TECHNIQUES: Methods - Data flow modeling - Semantic Data models- Object oriented approaches - View point oriented Requirements Methods - Structured Analysis and Design Technique (SADT), CORE, VOSE, VORD. (12)

NON FUNCTIONAL REQUIREMENTS: Classification - Derivation - Requirements for critical systems Interactive System Specification - VORD - Requirements definition Transition to object oriented design. (12)

TEXT BOOK

1. Gerald Kotonya and Ian Sommerville, "Requirements Engineering - Process and Techniques", John Wiley & Sons, New York, 2006.

REFERENCE

1. Michael Jackson, "Software Requirements and Specifications", Addison Wesley, Boston, 2000.

LAB

1. Analysis and evaluation of tools for requirement engineering analysis.
2. Exercise for Requirements Analysis process.
3. Exercise for requirements Elicitation.
4. Exercise for Creation of SRS.
5. Exercise for Creating Requirements analysis documents such as DFD, ERD and other representations using UML tools.

Total L:45+P:30=75

12XWAA SERVICE ORIENTED ARCHITECTURE

3 0 2 4

INTRODUCTION TO SERVICE ORIENTED ARCHITECTURE: Service Oriented Architectures – Business value of SOA - Characteristics of SOA - SOA Architecture – Service based collaboration through Federation – Component Definition - Component Granularity – Component Based Software Engineering – Enterprise Service bus – SOA Enterprise Service Model. (8)

QUALITY OF SERVICE: Web services orchestration – Workflow and Business Process Management – Business Process Execution Language – ACID Transactions - Web services Transactions – SOA Management – Systems Management – Alerting – Provisioning – Leasing – Lifecycle management – Management Architecture. (10)

FUNDAMENTAL PIECES OF SOFTWARE ORIENTED ARCHITECTURE: Universal Description Discovery and Integration – Programming UDDI – UDDI Data Model – UDDI SOAP APIs – Inquiry APIs – Publisher APIs – Web Service Definition Language – Defining Message data types – Defining Operations on Messages – Importing WSDL documents – Extensions for binding to SOAP – Simple Object Access Protocol – SOAP Specification – SOAP Message processing – SOAP use of Namespaces – SOAP Multipart MIMI attachments. (15)

WEB SERVICES STANDARDS: Web Services Security – WS Trust – WS Privacy – WS SecureConversation – WS Federation - Web Services Coordination – Web Services Policy – Web Services Reliable Messaging – Web Services Attachments. (12)

TEXT BOOKS

1. Thomas Erl, “Service Oriented Architecture (SOA): Concepts, Technology and Design”, Prentice Hall, New Delhi, 2008.
2. James McGovern, Oliver Sims, Ashish Jain and Mark Little, “Enterprise Service Oriented Architectures: Concepts, Challenges Recommendations”. Springer, New York, 2006.

REFERENCES

1. Eric New Comer, ”Understanding Web Services: XML, WSDL, SOAP and UDDI”, Pearson Education, Boston, 2002.
2. Thomas Erl, “Service Oriented Architecture: A Field Guide to Integrating XML and Web Services”, Prentice Hall, New Delhi, 2004.
3. Eric Newcomer and Greg Lomow, “Understanding SOA with Web Services”, Pearson Education, New Delhi, 2009.
4. Sandy Carter, “The New Language of Business: SOA and Web 2.0”, Pearson Education, New Delhi, 2007.

5. Sanjiva Weerawarana, Francisco Curbera, Frank Leymann, Tony Storey and Donald, “Web Services Platform Architecture: SOAP, WSDL, WS.Policy, WS-Addressing, WS-BPEL”, Prentice Hall, New Delhi, 2005.

LAB

1. Implement a XML Web Service by using Microsoft Visual Studio .Net
2. Implementation of webservice using Java APIs
3. Create a content syndication using RSS
4. Web service design / Coding projects

Total L:45+P:30=75

12XWAB PRINCIPLES OF PROGRAMMING LANGUAGES

3 0 2 4

INTRODUCTION: The Role of Programming Languages: Toward Higher-level Languages, Problems of Scale, Programming Paradigms, Language Implementation Bridging the Gap - Language Description:- Syntactic Structure: Expression Notations, Abstract Syntax Trees, Lexical Syntax, Context -Free Grammars, Grammars for Expressions, Variants of Grammars. (9)

IMPERATIVE PROGRAMMING: Statements: Structured Programming:- The Need for Structured Programming, Syntax-Directed Control Flow, Design Considerations: Syntax, Handling Special Cases in Loops, Programming with invariants, Proof Rules for Partial Correctness, Control flow in C - Types: Data Representation:- The Role of Types, Basic Types, Arrays Sequences of Elements, Records: Named Fields, Unions and variant Records, Sets, Pointers: Efficiency and Dynamic Allocation, Two String Tables, Types and Error Checking - Procedure Activations:- Introduction to Procedures, Parameter-passing Methods, Scope Rules for Names, Nested Scopes in the Source Text, Activation Records, Lexical Scope: Procedures as in C, Lexical Scope: Nested Procedures and Pascal. (12)

OBJECT ORIENTED PROGRAMMING: Groupings of Data and Operations:- Constructs fro Program Structuring, Information Hiding, Program Design with Modules, Modules and Defined Types, Class Declarations in C++, Dynamic Allocation I C++, Templates: Parameterized Types, Implementation of Objects in C++. - Object-Oriented Programming:- What is an Object?, Object-Oriented Thinking - Objects in Smalltalk. (6)

FUNCTIONAL PROGRAMMING: Elements of Functional Programming:- A little Language of expressions, Types : Values and Operations, Function declarations, Approaches to Expression Evaluation, Lexical Scope, Type Checking - Functional Programming in a Typed Languages:- Exploring a List, Function Declaration by Cases, Functions as First-Class Values, ML: Implicit Types, Data Types, Exception Handling in M, Little quit in Standard ML - Functional Programming with Lists:- Scheme, a Dialect of Lisp, The Structure of Lists, List Manipulation, A Motivating Example: Differentiation, Simplification of Expressions, Storage Allocation for Lists. (10)

OTHER PARADIGMS: Logic Programming:- Computing with Relations, Introduction to Prolog, Data Structures in Prolog, Programming techniques, Control in Prolog, Cuts - An Introduction to Concurrent Programming:- Parallelism in Hardware, Streams: Implicit Synchronization, Concurrency as interleaving, Liveness Properties, Safe Access to Shared Data, Concurrency in Ada, Synchronized Access to Shared variables. (8)

TEXT BOOKS

1. Terrence W Pratt, Marvin V Selkowitz and T V Gopal, “Programming Languages Design and Implementation”, Pearson Education, New Delhi, 2006.
2. Robert Harber, “Programming in standard ML”, Carnegie Mellon University, Pennsylvania, 2005.

REFERENCES

1. Ravi Sethi, “Programming Languages Concepts and Constructs “, Pearson Education, New Delhi, 2009.
2. Robert W Sebesta, “Concepts of Programming Languages”, Pearson Education, New Delhi, 2009.
3. Larry C Paulson, “ML for working Programmer”, Cambridge University Press, Cambridge, 1997.
4. Al Kelley and Ira Pohl, “A Book on C “, Pearson Education, New Delhi, 2009.

LAB

1. Language tools like lex, yacc.
2. Inter – Intra sequence control mechanism.
3. Parameter passing mechanism in C, C++.
4. Comparing Object oriented concepts in C++, Java.
5. List Operations in Prolog.
6. Fact finding & Theorem proving in Prolog.
7. Recursive functions in Functional programming language.
8. Expression evaluation in functional programming language.

Total L:45+P:30=75

12XWAC DATA MINING

3 0 2 4

INTRODUCTION: Motivation for Data Miniing – Importance – Definition – Kinds of data for Data Mining – Data Mining functionalities – Patterns – Classification of Data Mining Systems – Major issues in Data Mining. (3)

DATA PREPROCESSING: Types of data, Data cleaning, Aggregation, Sampling – Data Reduction –PCA, LDA-Feature subset selection - x^2 and Information Gain. (5)

MINING FREQUENT PATTERNS, ASSOCIATIONS AND CORRELATIONS: Basic concepts – Efficient and Scalable Frequent Itemset Mining methods – Apriori, FP Tree . (5)

CLASSIFICATION AND PREDICTION: Classification – Prediction – Classification by Decision Tree Induction – Bayesian Classification – Instance based learning- SVM- Classifier accuracy –Evaluating the accuracy of a classifier-Ensemble Learning- Class imbalance- Semisupervised learning. (6)

C**LUSTER ANALYSIS:** Cluster Analysis – Types of data in Cluster Analysis –Distance measure for numerical and non numeraical data- A categorization of major clustering methods – partitioning methods – hierarchical methods – density based methods –DBSCAN, OPTICS, DENCLUE- Model based clustering – Outlier analysis. (7)

MINING DATA STREAMS: : Challenges-Mining time- Series databases and sequence data –Stationary data stream learning- Hoeffding trees- Evolving data stream mining. (5)

MINING MASSIVE DATA SETS- Challenges- Distributed file system – Introduction to Map Reduce- Mining high dimensional association rules-CARPENTER- classifying high-dimensional data- PLANET- clustering high-dimensional Data-BIRCH-Distributed Data Mining (8)

APPLICATIONS AND TRENDS IN DATA MINING: Spatial Data Mining –Graph Mining- Web Mining –Text Mining. (6)

TEXT BOOKS

1. Jiwei Han and Micheline Kamber , " Data Mining – Concepts and Techniques", Morgan Kaufmann, California, 2011.
2. Tan, Steinbach, Kumar, "Introduction to Data Mining", Pearson Education, New Delhi, 2007

REFERENCES

1. Anand Rajaraman, and Jeffrey Ullman, "Mining Massive Data sets", Cambridge University Press, Cambridge, 2012.
2. Trevor Hastie, Robert Tibshirani, Jerome Freidman," The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Springer, New York, 2011.
3. Ian Witten, Frank Eibe, Mark A Hall and Geffery Holmes, "Data Mining: Practical Machine Learning Tools", Elsevier, California, 2011.

LAB

1. Problems on Data mining tools like WEKA.

2. Association rule mining using Apriori algorithms.
3. Classification rules using Decision Tree classifier, Ensemble of Classifiers.
4. Clustering techniques.
5. A Package using data mining techniques preferably research papers.

Total L:45+P:30=75

12XWAD AGILE SOFTWARE DEVELOPMENT

3 0 2 4

AGILE COMPUTING - An Introduction– The Problem with parsing experience-Three levels of listening Cooperative game of Invention and Communication-Individuals-Overcoming Failure modes-Working Better in some ways than others - Drawing on Success modes (9)

AGILE PROCESS MODELS – Extreme programming, ASD, DSDM, Scrum, Crystal, FDD, Agile Modeling (9)

TEAM COMMUNICATION -Communicating and Cooperating teams – Convection currents of information-Jumping communication gaps-Teams as communities-Teams as Ecosystems (10)

AGILE METHODOLOGIES -Agile and self-adapting-The crystal methodologies-Crystal orange web-The agile software development manifesto-The agile alliance-Peter Naur, Programming as Theory Building. (12)

Case Studies (5)

TEXT BOOKS

1. Alistair Cockburn, “Agile Software Development”, Pearson Education, New Delhi, 2008.

REFERENCES

1. Craig Larman, “Agile and Iterative Development”, Pearson Education, Boston, 2006.
2. Mike Cohn, “Agile Estimating and Planning”, Pearson Education, New Delhi, 2007.

LAB

1. Exercise for modular development.
2. Exercise for Incremental delivery approach.
3. Development of Metaphor.
4. Exercise for proving the productivity using pair programming approach.
5. Exercise for understanding the concept of “Simple Design”.
6. Exercise to understand “Test first “ technique.
7. Writing user stories.
8. Creation of vision card.
9. Writing acceptance tests.
10. Exercise for refactoring the code.

Total L:45+P:30=75

12XWAE SECURITY IN COMPUTING

3 0 2 4

INTRODUCTION: Security Problems in computing – security goals –attacks – Services and mechanisms. (4)

SYMMETRIC KEY CRPTOSYSTEM: Introduction **-** Encryption building blocks - stream ciphers and block ciphers, substitution cipher – transposition cipher – modern symmetric key ciphers – Data Encryption Standard (DES) - Advanced Encryption standard (AES) – RC4 (6)

PUBLIC KEY CRYPTOSYSTEM: Introduction – RSA cryptosystem -ElGamal Cryptosystem – Elliptic curve cryptosystem. (8)

MESSAGE INTEGRITY AND AUTHENTICATION: Message digest – Message authentication code – Cryptographic hash function – SHA-512-Digital signatures – digital signature standard . (6)

KEY MANAGEMENT: Symmetric key distribution – Kerberos symmetric key agreement – Diffie – Hellman key agreement – Public key distribution (4)

NETWORK SECURITY: Application Layer Security – PGP and S/MIME, Transport Layer security – SSL and TLS, Network layer security – IPSec Internet key exchange. (8)

PROGRAM SECURITY: Buffer overflows – malware taxonomy – viruses and other malicious code – defense mechanisms (4)

LEGAL ISSUES IN COMPUTER SECURITY: Protecting programs and data – rights of employees and employers – computer crime – digital rights management. (5)

TEXT BOOKS

1. Charles P Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Pearson Education, New Delhi, 2009.
2. Behrouz Forouzan and Debdeep Mukhopadhyay, “Cryptography and Network Security”, Tata McGraw Hill, New Delhi, 2010.

REFERENCES

1. Richard E Smith, "Internet Cryptography", Pearson Education, New Delhi, 2008.
2. William Stallings, “Cryptography and Network Security”, Principles & Practice “, Pearson Education, New Delhi, 2009.
3. Roberta Bragg, Mark Rhodes Ousley and Keith Strassbery, “The complete reference, Network Security”, Tata McGraw Hill, New Delhi, 2008.

LAB

Implementation of

1. Substitution cipher and transposition cipher.
2. RSA cryptosystem.
3. Diffie – Hellman Key exchange algorithm.
4. Digital signature algorithm.
5. Simulation of Kerberos.
6. ANSI X9.17 generator.
7. Simulating SSL.

Total L:45+P:30=75

12XWAF PERVASIVE COMPUTING

3 0 2 4

INTRODUCTION: basics and visions of pervasive computing - Moore’s law - living in a digital world - modeling key for pervasive computing properties - pervasive system environment interaction - architectural design for pervasive system - computing devices and their characteristics - pervasive information access devices-smart identification, smart card, labels, tokens- embedded controls, smart sensors, actuators, appliances, home networking, entertainment - various operating systems for pervasive devices - Middleware – Connecting the world – WWAN, SRWC, DECT, Bluetooth, IrDA – mobile internet – internet protocols (9)

APPROACHES FOR DEVELOPING PERVASIVE APPLICATIONS: Categorization - smart services for pervasive application development - developing mobile applications – presentation transcoding – device independent view component – heterogeneity of device platforms - Context Awareness and Mobility to building pervasive applications.

(8)

COMMUNICATION TECHNOLOGIES FOR PERVASIVE COMPUTING: Audio networks, data networks - wireless data networks - pervasive networks - service oriented networks - network design issues - Managing smart devices in virtual environments, human user-centered and physical environments - pervasive computing issues and outlook (7)

CONTEXT AWARE SYSTEMS: Modeling - mobility awareness - spatial awareness - temporal awareness - ICT system awareness - Intelligent Systems - basic concepts- autonomous systems - reflective and self aware systems - self management and autonomic computing - complex systems. (8)

LOCATION AWARE SYSTEMS: Basic concepts - location modeling - Introduction to location management – DNS Server, server process, client process – location update – location inquiry-location management cost – network topology – mobility pattern, memory less movement model, Markovian Model, Shortest distance model, Gauss-Markov model, Activity Based Model, Mobility Trace, Fluid-flow Model, Gravity Model. (7)

Location Updates - Location relatedness and the query model – location dependent data – location aware queries – location dependent queries – moving object database queries – query classification – query transition steps in LDQ processing. (6)

TEXT BOOKS

1. Stefan Poslad, "Ubiquitous Computing - Smart Devices, Environment and Interactions", John Wiley & Sons, New York, 2011.
2. Adelstein F and Gupta S K S, "Fundamentals of Mobile and Pervasive Computing", Tata McGraw Hill, New Delhi, 2008.

REFERENCES

1. Mohammed Ilyas and Imad Mahgoub, "Mobile Computing Handbook", Auerbach Publications, New York, 2005.
2. Burkhardt, Henn, Hepper, and Rintdorff, Schaeck. "Pervasive Computing", Pearson Education, New Delhi, 2009.
3. Ashoke Talukdar and Roopa Yavagal, "Mobile Computing", Tata McGraw Hill, New Delhi, 2010.

LAB

1. Create Application with onClick, onKeyDown, onFocusChanged Event Handlers
2. Create Application with Toast Notifications
3. Create Application with Android's Advanced User Interface Functions
4. Create Android Audio/Video Application
5. Create Application to Create, Modify and Query an SQLite Database
6. Create Application that Works with an Android Content Provider
7. Create application that performs Data Storage and Retrieval from Android External Storage
8. Create Location-Aware application that uses Proximity Alerts and Google Maps API
9. Implementation of small packages to demonstrate all APIs.

Note: All implementations using android.

Total L:45+P:30=75

12XWAG SEMANTIC WEB

3 0 2 4

INTRODUCTION TO SEMANTIC WEB: Today's Web - From Today's Web to the Semantic Web - Examples - Semantic Web Technologies - A Layered Approach. (4)

DESCRIBING STRUCTURED WEB DOCUMENTS USING XML: Introduction to Markup languages - The XML Language - Structuring - Namespaces - Addressing and Querying XML Documents - Processing. (8)

DESCRIBING WEB RESOURCES IN RDF: Introduction to RDF - Basic Ideas - RDF: XML-Based Syntax - RDF Schema: Basic Ideas - RDF Schema - An Axiomatic Semantics for RDF and RDF Schema - A Direct Inference System for RDF and RDFS - Querying in RQL. (9)

WEB ONTOLOGY LANGUAGE: OWL Introduction - The OWL Language - Examples - OWL in OWL - Future Extensions. (8)

LOGIC AND INFERENCE: Introduction - Example of Monotonic Rules: Family Relationships - Monotonic Rules: Syntax - Monotonic Rules: Semantics - Nonmonotonic Rules: Motivation and Syntax - Example of Nonmonotonic Rules - Rule Markup in XML for Monotonic Rules - Rule Markup in XML for Nonmonotonic Rules. (8)

APPLICATIONS: Horizontal Information Products - Data Integration - e-Learning - Web Services - Other Scenarios. (4)

ONTOLOGY ENGINEERING: Constructing Ontologies Manually - Reusing Existing Ontologies - Using Semiautomatic Methods - On-To-Knowledge Semantic Web Architecture. (4)

TEXT BOOKS

1. Grigoris Antoniou and Frank van Harmelen, "A Semantic Web Primer", The Massachusetts Institute of Technology Press, Cambridge, 2004.

REFERENCES

1. John Davies, Dieter Fensel and Frank van Harmelen, "Towards the Semantic Web", John Wiley & Sons, New York, 2003.
2. Breitman K K, Casanova M A and Truszkowski W, "Semantic Web: Concepts, Technologies and Applications", Springer, London, 2007.

LAB

1. Generate of well formed XML document.
2. Creating XML DTD and XSD for the given XML document.
3. Design a XSLT to display the XML document (given as input) based on the constraints given.
4. Generate an RDF graph.
5. Create an RDFS ontology (in triple or graph notation).
6. Write an RDF/XML encoding for the given situation.
7. Generation of OWL document.
8. A Package to implement the techniques.

Total L:45+P:30=75

12XWAH CLOUD COMPUTING

3 0 2 4

INTRODUCTION TO PARALLEL AND DISTRIBUTED COMPUTING: Introduction, Architecture and Distributed computing models and technologies SOA, Web Services (5)

GRID, CLUSTER AND UTILITY COMPUTING: Introduction, Architecture, Pros & Cons, Real time applications. (4)

INTRODUCTION TO CLOUD COMPUTING: Definition, History, Comparison of Cloud Computing with Grid, Cluster and Utility Computing, Deployment models – Private, Public, Hybrid and Community - Pros and Cons of Cloud Computing. SaaS, PaaS, IaaS etc. (8)

VIRUTUALIZATION: Types of Virtualization, Tools for Virtualization, Architecture of VMM, Virtualization for Cloud. (4)

ADVANCED WEB TECHNOLOGIES: AJAX and Mashup – Programing examples using applications. (4)

MAP REDUCE PARADIGMS: Introduction, GFS Architecture, HDFS Architecture, Hbase, Google big Table, Amazon's (key value) pair storage and Microsoft's Azure infrastructure, Map reduce programming examples. (6)

CLOUD COMPUTING FRAMEWORK: Amazon EC3, S3 storage revises, Aneka frame work, IBM blue Cloud. (7)

APPLICATIONS: Distributed search engine and distributed data mining in the cloud. (7)

TEXT BOOKS

1. Anthony T Velte, Toby J Velte and Robert Elsenpeter, "Cloud Computing : A Practical Approach", Tata McGraw Hill, New Delhi, 2010
2. Liu M L, "Distributed Computing Principles and Applications", Pearson Education, New Delhi, 2009.

REFERENCES

1. Ron Schmelzer, "XML and Web Services unleashed", Pearson Education, New Delhi, 2008.
2. Dean J and Ghemawat S, " MapReduce: Simplified Data Processing on Large Clusters" OSDI, San Francisco, 2004.
3. DeCandia, Deniz Hastorun, Madan Jampani, Gunavardhan Kakulapati, Avinash Lakshman, Alex Pilchin, Swaminathan Sivasubramanian, Peter Vosshall and Werner Vogels, " Dynamo Amazon's Highly Available Key-Value Store", SOSP, Washington, 2007.
4. Ghemawat S, Gobioff H and Leung S T, "The Google File System", SOSP, Washington, 2003.
5. www.gridcomputing.com
6. www.cloudcomputing.com
7. https://computing.llnl.gov/tutorials/parallel_comp/
8. http://www.vmware.com/pdf/virtualization.pdf

LAB

1. Implement a distributed search engine.
2. Implement distributive data mining for an application.
3. Package to be developed using Virtualization and other cloud concepts.

Total L:45+P:30=75

12XWAI HUMAN COMPUTER INTERACTION

3 0 2 4

INTRODUCTION: Design, Models, Evaluation. Need to understand people, computers and methods. Motivation. Contexts for HCI. (4)

FOUNDATION OF HCI - HUMAN ABILITIES & COMPUTERS:Human abilities - Vision. Hearing. Touch. Memory. Computers - Speed. Interfaces. Widgets. Effects on interaction. (6)

INTERACTION: Understanding the psychology towards Compters. Egonomics. Need finding. Understanding user's needs and expectations. Interaction styles - Command language. Form filling. Menu selection. Direct manipulation. (6)

DESIGN GUIDELINES & EVALUATION: Heuristics as guidelines - Simple and natural dialogue, Speak the user's language, Be consistent, Provide shortcuts. Using heuristics to explain usability problems. Style guides. Evaluation of users interfaces: Heurisitc evaluation, measuring API usability. (8)

USER-CENTERED DESIGN: Introduction to User-centered design and prototyping. Methods - Verbal techniques, Paper prototyping, Mock interfaces, Tutorials and manuals. Collaboration with users. (9)

CASE STUDIES:

Web design: Build a web application to demonstrate various techniques. Focus on user interaction, design and ease of use.

Mobile app design: Build a mobile application to demonstrate the following: Issues with interactions in mobile. Limitations of building apps in the small screens of mobile device; Designing the app for better usability.
Game development: Build a game to understand the challenges in building a rich as well as an easy to use interface. (12)

TEXT BOOKS

1. Alan Dix, Janet Finlay, Gregory Abowd and Russell Beale, “Human-Computer Interaction”, Prentice Hall, New Delhi, 2009.
2. Yvonne Rogers, Heken Sharp and Jenny Preece “Interaction Design: Beyond Human-Computer Interaction”, John Wiley & Sons, New Delhi, 2011.

REFERENCES

1. Nielsen J, “Enhancing the explanatory power of usability heuristics”, In Proceedings of the CHI'94 Conference on Human Factors in Computing Systems, p152-158, ACM Press, New York, 1994.
2. William Buxton, “Performance by design: The role of design in software product development”, Proceedings of the Second International Conference on Usage-Centered Design, Portsmouth, 2003.

LAB

1. Web design: Build a web application with preference to user interaction, design and ease of use.
2. Mobile app design: Build a mobile application to demonstrate Issues with interactions in mobile; using small screens of mobile device with better usability.
3. Game development: Build a game to understand the challenges in building a rich as well as an easy to use interface.

Total L:45+P:30=75

12XWAJ SOCIAL NETWORK ANALYSIS

3 0 2 4

INTRODUCTION: Motivation - different sources of network data - types of networks - tools for visualizing network data - review of graph theory basics - game theory basics. (9)

GRAPH THEORETIC PROPERTIES OF SOCIAL NETWORKS: Notions of centrality - Strong and weak ties – Homophily - Structural Balance. (6)

DYNAMIC PROPERTIES OF NETWORKS: Information diffusion - networks effects on information diffusion - maximizing influence spread - power law and heavy tail - preferential attachment models - small world phenomenon - cascading behavior on networks - Epidemics. (10)

BEHAVIORAL PROPERTIES ON NETWORKS: Network economics - Bargaining and power in networks - Sponsored search markets. (10)

MINING GRAPHS: Community and cluster detection: random walks - spectral methods - link analysis for web mining. (10)

TEXT BOOKS

1. David Easley and Jon Kleinberg, “Networks, Crowds, and Markets: Reasoning About a Highly Connected World”, Cambridge University Press, Cambridge, 2010.
2. Stanley Wasserman, Katherine Faust, “Social network analysis: methods and applications”, Cambridge University Press, Cambridge, 1999.

REFERENCES

1. Peter R Monge and Noshir S Contractor, “Theories of communication networks”, Oxford University Press, New York, 2003.
2. Duncan Watts, “Six degrees: the science of a connected age”, Norton, New York, 2004.
3. Narahari Y, Garg D, Ramasuri N, and Prakash H, “Game Theoretic Problems in Network Economics and Mechanism Design Solutions”, Springer, London, 2009.

LAB

1. Getting acquainted with UCINET and Netdraw.
2. Implementing graph-theoretic concepts using UCINET
3. Working with data entry of network data using a variety of formats.
4. Working with Visualization, Ego networks, Centrality etc.

Total L:45+P:30=75