Syllabus

(B. Tech. Second Year, Third Year and Final Year)

Course: B. Tech in Computer Engineering.

Department of Computer Engineering
Dr. Babasaheb Ambedkar Technological University,
"Vidyavihar", Lonere-402 103, Dist:- Raigad

Website: www.dbatechuni.org

Teaching and Credit Scheme

Semester: III

Sr. No.	Course Code	Name of the Course	Contact Hours			Credits
			L	T	P	
1	CEIT2101	Engineering Mathematics-III	3	1	-	8
2	CEIT2102	Programming Language Paradigms and Methodologies	3	-	-	6
3	CEIT2103	Computer Organization	3	-	-	6
4	CEIT2104	Switching Theory and Logic Design	3	-	-	6
5	CEIT2105	Discrete Mathematics	3	1	-	8
6	CEIT2106	Programming Lab	-	-	4	4
7	CEIT2107	Computer Organization Lab	-	-	2	2
8	CEIT2108	Switching Theory and Logic Design Lab	-	-	2	2
9	CEIT2109	Numerical Programming Lab	-	1	2	4
10	CEIT2110	Mathematical Foundations Lab	-	-	2	2
11	CEITAU2111	Language Proficiency – I (Audit)	1	-	-	-
		Total	**16**	**3**	**12**	**48**

Semester: IV

Sr. No.	Course Code	Name of the Course	Contact Hours			Credits
			L	T	P	
1	CEIT2201	Principles of Management	3	-	-	6
2	CEIT2202	Microprocessor and Interfacing	3	-	-	6
3	CEIT2203	Probability Statistics and Queuing Theory	3	-	-	6
4	CEIT2204	Data Communications	3	-	-	6
5	CEIT2205	Data Structures	3	1	-	8
6	CEIT2206	Microprocessor and Interfacing Lab	-	-	4	4
7	CEIT2207	Data Communication Lab	-	-	2	2
8	CEIT2208	Data Structures Lab	-	-	4	4
9	CEIT2209	Soft Skills	1	1	-	4
10	CEIT2210	Language Proficiency – II (Audit)	1	-	-	-
		Total	**17**	**2**	**10**	**46**

Semester: V

Sr. No.	Course Code	Name of the Course	Contact Hours			Credits
			L	T	P	
1	CE3101	Theory of Computation	3	1	-	8
2	CE3102	Object Oriented Analysis and Design	3	-	-	6
3	CE3103	Operating System	3	-	-	6
4	CE3104	Database Management System	3	-	-	6
5	CE3105	Design and Analysis of Algorithms	4	-	-	8
6	CE3106	Object Oriented Analysis and Design Lab	-	-	2	2
7	CE3107	Operating System Lab	-	-	2	2
8	CE3108	Data Base Management System Lab	-	-	2	2
9	CE3109	Design and Analysis of Algorithms Lab	-	-	4	4
		Total	**16**	**1**	**10**	**44**

Semester: VI

Sr. No.	Course Code	Name of the Course	Contact Hours			Credits
			L	T	P	
1	CE3201	Compiler Construction	3	1	-	8
2	CE3202	Operating System Design	3	-	-	6
3	CE3203	Software Engineering	3	-	-	6
4	CE3204	Computer Graphics	3	-	-	6
5	CE3205	Computer Networks	3	1	-	8
6	CE3206	Compiler Construction Lab	-	-	2	2
7	CE3207	Operating System Design Lab	-	-	2	2
8	CE3208	Software Engineering Lab	-	-	2	2
9	CE3209	Computer Graphics Lab	-	-	2	2
10	CE3210	Computer Network Lab	-	-	2	2
11	CE3211	Seminar	-	-	2	4
		Total	**15**	**2**	**12**	**48**

Semester: VII

Sr. No.	Course Code	Name of the Course	Contact Hours			Credits
			L	T	P	
1	CE4101	Advanced Programming Technologies	3	-	-	6
2	CE4102	Internetworking Protocols	3	-	-	6
4	CE4103	Advanced Databases Techniques	3	-	-	6
5	CE4104	Elective –I	3	-	-	6
6	CE4105	Advanced Programming Technologies Lab	-	-	2	2
7	CE4106	Internetworking Protocols Lab	-	-	2	2
8	CE4107	Advanced Databases Technology Lab	-	-	2	2
10	CE4108	Project Phase – I	-	-	2	6
11	CE4109	Seminar based on Project work	-	-	2	4
12	CE4110	Technical Project related to Community	-	-	2	2
13	CE4111	Industrial Training*****	-	-	-	-
		Total	**12**	**-**	**12**	**42**

Elective –I **1.** Computer Architecture **2.** Advanced Discrete Mathematics
3. Advanced Software Engineering

***** Compulsory, Non-credit course, evaluation by NP/PP grade.

Semester: VIII

Sr. No.	Course Code	Name of the Course	Contact Hours			Credits
			L	T	P	
1	CE4201	Information Security	3	-	-	6
2	CE4202	Artificial Intelligence	3	-	-	6
3	CE4203	Distributed System	3	-	-	6
4	CE4204	Elective-II	3	-	-	6
5	CE4205	Information Security Lab	-	-	2	2
6	CE4206	Artificial Intelligence Lab	-	-	2	2
7	CE4207	Distributed System Lab	-	-	2	2
9	CE4208	Project Phase –II	-	-	2	10
		Total	**12**	**-**	**8**	**40**

Elective- II **1.** Wireless Mobile Communication **2.** Software Testing
3. Multimedia Systems

CEIT2101: Engineering Mathematics –III

Prerequisite: Engineering mathematics - II

OBJECTIVE:

The basic necessity for the foundation of engineering and technology being mathematics, the main aim is to, teach mathematical methodologies and models, develop mathematical skills and enhance thinking power of students.

Unit 1: **[7Hrs]**

Power series methods for solution of ordinary differential equations, Legendre equations and Legendre polynomials, Bessel functions of first and second kind orthogonality, Strum – Liouville problems.

Unit 2: **[7 Hrs]**

Laplace transform, Inverse transforms shifting on s and t axes Convolutions Partial Fractions.

Unit 3: **[7 Hrs]**

Fourier series, half range expansions, approximations by trigonometric polynomial, Fourier integrals.

Unit 4: **[7 Hrs]**

Partial differential Equations, First and second order linear PDEs with variable coefficients.

Unit 5: **[7 Hrs]**

Wave equations and heat equations in one and two dimensions, Laplace equation in two and three dimensions. Transform techniques in ODE and PDE.

Unit 6: **[7 Hrs]**

Infinite sequence and series numbers, improper integrals Cauchy criterion, Test of convergence Absolute and Conditional convergence series of functions uniform convergence, power series radius of convergence.

Text Books:

1. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Pub, New Delhi.
2. J.N. Wartikar, and P. N. Wartikar, *Engineering Mathematics Vol I and Vol II*.

Reference Books:

1. E. Kreszig, *Advanced Engineering Mathematics*, Wiley Eastern 6th Edition.
2. C. R. Wylie, *Advanced Engineering Mathematics*, McGraw Hill Pub. New Delhi.

CEIT2102: Programming Languages Paradigms and Methodologies

Prerequisite: Computer Fundamentals and Programming

OBJECTIVE:
Improve the ability to develop software that is both correct and efficient in execution learn the concepts of C++.

Unit 1: [7 Hrs]
Overview of Programming Languages:
History, brief survey of programming paradigms, Comparative study of procedure and object oriented programming, functions, structures, structures with functions, Assert(), pointers, dynamic memory allocation by new and delete operator.

Unit 2: [8 Hrs]
Object Oriented Programming Design:
Fundamental programming constructs syntax and semantics of higher level languages, objects and classes, inline functions and friend functions, constructors and destructors, function and operating overloading.

Unit 3: [6 Hrs]
Type Conversion and Dynamic Polymorphism:
Type conversion from built in type to user defined type, from user defined type to built in type, from one class object to another class object.
Dynamic polymorphism with virtual functions and function overriding.

Unit 4: [6 Hrs]
Inheritance and Containership:
Single inheritance, multiple inheritance, multilevel inheritance, hierarchical inheritance, hybrid inheritance, containership : classes within classes.

Unit 5: [6 Hrs]
Templates and Exception Handling:
Function template and class template, Exception handling in C++ and JAVA, Differences between C++ and JAVA, Case study with C++ and JAVA.

Unit 6: [7 Hrs]
Event Driven Programming:
User-Initiated actions and GUI Components, Designing GUI, Attributes of GUI components, logic programming, horn clauses, facts and rules, resolution and back tracking, prolog programming.

Text Books:

1. E. Balgurusamy, *Object Oriented Programming with C++*, TMH 1997.
2. Robert Lafore, *Object Oriented Programming in turbo C++*, Galgotia Pub, 1996.
3. Seyed H. Roosta, *Foundations of Programming languages Design and Implementations*, Thomson Pub
4. Prata, Foundation of Programming Language, TMH pub.

Reference Books:

1. Ellis Horowitz, *Fundamental of programming Languag*e, Galagotia Publication.
2. Doris Appleby, *Programming Languages Paradigm and Practice*, McGraw Hill.
3. S. Koshafian, *Object Orientation*, Wiley Pub.
4. Sebesta, *Principles of Programming Language*, Addison Wesely.
5. Ravi Sethi, *Programming Language*, Addison Wesely.

CEIT2103: Computer Organization

Prerequisite: Computer Fundamental and Programming

OBJECTIVE:
To make the students familiar with various functional blocks present in the general organization of the computer. Study the internal details of the computer. Study the interfacing of various peripherals.

Unit 1: [5 Hrs]
Introduction:
Computer Organization, History of Computers, Fundamental unit, Computer functions and interconnection, Operating system overview.

Unit 2: [6 Hrs]
Instruction Sets: Characteristics and functions:
Information Representation, Addressing modes, Types of instruction, Instruction execution, Machine state and processor status, Structure of Program.

Unit 3: [6 Hrs]
Computer Arithmetic:
Addition and subtraction of signed numbers, signed operand multiplication and division, Floating-point numbers and operations, Introduction of Arithmetic co-processor.

Unit 4: [8 Hrs]
Memory Organization:
Introduction to memory technologies, Memory device characteristics, Memory Hierarchy and concept virtual memory systems and cache memory systems, Organization and characteristic of floppy disk, hard disk, magnetic tape and compact disk, Memory controllers.

Unit 5: [5 Hrs]
Control unit design:
Concept of pipelining, Introduction to RISC and CISC architecture, Hardwired and Micro-programmed control Unit.

Unit 6: [8 Hrs]
Input/Output Organization:
I/O interface, Direct Memory Access (DMA), Interrupts, Interrupts handling, I/O Processors.

Text Books:

1. Hays, *Computer Architecture and Organization*, McGraw Hill Pub.
2. Zaky, *Computer Organization,* McGraw Hill Pub.

Reference Books:

1. Henssey and Patterson, *Computer Architecture a quantitative Approach*, Morgan and Kaufman Pub.
2. Moris Mano, *Computer Architecture and Organization*, PHI.
3. Stone, *Introduction to computer organization and Data Structure,* McGraw Hill Pub.

CEIT2104: Switching Theory and Logic Design

Prerequisite: Nil

OBJECTIVE:
The course is designed in such a manner that students will know the basics of Analog and digital electronics fundamentals.

Unit 1:
Number Systems:
Decimal, Hexadecimal, Octal, binary. (For fixed and floating n-base Point numbers).**Number System Conversions:** Decimal, Hexadecimal, Octal, and Binary. **Arithmetic Operations in different number systems:** Addition, Subtraction, Multiplication and division. Arithmetic Operations using 1's complement, 2's complements, 9's, 10's i.e. n and n-1 complement, **Alphanumeric codes**-BCD,Excess-3, Gray code Error detection and correction.

Unit 2:
Switching Theory:
Introduction to analog and digital signal, Analog and digital system Logic gates and switching functions: AND, OR, NOT, EX-OR, EX-NOR, Universal gates : NAND, NOR, **Truth tables and switching expressions:** Implementation of Universal gates using Logic gates, De Morgan's Theorem, Boolean Algebra, Representation of logic functions using POS and SOP form, Minimization of completely and incompletely specified switching functions- K- map (2,3,4 variable)

Unit 3:
Karnough map (5,6 variables), Quine – Mccluskey, TTL and CMOS logic families, Multiple O/P Minimization , Half and full adder, Half and full Substractor, BCD to 7- segment decoder, Binary to gray code Converter, Gray to Binary code converter, Representation and manipulation of functions using BDD's. **Combinational circuits Design:** Combinational circuits, Multiplexers, Demultiplexers, Multiplexer, Combinational

Unit 4:
Design using LSI and MSI for ALU, Design of PCA, Adders, Subtractors, (BCD adders, BCD Subtractor) Arithmetic (Subtractor)

Unit 5:
Sequential Circuits and Design: Difference between sequential and combinational circuit, Synchronous and asynchronous circuits, Flip Flop, Registers, Counters, Sequential Circuits Implementation.

Unit 6:
FSM and ASM
FSM : Finite state machines, Regular Expressions Using FSM, Optimization using FSM, Reduction of states , Mealy and Moore machine.
SM - ASM Charts: Representation of sequential circuits using ASM Charts, Synthesis of O/P and next state functions, Data path and control path partition-based design.

Text Books:

1. Z. Kohavi**,** *Switching Theory and Finite Automata*, TMH Pub.
2. Moris Mano, *Digital Computer Design*, PHI.

Reference Books:

1. F. J. Gill Peterson, *Switching Theory and Logic Design*, John Wiley Pub.
2. S. Lee, *Digital Circuits and Logic Design*, PHI
3. R. P. Jain, *Digital Electronics*, TMH Pub.
4. Hatchel and Gray ,*Logic Synthesis and Verification Algorithms*,Kluwer Academic

CEIT2105: Discrete Mathematics

Prerequisite: Engineering Mathematics - II

OBJECTIVE:
Learn basic terminology, formal logic, proofs, sets, relations, functions, recursions. Use formal logic proof and logical reasoning to solve problems. Relate the ideas of mathematical induction to recursion and recursively defined structures. Learning graphs trees and related algorithms. Relate, interpret and apply this concept to various areas of computer science.

Unit 1: [**8 Hrs]**
Fundamental structures and Basic Logic:
Sets, Venn diagram, Completeness, Cartesian product, Power sets, pigeonhole principle, Cardinality and countability. Propositional logic, logical connectives, truth tables, normal forms, validity, predicate logic, limitations of predicate logic, universal and existential quantification, modus ponens and modus tollens.

Unit 2: **[6 Hrs]**
Functions and Relations:
Subjective, Injective, Bijective and inverse functions, Composition of function, Reflexivity, symmetry, Transitivity, and Equivalence Relations.

Unit 3: **[8 Hrs]**
Proof Techniques:
Notions of implication, converse, inverse, Contra-positive, negation and contradiction, structure of formal proofs, directs proofs, proof by counterexample, proof by contradiction, mathematical induction, strong induction, recursive mathematical definitions, well orderings.

Unit 4: **[8 Hrs]**
Graph Theory:
Basic terminology, multi graphs and weighted graphs, paths and circuits, shortest path problems, Euler and Hamiltonian paths, Representation of graph, isomorphic graphs, Planar Graphs.

Unit 5: **[4 Hrs]**
Trees:
Trees, rooted trees, path length in rooted tree, binary search trees, spanning trees and cut set, minimal spanning trees, Kruskal's and Prim's algorithms for minimal spanning tree.

Unit 6: **[10 Hrs]**
Algebraic Systems:
Algebraic Systems, Groups, Semi Group, Monoid, Subgroup, Isomorphism and Homomorphism, Rings and Fields, Lattices, Boolean lattices and Boolean algebra.

Text Books:

1. C. L. Liu, *Elements of Discrete Mathematics*, 2nd Edition, McGraw Hill Pub 2002.
2. Kenneth H. Rosen, *Discrete mathematics*, 5th Edition, McGraw Hill Pub 2003.

Reference Books:

1. Lipschutz Lipson, *Discrete Mathematics*, 2nd Edition TMH, 1999.
2. V. K. Balakrishn, *Graph Theory*, TMH (Recommended for Graph).

CEIT2106: Programming Lab

List of Experiments:

Implement following programs in C++

1. Write a program using function to check entered number strong or not.
2. Write a program for implementing friend function, as a member function.
3. Write a program using class to create calculator to perform addition, subtraction, multiplication and division operations.
4. Write a program where friend function is used as a bridge between two or three classes.
5. Write a program for implementing following types of inheritance.
   i) Single inheritance ii) Multilevel inheritance iii) Multiple inheritance
   iv) Hierarchical inheritance v) Hybrid inheritance
6. Write a program to overload function volume three times.
7. Write a program to overload + +, - - operators.
8. Write a program to implement constructor and copy constructor.
9. Write a program by using pointer to implement structure.
10. Write a program for virtual function and pure virtual function.
11. Write a program using function template and class template.
12. Write a program on exception handling for any run time error e.g. divides by zero, overflow or out of range.

Implement following programs in JAVA

1. Write a program to check entered number perfect or not.
2. Write a program to check entered number strong or not.
3. Write a program by using function to calculate power if base and raised to power value given.
4. Write a program to implement single inheritance.
5. Write a program for matrix operations like addition, subtraction or multiplication.

Text Books:

1. E. Balgurusamy, *Object Oriented Programming with C++*, TMH 1997.
2. Robert Lafore, Galgotia*Object Oriented Programming in turbo C++*, Galgotia Pub, 1996.
3. Seyed H. Roosta, *Foundations of Programming languages Design and Implementations*, Thomson Pub
4. Prata, Foundation of Programming Language, TMH pub.

Reference Books:

1. Ellis Horowitz, *Fundamental of programming Languag*e, Galagotia Publication.
2. Doris Appleby, *Programming Languages Paradigm and Practice*, McGraw Hill.
3. S. Koshafian, *Object Orientation*, Wiley Pub.
4. Sebesta, *Principles of Programming Language*, Addison Wesley.
5. Ravi Sethi, *Programming Language*, Addison Wesley.

CEIT2107: Computer Organization Lab

1. Study of general organization of PC.
2. Study of Motherboard and its components.
3. Case study of 8085
4. Study of various memory devices like RAM, Hard disk, Floppy disk CD, etc.
5. Assembly language programs for basic operations like addition, subtraction, multiplication and division.
6. Implementation of FIFO replacement algorithm.
7. Implementation of LIFO replacement algorithm.
8. Implementation of LRU replacement algorithm.
9. Implementation of Booth's algorithm.
10. Study of input/output devices.

Text Books:

1. Hays, *Computer Architecture and Organization*, McGraw Hill Pub.
2. Zaky, *Computer Organization*, McGraw Hill Pub.

Reference Books:

1. Henssey and Patterson, *Computer Architecture a quantitative Approach*, Morgan and Kaufman Pub.
2. Moris Mano, *Computer Architecture and Organization*, PHI.
3. Stone, *Introduction to computer organization and Data Structure*, McGraw Hill Pub.

CEIT2108: Switching Theory and Logic Design Lab

List of Experiments:

1. Implementation of Boolean function using Logical Gates.
   - Code converters : Binary code to Gray code and vice versa, Excess-3 code to BCD and vice versa.
2. Application of Multiplexer and Demultiplexer.
3. BCD adder/substractor using 4 bit adder IC.
4. Study of Flip Flops, Designing up/down counter using, Flip Flops .
5. Designing divide by N counter using 7490/74191 etc.

OR

5. Design and implementation of sequence generator.
6. Design and implementation of sequence detector (Mealy/Moore).
7. Simple ASM using, multiplexer controller- method.
8. Design and implementation of digital circuit using, RTL (Data section using, 74 series chips and control section using shift register controller and classical methods).

OR

8. Design of controller and ALU with hypothetical instruction set.

Extensive use of CRO, logic analyzer is to be made in experiments.

Text Books:

1. Z. Kohavi**,** *Switching Theory and Finite Automata*, TMH Pub.
2. Moris Mano, *Digital Computer Design*, PHI.

Reference Books:

1. F. J. Gill Peterson, *Switching Theory and Logic Design*, John Wiley Pub.
2. S. Lee, *Digital Circuits and Logic Design*, PHI
3. R. P. Jain, *Digital Electronics*, TMH Pub.
4. Hatchel and Gray ,*Logic Synthesis and Verification Algorithms*,Kluwer Academic

CEIT2109: Numerical Programming Lab

Prerequisite: Computer Oriented Numerical Programming in either C++/Java based on following topics:

Unit 1:
Solution of Algebraic and transcendental equation: Bisection methods of false position, Newton's methods and Newton-Raphson method. Approximate solution of equation – Horner's methods.

Unit 2:
Solution of linear simultaneous equation: Gauss Elimination methods. Gauss Jordan method. Crouts Triangular method.Iterative methods of solution- Jacobi Iteration method, Gauss-Seidal Iteration method, Relaxation method.

Unit 3:
Finite Differences: Forward difference operator, Backward Difference operator, Central difference operator, Newton's Interpolation Formulae, Newton's Forward –backward-Central Interpolation Formulae, Sterling Formula, Bessel's Formula Interpolation with unequal intervals.

Unit 4:
Differentiation and Integration: Newton-Cortes Formula. Trapezoidal Rule. Simpson One – Third Rule, Simpson Three- Eight Rule. Weddle's rule.

Unit 5:
Numerical Solution of ODE: Picards methods, Taylor series method, Euler's method, modified Euler's method. Runge- Kutta method. Predictor –Corrector methods-Milne's method.

Unit 6:
Adams-Bash forth method, second –order Differential equation. Numerical Solution For Ell optical Partial differential Equation.

Text Books:

1. B.S Grewal **,** Higher Engineering Mathematics
2. S.S.Shastri **,** Introduction to Numerical Methods

Reference Books:

1. Contee and Deboor , Elementary Numerical Analysis.
2. E. Kreysing , Advanced Engineering Mathematics .
3. V. Rajaraman , Computer Oriented Numerical Methods.
4. Chhapra, Numerical Methods

List of Experiments:

1. Implementation of Trapezoidal rule

2. Program for Bisection method
3. Program for False position method
4. Program for Newton-Rapson methods
5. Program for Euler's methods
6. Program for Euler's modified methods
7. Program for Runge Kutta 2nd Order method
8. Program for Runge Kutta 4th Order method
9. Program for Gauss Elimination methods
10. Program for Gauss Jordon methods
11. Program for Jacobis methods
12. Program for gauss seidal methods
13. Implementation of Simpson's 1/3 and 3/8 rule

CEIT2110: Mathematical Foundations Lab

List of Assignment:

1. Program to find out category of numbers. (Real, Natural, Whole etc.)
2. Program for Lagrange Interpolation method.
3. Write a program to check that whether entered sets are equal, equivalent, subsets or proper subsets.
4. Write a program to implement Set operations using arrays- union, intersection, difference, symmetric difference.
5. Program to implement Cartesian product of two sets.
6. Program to determine truth values like conjunction, disjunction etc.
7. Program to determine the properties of relation. (Transitive, reflexive, symmetric)
8. Program to implement adjacency and incidence matrix.
9. Program to implement Prim's algorithm
10. Program to implement Kruskal's algorithm

Text Books:

1. C. L. Liu, *Elements of Discrete Mathematics*, 2nd Edition, McGraw Hill Pub 2002.
2. Kenneth H. Rosen, *Discrete mathematics*, 5th Edition, McGraw Hill Pub 2003.

Reference Books:

1. Lipschutz Lipson, *Discrete Mathematics*, 2nd Edition TMH, 1999.
2. V. K. Balakrishn, *Graph Theory*, TMH (Recommended for Graph).

CEITAU2111: Language Proficiency – I (Audit)

Unit 1: **[03 Hrs]**

Technical Writing:

Basic facts of Technical Writing, Importance of Style in Technical Writing, Use of Illustrations in Technical Writing

Unit 2: **[03 Hrs]**

Mechanics of Writing, Stages of Writing, Style and Tone

Unit 3: **[02 Hrs]**

Dictionary and Thesaurus Usage, Deleting Redundancies/Using Simple words

Unit 4: **[02 Hrs]**

Proper use of Abbreviations, Numerals and Capitalization

Unit 5: **[02 Hrs]**

Instructional Writing, Writing Research Papers, Abstract Writing

Unit 6: **[02 Hrs]**

Writing Dissertation and Thesis, Minutes Writing

Reference Books:

1. Anne Eisenberg, A Beginner's Guide to Technical communication, Tata McGraw Hill publication.
2. Rutherford, Basic Communication skills for Technical Students, 2nd edition, Pearson Education publication.

Reference Books:

1. Chaturvedi and Chaturvedi, Business communication, Pearson Education publication.
2. M.A.Rizvi, Effective Technical Communication, Tata McGraw Hill publication.

CEIT2201: Principles of Management

Prerequisite: Nil

Objective: *To make the student familiar with management and finance concepts.*

Unit 1: **[6 Hrs]**

Introduction to management:

Evolution of management Science, Contributions of F.W Taylor, Henry Fayol, Gantt,Gilbreth etc.Definations of Management, Management as an art, Science and profession, Management, Administration and Organization concept, Levels of managements, Functions of Management, Management by objectives.

Unit 2: **[6 Hrs]**

Managerial Economics:

Basic Economy concepts: Human wants, Economics Goods,Price Value ,Utility, Wealth.Law of Demands,Law of Supply, Scales of production, internal and external economics of scale. Concepts of E-commerce, E-Business management, E-Governance, Enterprise Resource Planning (ERP). Intellectual property laws: Patents, Copyrights, Trademarks law of contracts: Salient Features, Role of Chambers of Commerce and Industries.

Unit 3: **[6 Hrs]**

Business Organisation:

Norms of Business Organisation, Definitions, Features, Advantages, Disadvantages of Indivisual proprietorship, Partnership, Joint stock companies, co-operatives and Public Sector Under takings. Types of companies, Formation of Joint stock company. MOA and AOA. Organisational structures, Definition, types, merits and demerits of each of structures (line, functional, Line and Staff, Committee, Matrix and Project structure).

Unit 4: **[6 Hrs]**

Human Resource Management:

Manpower planning, Factors affecting manpower planning, Process of manpower planning, Recruitment, selection, training. Communication: Elements, process principles, Barriers listening skills, body language, Media of communication. Communication in Organisation (vertical, horizontal etc) Motivation concept and meaning. Maslows theory Of need hierarchy, Mc Gregors theory X and theory Y.

Unit 5: **[6 Hrs]**

Financial Management :

Capital and its significance, Types of Capital, Estimation of Capital Requirements, Methods of raising capital, Concept of Money market and capital market, cost analysis, classification, of costs, Financial statements P and L account, Balance sheet)Budget and Budgetary control, Financial Institutions sources capital.

Unit 6: **[6 Hrs]**

Financial Analysis:

Ratio Analysis, Break even Analysis ,Introduction to capital budgeting methods (Pay back method, Accounting rates of returns and net present value method) concept of annuity, Depreciation ,Basics of credit rating of software projects and organization.

Ratio Analysis Liquidity ratios, (current ratio and Quick ratios) Activity Ratios (Inventory

Turnover Ratio) Capital Turnover Ratio (Debt-Equity ratio), Profitability Ratio (Gross Profit Ratio, Net Profit Ratio).

Text Books:

1. A.RAryasri “Managerial Economics and Financial Analysis ”, Tata McGraw Hill.
2. A.RAryasri “Management Science”, Tata McGraw Hill.
3. Industrial Organization, O. P. Khanna.

Reference Books:

1. Harold Koontz –Heinz Weihrich “Essentials of Management”, Tata McGraw Hill.
2. Prasanna Chandra, “Financial Management Theory and Practice”, Tata McGraw Hill.

CEIT2202: Microprocessor and Interfacing

Prerequisite: Computer Organization

OBJECTIVES:
To learn the architecture and assembly language programming of 8086 microprocessor. To study peripherals and their interfacing with 8086 microprocessor.

Unit 1: **[6 Hrs]**
Terminology:
Microprocessor and Microcomputers, Computer Codes, Programming.

Unit 2: **[4 Hrs]**
Processor Architecture:
80x86 Processor Architecture, Pin diagram. Physical Memory organization, general bus operations, Minimum and Maximum mode, System and Timings.

Unit 3: **[6 Hrs]**
Programming 8086:
Introduction to 80x86 programming, 80x86 programming Techniques. Instruction set 8086, Addressing modes, Assembler directives and operators 80x86 Assembly Languages Programming examples. Machine coding of the programs.

Unit 4: **[10 Hrs]**
Special Architectural features:
Introduction to Stack, Stack structure in 8086/88**,** interrupts and interrupt service routines, interrupt cycle in 8086/88, NMI and INTR, Interrupt programming, Procedures, Macros, Timing and delays.

Unit 5: **[8 Hrs]**
Basic Peripherals interfacing with 8086/88:
Memory interfacing, Dynamic RAM Interfacing, Interfacing I/O ports, interfacing 8255A-PIO with 8086/88, Interfacing Analog to Digital Converter and Digital to Analog Converters.

Unit 6: **[6 Hrs]**
Special Purpose Programmable Devices:
88237-DMA controller, Data Communications-synchronous and asynchronous, Digital data transmission using modems, 8251A USART–block diagram and pin description. 8253 Programmable Interval Timer, 8259A Programmable Interrupt controller, 8279 Keyboard/Display Controller.

Text Books:

1. Douglus Hall, *8086 Microprocessor, Architecture and Programming*, PHI.
2. Uffenback , *8086 Microprocessor*, PHI.
3. A. K. Ray and K. M. Bhurchandi *Advanced Microprocessors and Peripherals,* TMH

Reference Books:

1. Liu and Gibson, *Microcomputer system – The 8086/8088 family*, PHI.
2. John F.Uffenbeck, *The 8086/8088 family design, programming and interfacing*, PHI
3. Turley *Advanced 80386 programming*, MGH pub.

CEIT2203: Probability Statistics and Queuing Theory

Prerequisite: Engineering Mathematics II

OBJECTIVE:
To provide an introduction to probability and statistic required for computer engineering and information technology field.

Unit 1: **[7 hrs]**
Probability:
Axiomatic definition of Probability, Conditional probability and independence, Bays theorem, Geometric portability.

Unit 2: **[7 hrs]**
Random variables and their properties, some standard discrete and Continuous variables.

Unit 3: **[7 hrs]**
Statistics:
Mathematical Expectations, Mean variance and Moments generating function, Characteristics functions and its properties Law of large numbers, central, limit theorems.

Unit 4: **[7 hrs]**
Correlation.

Unit 5: **[7 hrs]**
Regression:
Simple multiple and partial Estimation of parameters, Properties of best estimates, Test of significance.

Unit 6: **[7 hrs]**
Queuing Theory:
Markov chains, queuing models, M/M/K and M/G/K, finite queues and their steady state behavior, computer science applications.

Text Books:

1. Kishor S. Trivedi, *Probability and Statistics with Reliability Queuing and Computer Science Applications*, PHI pub.
2. Spiegel, Schiller, Shrinivasan, *Probability and Statistics*, 2nd Edition, TMH Pub.

Reference Books:

1. W. Feller, *An Introduction to probability theory and its application*, Willey Eastern pub.
2. Papoulis, Pillai, *Probability, Random Variables and Stochastic Processes*, TMH pub.

CEIT2204: Data Communication

Prerequisite: Nil

OBJECTIVE:

To understand transmission and reception of basic communication system, procedure of wireless, satellite communication system, the modern communication techniques

Unit 1: [7 Hrs]

Introduction:

What is Component of Communication, Data Representation, Data Flow, communication model, network, network topologies, network connection, network categories, LAN, WAN, MAN, Internet.

Data and Signals:

Analog and digital data, analog and digital signals, periodic and non-periodic signals, Sine wave, Parameters of sine wave, Time and frequency domain, Composite signals, bandwidth, Digital signal-Bit rate, Baseband and broadband transmission, Transmission impairments, Nyquist bit rate, Shannon capacity, Performance- Throughput, Latency, Bandwidth
-delay product, jitter.

Unit 2: [5 Hrs]

Digital Transmission:

Digital and digital conversion, Techniques, Signals element, data element, signal rate, data rate, DC-component, Self synchronization, Line Coding Schemes - NRZ, NRZI. Bipolar AMI. Pseudoternary. Manchester, Differential Manchester. Block coding schemes -4B/5B, 8B/10B. Scrambling –HDB3, B8ZS. Analog to Digital Conversion: Pulse code modulation. Delta Modulation. Transmission Modes- serial and parallel transmission.

Unit 3: [6 Hrs]

Analog Transmission:

Digital and Analog conversion- Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying, Quadrature amplitude Modulation. Analog to Analog Conversion - Amplitude Modulation, Frequency Modulation, Phase Modulation.

Multiplexing: Need of multiplexing, Introduction, Multiplexer and Demultiplexer, Frequency Division Multiplexing, Wavelength Division Multiplexing, Time Division Multiplexing – Statitical TDM, Synchronous TDM. Datarate management in TDM.

Unit 4: [6 Hrs]

Transmission Media:

Guided Media – Twisted Pair Cable, Co-axial cable, Fiber Optic Cable, Performance of each, Unguided media – Radio waves, Microwaves, Infrared.

Network Models: Layered tasks, OSI Model – Layered Architecture, Layers in OSI model TCP/ IP model. Comparison.

Unit 5: [5 Hrs]

Error Detection and Correction:
Introduction – Types of errors, Redundancy, Detection versus correction, Forward error correction and retransmission, Modular arithmetic. Block Coding –error detection, error correction, Hamming distance, Minimum Hamming distance, Linear block codes, Cyclic Codes – Cyclic Redundancy check, Hardware implementation, Polynomials, Cyclic code analysis, Checksum – Concept, One's component, Internet checksum.

Unit 6: **[6 Hrs]**

Multiple Access:
Random Access Protocol, - ALOHA, CSMA, CSMA/CD, CSMA/CA. Controlled Access :Reservation, Polling, Token passing, Channelization :FDMA, TDMA, CDMA.

Cellular Phones and Satellite Networks:
Frequency reuse principle, roaming, three generations Satellite networks : Orbits, GEO, MEO, LEO satellite.

Text Books:

1. Schweber, *Data Communication*, McGraw Hill Pub.
2. Forouzan, *Data Communication and Networking,* TMH Pub.
3. Stalling, *Data Communication and Computer Network.*

Reference Books:

1. Roddy Coolan , *Electonic Communication*, PHI.
2. William A. Shay, Understanding *Data Communication and Networks*, Thomson Learning.
3. Miller, *Data Communication.*

Special References:

1. www.techbooksforfree.com/intro_to_data_com
   (For introductory and some core part of syllabus)
2. www.williamstalling.com (For material and slides(for reference))

CEIT2205: Data Structures

Prerequisite: Programming languages and paradigms and Methodologies.

OBJECTIVE:

Study the representation and use of primitive data types and built-in data structures. Study how the data structures are allocated and used in memory. Study common applications of each of the data structures. Implement the use of defined data structures in high-level language. Compare alternative implementations of data structures. Compare and contrast the benefits of dynamic and static data structures.

Unit 1: [6 Hrs]

Introduction:

Data, Data types, Data structure, Abstract Data Type (ADT), representation of Information, characteristics of algorithm, program, analyzing programs, time and space complexity, Big 'O' and 'Ω' notation, best average and worst cases.

Unit 2: [5 Hrs]

Arrays:

Concept of sequential organization, linear and non-linear data structure, storage representation, array processing sparse matrices, transpose of sparse matrices.

Unit 3: [8 Hrs]

Linked Lists:

Concept of linked organization, singly and doubly linked list and dynamic storage management, circular linked list, operations such as insertion, deletion, concatenation, traversal of linked list, dynamic memory management, garbage collection.

Unit 4: [8 Hrs]

Stacks and Queues:

Introduction, stack and queue as ADT, representation and implementation of stack and queue using sequential and linked allocation, Circular queue and its implementation, Application of stack for expression evaluation and expression conversion, recursion, priority queue.

Unit 5: [8 Hrs]

Trees and Graphs:

Basic terminology, binary trees and its representation, insertion and deletion of nodes in binary tree, binary search tree and its traversal, threaded binary tree, Heap, Balanced Trees. Terminology and representation of graphs using adjacency matrix, Warshall's algorithm

Unit 6: [8 Hrs]

Searching:

Sequential, binary searching, skip lists – dictionaries, linear list representation, skip list representation, operations – insertion, deletion and searching. **Sorting:** Insertion sort, selection sort, radix sort. File handling

Text Books:

1. Mark Allen Weiss, *Data structures and algorithms analysis in C++*, Second edition,

Pearson Education.
2. S. Lipschutz, *Data Structures*, McGraw Hill Pub.
3. Y. Langsm, M. Augenstin, A. Tanabaum,*Data Structure using C and C++*, Pearsons Education Asia Pub.
4. Trembley and Sorenson, *Introduction to Data Structures*, PHI Pub.

Reference Books:

1. E. Horowitz, S. Sahani, *Data Structure and Algorithm*, Galgotia Pub.
2. Thomson Cormen, *Introduction to Algorithms*, PHI.
3. Sara Base, *Computer Algorithm, Introduction to design and analysis,* Addison Wesley Pub

CEIT2206: Microprocessor and Interfacing Lab

List of Experiments

1. Study of MASM/TASM.
2. Write an assembly language program to perform 8 bit, 16 bit addition.
3. Write an assembly language program to perform 8 bit, 16 bit subtraction.
4. Write an assembly language program to perform negative result Subtraction.
5. Write an assembly language program to perform 8 bit, 16 bit Multiplication.
6. Write an assembly language program to perform16 bit by 8 bit division
7. Write an assembly language program to check whether entered number is even or odd.
8. Write an assembly language program to calculate average of temperatures.
9. Write an assembly language program to perform sum of digits for 2, 3 digits numbers.
10. Write an assembly language program to perform conversion from two ASCII no's to packed BCD.
11. Write an assembly language program to perform conversion from BCD to Hex.
12. Write an assembly language program to add inflation factor using array.
13. Write an assembly language program to add profit to price array.
14. Write an assembly language program to generate Real time clock.

Text Books:

1. Douglus Hall, *8086 Microprocessor, Architecture and Programming*, PHI.
2. Uffenback , *8086 Microprocessor*, PHI.
3. A. K. Ray and K. M. Bhurchandi *Advanced Microprocessors and Peripherals*, TMH

Reference Books:

1. Liu and Gibson, *Microcomputer system – The 8086/8088 family*, PHI.
2. John F.Uffenbeck, *The 8086/8088 family design, programming and interfacing*, PHI
3. Intel 8086, 80386 manuals.
4. Turley *Advanced 80386 programming*, MGH pub.

CEIT2207: Data Communication Lab

List of Experiments:

1. Study of frequency modulation and demodulation
2. Study of sampling (Pulse amplitude modulation)
3. Study of frequency division multiplexing and demultiplexing
4. Study of time division multiplexing and demultiplexing
5. Packet transmission
6. Study of stop and wait protocol
7. Study of sliding window protocol
   (a) Go Back n
   (b) Selective Repeat
8. Study of ALOHA and CSMA
9. Study of CSMA/CD
10. Study of token passing access method

Text Books:

1. Schweber, *Data Communication*, McGraw Hill Pub.
2. Forouzan, *Data communication and Networking*, TMH Pub.
3. Stalling, *Data communication and Computer Network*.

Reference Books:

1. Roddy Coolan, *Electronic Communication*, PHI.
2. William A. Shay, *Understanding Data Communication and Networks*, Thomson Learning.

CEIT2208: Data Structure Lab

List of Experiments:

1. Search Operation on linear array data structure.
   i) To find particular items location using linear search algorithm
   ii) Insertion and linear search algorithm.
   Iii) Binary search algorithm.
2. Insertion and deletion operations on linear array.
3. Sorting i) Bubble Sort ii) Insertion Sort iii) Quick Sort
   iv) Selection Sort IV) Heap Sort
4. Creation and display linked list using pointer.
5. Insertion Operation on linked list using pointer: at beginning, given location, end.
6. Deletion in linked list using pointer: at beginning, given location, end.
7. Implementation of doubly linked list using pointer.
8. Tower of Hanoi problem.
9. Traversing of tree using pointer: preorder, postorder and inorder traversal.
10. To traverse graph using Breadth First Search and Depth First Search techniques.
11. Implementation of searching algorithms.
12. Implementation of File handling concepts.

Text Books:

1. Mark Allen Weiss, *Data structures and algorithms analysis in C++*, Second edition, Pearson Education.
2. S. Lipschutz, *Data Structures*, McGraw Hill Pub.
3. Y. Langsm, M. Augenstin, A. Tanabaum,*Data Structure using C and C++*, Pearsons Education Asia Pub.
4. Trembley and Sorenson, *Introduction to Data Structures*, PHI Pub.

Reference Books:

1. E. Horowitz, S. Sahani, *Data Structure and Algorithm*, Galgotia Pub.
2. Thomson Cormen, *Introduction to Algorithms*, PHI.
3. Sara Base, *Computer Algorithm, Introduction to design and analysis,* Addison Wesley Pub

CEIT2209: Soft Skills

Objectives:

1. *To encourage the all round development of students by focusing on soft skills.*
2. *To make the engineering students aware of the importance, the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice. To develop and nurture the soft skills of the students through individual and group activities. To expose students to right attitudinal and behavioral aspects, and to build the same through activities.*

Unit 1:

Self- development:

Self- development and Assessment self-Awareness, Perceptions and Attitudes, Values and Belief systems, Personal goal setting, career Planning, Self-Esteem, Building of self-confidence.

Unit 2:

Verbal and Nonverbal spoken communications:

Includes planning, preparations, delivery and feedback and assessment of activities like: Public speaking, Group discussions, Oral presentation skills, perfect interview, listening and Observation skills, Body language, Use of presentation graphics , Use of presentation aids, Study of communication barriers.

Unit 3:

Written communications:

Technical writing: technical reports, project proposals, brochures, newsletters, technical articles, and technical manuals.

Official/ business correspondence: Business Letters, memos, Progress report, Minutes of meeting, event reporting. Use of : Style grammar and vocabulary for effective **technical** writing Use of : Tools , Guidelines for technical writing , publishing.

Unit 4:

Ethics and Etiquettes:

Business Ethics, Etiquettes in social as well as office settings, E-mail Etiquettes, Telephone Etiquettes, Engineering Ethics and Ethics as an IT professional, Civic sense.

Unit 5:

Leadership skills and Interpersonal communications:

Leaders: their skills, roles and responsibilities. Vision, empowering and delegation, motivating others, organizational skills, problem solving and conflict management, team building, interpersonal skills. Organizing and conducting meetings, decision making, giving support.

Unit 6:

Others skills:

Managing Time, Stress, Meditation. Understanding roles of Engineer's and their responsibilities.

Exposures to work environment and culture in today's job places, improving personal memory, Study skills that include Rapid Reading, Notes Taking, Self learning, Complex problem solving and creativity.

Reference Books:

Topic 1:

1. Shiv Khera," YOU CAN WIN", Macmillan Books. 2003 revised edition.
2. Stephen Covey," 7 Habits of highly effective people".

Topic 2 and 3:

1. John collin," Perfect Presentation", Video Arts MARSHAL
2. Jenny Rogers," Effective Interviews", Video Arts MARSHAL.
3. Raman, Sharma, "Technical Communications", OXFORD.
4. Sharon Gerson, Steven Gerson, "Technical Writing process and product", Pearson education Asia, LPE Third Edition.
5. R Sharma, K. Mohan, "Business correspondence and Report Writing", Tata McGraw Hill ISBN 0-07-044555-9.
6. Videos for Technical Education Catalog, National Education and Information Films Ltd, Mumbai.
7. Management Training and Development Catalog, National Education and Information Films Ltd, Mumbai.
8. EEBEC," Presentation Book 1,2,3", Tata McGraw Hill ISBN 0-040221-3

Topic 4, 5 and 6:

1. Tim Hindle," Reducing Stress", Essential Manger Series DK Publishing.
2. Shelia Cameron," Business Students Handbook", Pitman Publishing.
3. Dr. R. L. Bhatia," Managing Time for a competitive edge".
4. Lorayne, Lucas "Memory Book".
5. Robert Heller, "Effective leadership", Essential Managers DK publishers.
6. Newstrom, Keith Davis, "Organizational Behavior", Tata McGraw Hill.
7. Sasikumar, P Dhamija," Spoken English (With video cassettes)" Tata McGraw Hill ISBN 0-07-460358-2.

CEIT2210: Language Proficiency – II (Audit)

Unit 1: **[03 Hrs]**

Creativity:

Creativity and Profession, Ways to be creative, developing your Creativity, Creating Intuitive Space, Factors that Block Creativity, Creativity in Workplace

Unit 2: **[02 Hrs]**

Oral communication:

Importance of Language Learning Skills, Listening: Active Listening, Barriers to Good Listening

Unit 3: **[03 Hrs]**

Speaking:

Speech Styles, Presentation Skills

Unit 4: **[02 Hrs]**

Visual Aids:

Use of Visual Aids, the Language of Meetings

Unit 5:

Discussion: **[03 Hrs]**

Group discussions, Body Language, Studying Body Language

Unit 6: **[03 Hrs]**

Distance and Positioning, Body Orientation, Vocabulary Building

CE3101: Theory of Computation

Prerequisite: Discrete Mathematics.

OBJECTIVE:
To understand the various languages, and their grammars. To make the students know the various machines accepting those languages.

Unit 1: **[6 Hrs]**
Finite Automata and Regular Expressions:
Definition of Deterministic Finite Automata, Non Deterministic Finite Automata, Moore and Mealy Machines and their conversions, Regular Expressions, recursive definition, NFA with e-Moves, Interconversion between NFA and DFA and DFA regular expression and FA, Pumping lemma.

Unit 2: **[4 Hrs]**
Context Free Grammers:
Definition, production rules, ambiguous grammar, removal of ambiguity, Chomsky hierarchy, Context Free Grammar (CFG) - definition simplification of CFG.

Unit 3: **[6 Hrs]**
Context Free Languages:
Definition of Context free Languages, regular grammar definition, left linear right linear grammar, Interconversion between left linear and right linear regular grammar, Regular grammar and finite automata, CNF, GNF, derivation graphs type0 and type1 grammars.

Unit 4: **[6 Hrs]**
Pushdown automata:
Formal definition, Pushdown automata (PDA), deterministic pushdown automata (DPDA) – definition, non-deterministic pushdown automata (NPDA)-definition relative powers of DPDA and NPDA.

Unit 5: **[7 Hrs]**
Turing Machines:
The definition of a Turing machine, computing with Turing machine, Extensions of Turing machines, Random access Turing machines, Non-deterministic Turing machines, Grammars. The Church's Turing Hypothesis, Universal Turing Machines, the Halting problem, Unsolvable problems about Turing machines.

Unit 6: **[6 Hrs]**
Applications:
Applications of RE and FA - Lexical analyzer, text editor, and searching using RE. Applications of PDA - Expression conversion. Applications of CFG – syntax analysis, language definition.

Text Books:

1. Hopcroft, Ullman, *Introduction to Automata Theory, Languages, and Computation*,

Addison Wesley Pub.
2. Daniel I. A. Cohen, *Introduction to computer theory*, Willey Pub.

Reference Books:

1. John C. Martin, *Introduction to Languages and Theory of Computation*, McGraw Hill.
2. Papadimitriou, *Elements of the Theory of Computations*, PHI.
3. E. V. Krishnmurthy, *Theory of Computer Science*, EWP Pub.

CE3102: Object Oriented Analysis and Design

Prerequisite: Programming languages paradigm and methodologies.

OBJECTIVES:
The goal of this subject is to make the students to know the concepts of object oriented analysis. Also to make them to understand the various system by using the object oriented concepts.

Unit 1. **[6 Hrs]**
Introduction:
overview of object oriented system, Object orientation, Objects, attributes, object behavior,Object respond to messages, encapsulation, Inheritance, Polymorphism, object relationships and association, aggregation,Object identity static and dynamic binding, Object persistence, meta classes. Object oriented system development life cycle.

Unit 2. **[6 Hrs]**
Object oriented modeling :
Modeling, UML Modeling, class diagram, activity diagram,
Sequence diagram,collaboration diagram, statechart diagram, interaction diagram,
Implementation diagram, use case diagram.

Unit 3. **[6 Hrs]**
Object oriented analysis :
Use case analysis, CRC card analysis

Unit 4 **[6 Hrs]**
Object Oriented Design: Design Patterns.

Unit 5
Implementation **[6 Hrs]**
From Design to Implementation, Programming Style, Object-Oriented languages, Non- Object-Oriented languages, Object Oriented Databases.

Unit 6. **[6 Hrs]**
Computer animation, Electrical Distribution design System, Future of Object-Oriented Technology.

Text Books:

1. Grady, Booch, *Object Oriented analysis and design with applications*; 2nd Edition, PHI
2. James Rumbaugh, *Object-Oriented Modeling And design*, 1st Edition, PHI Pub
3. Ali Bahrami, Object Oriented Systems Development , 1st Edition Tata Mcgraw - Hill Pub

Reference Books:

1. Robert Lafore, *Object oriented programming*, Galgotia Pub.
2. E – Balagurusamy, *Object oriented programming*, TMH Pub.
3. S. Koshafian, *Object Orientation*, Wiley Pub.

CE3103: Operating System

Prerequisite: Data structures.

OBJECTIVE:
Students will be able to learn about memory management, file management, distributed system, multiprocessor system, and process management concepts in regard with the operating system.

Unit 1: **[6 Hrs]**
Introduction and Operating system structures:
Definition, Types of Operating system, Real-Time operating system, System Components-System Services, Systems Calls, System Programs, System structure. Virtual Machines, System Design and Implementation, System Generations.

Unit 2: **[7 Hrs]**
Processes and CPU Scheduling:
Process Concept, Process Scheduling, Operation on a process, Co-operating processes. Threads, Interprocess Communication, Scheduling criteria, scheduling Algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Scheduling Algorithms and performance evaluation.

Unit 3: **[7 Hrs]**
Process Synchronization:
The critical-section problem, Critical regions, Synchronization Hardware, Semaphores, Classical Problems of synchronization, Monitors Synchronizations in Solaris.

Unit 4: **[7 Hrs]**
Deadlocks:
Systems Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Combined approach to deadlock Handling.

Unit 5: **[7 Hrs]**
Memory Management and **Virtual Memory:**
Logical versus Physical address space, Swapping, Contiguous allocation, Paging, Segmentation with Paging, Demand Paging, Page replacement algorithms, Thrashing.

Unit 6:
File Management: **[7 Hrs]**
File System and Secondary storage devices, Real-Time Operating Systems, RT Linux and Case Studies: MS-DOS and UNIX.

Text Books:

1. A. Silberschatz, Peter B Galvin, *Operating System Concepts*, Addison Wesley Publishing Company, 1993.
2. Andrew S. Tanenbaum, *Modern Operating System*, PHI Pub, 1995.

Reference Books:

1. D.M. Dhamdhere, *Systems Programming and Operating Systems*, (2nd Edition) TMH,

1996.
2. Garry Nutt, *Operating Systems Concepts*, Addison Wesley.
3. Harvey M. Deitel, *An Introduction to Operating Systems*, Addison Wesley Pub.

Prerequisite: Data structures.

OBJECTIVES:
The student will be able to learn the concept of database familiarize the different data models, create application using available database packages.

Unit 1: **[6 Hrs]**
Introduction:
Database system verses File System, Views of Data Models, Database languages, overall architecture of DBMS.

Unit 2: **[7 Hrs]**
Data Models:
Entity Relationship model and Relational Model, Brief description of Hierarchical and Network Model.

Unit 3: **[7 Hrs]**
Relational Database Model:
SQL and other relational languages like Relational Algebra, Tuple calculus, and domain calculus

Unit 4: **[7 Hrs]**
Advanced SQL:
Integrity and Security, Relational Database Design: Functional dependency, Decomposition

Unit 5: **[7 Hrs]**
Data Storage and Query Processing:
Storage and File Structure, Indexing and Hashing, Query Processing.

Unit 6: **[7 Hrs]**
Advanced Topics:
XML and Database System Architecture.

Text Books:

1. Korth, Schilberschatz, *Database Management Concepts*, TMH Pub.
2. James Martin, *Principles of Database Management*, TMH Pub.

Reference Books:

1. C. J. Date, *Introduction to Database Management*, Narosa Pub.
2. Ivan Bayross, *SQL, PL/SQL*, BPB Publication.

CE3105: Design and Analysis of Algorithms

Prerequisite: Data structures.

OBJECTIVES:

To make the student to understand the various solvable and unsolvable problems and their complexities. Also to understand various algorithmic methods and study how to make the use of these methods for solving the problems.

Unit 1: **[6 Hrs]**

Introduction:

Review to data structures, Trees-AVL trees and RB tree, algorithm specification, Performance analysis,**Complexity of algorithm** : Time complexity ,Asymptotic notations ,Big O notation ,Θ notation ,Ω notation , Recurrences

Unit 2: **[6 Hrs]**

Divide and conquer:

General method ,Merge sort, Quick sort, Selection sort, Strassen's matrix multiplication. **Sorting in linear time :**Counting sort , Radix sort , Bucket sort .Analysis of these algorithm.

Unit 3: **[6 Hrs]**

The greedy method:

The general method, Knapsack problem, Huffman Coding algorithm, Job sequencing with deadlines, Minimum cost spanning tree, Optimal storage on tapes, Single source shortest path.
Advanced data structures : Btrees ,Binomial heap and Fibonacci heap .

Unit 4: **[6 Hrs]**

Dynamic programming:

The general method, Multistage graph, optimal binary search trees, matrix chain multiplication , 0/1 knapsack, longest common sequence, assembly line scheduling

Unit 5: **[6 hrs]**

Direct address tables :

Algorithm for inserting an element into direct address tables ,
deleting an element from direct address tables ,searching an element .Complexities of these algorithms .**Hash tables** : Comparison with direct address tables ,binary search trees .
Algorithm for insertion and searching ,hash functions , collision resolution techniques – Chaining and open addressing.

Unit 6: **[6 Hrs]**

Graphs :

Representation of graphs in memory , traversal algorithms – depth first search and
breadth first search ,topological sort ,spanning trees , minimum spanning tree – Kruskal algorithm , Prim's algorithm , Analysis of these algorithms , Dijkstra's algorithm , Bellman – Ford algorithm , Floyd – Warshall algorithm , **Backtracking :** 8 queen's problem , algorithm to solve n – queens problem,traveling salesman problem .

Text Books:

1. Corman, *Computer Algorithm*, PHI
2. Sara Base, *Computer algorithms: Introduction to Design and Analysis*, Addison Wesley

Reference Books:

1. Elise Horowitz, Sartaj Sahani, *Fundamentals of Computer Algorithms*, Galgotia Pub.
2. Aho, Ullman, *Data Structure and Algorithms*.

CE3106: Object Oriented Analysis and Design lab

List of Experiments:

1. To narrate Requirement Definition Document for the target system with following three areas:
    a. Problem Identification
    b. Problem Definition
    c. Problem Statement
2. To narrate System Requirements Specification Document for target system with reference to the IEEE 610.12.1990 standard guidelines.
3. To decompose and organize the problem domain area into broad subject areas and identify the boundaries of problem/system. Specify the behavior of the target system and map requirements to Use cases. The System Context Diagram depicts the overall System behavioral trace and Requirement Capture diagram depicts the hierarchical Use case Organization. The Use Case diagram should encompass
    a. Actors (External Users)
    b. Transactions (Use Cases)
    c. Event responses related to transactions with external agents.
    d. Detection of System boundaries indicating scope of system.
4. To depict the dynamic behavior of the target system using sequence diagram. The Sequence diagram should be based on the Scenarios generated by the inter-object communication. The model should depict:
    a. Discrete, distinguishable entities (class).
    b. Events (Individual stimulus from one object to another).
    c. Conditional events and relationship representation.
5. To depict the state transition with the life history of objects of a given class model. The model should depict:
    a. Possible ways the object can respond to events from other objects.
    b. Determine of start, end, and transition states.
6. To depict the dynamic behavior using detailed Activity diagram.
7. To prepare Class Collaboration-Responsibility (CRC) cards for the Conceptual classes traced from System analysis phase.
8. To develop logical static structure of target system with Class diagram. The model should depict
    a. Relationship between classes: inheritance, Assertion, Aggregation, Instantiation
    b. Identification of objects and their purpose.
    c. Roles / responsibilities entities that determine system behavior.

9. To represent physical module that provides occurrence of classes or other logical elements identified during analysis and design of system using Component diagram. The model should depict allocation of classes to modules.
10. To represent deployment view of the system through Architecture Diagram.
11. To narrate the Program Design Language Constructs for the target system and implement the system according to specification.

Text Book:

1. Jim Arlow, Ila Neustadt, "*UML 2 and Unified Process: Practical Object Oriented Analysis and Design.* ", 2nd Edition, Addison- Wesley, ISBN – 0321321278.
2. Tom Pender, "*UML Bible*", John Wiley and sons, ISBN – 0764526049.

Reference Books:

1. Grady Booch, James Rambaugh, Ivar Jacobson, "*Unified Modeling Language Users Guide*", 2nd Edition, Addison- Wesley, ISBN – 0321267974.
2. Martin Flower, "*UML Distilled: A Brief Guide to The Standard Object Modeling Language* ", 3rd Edition, Addison- Wesley, ISBN – 0321193687.
3. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, "*UML 2 Tool Kit*", John Wiley and sons, ISBN – 0471463612.

CEIT3107 - Operating System Lab

List of Experiments:

1. Study of all Linux Commands:
   Ls, man, pwd, cd, mkdir, chmod, cp, rm, file, we, cmp, who, Wild cards
2. Implementation of shell programming with various control statements and loops
3. Study of Linux AWK programming.
4. Implementation of various scheduling algorithm.
   Round Robin, SJF, FCFS.
5. Simulation of sequential, indexed and linked file allocation strategies.
6. Simulation of FIFO, LRU, optimal page replacement algorithm.
7. Implementation of bankers algorithm.
8. Multithreaded programming.

Text Books:

1. A. Silberschatz, Peter B Galvin, *Operating System Concepts*, Addison Wesley Publishing Company, 1993.
2. Andrew S. Tanenbaum, *Modern Operating System*, PHI Pub, 1995.

Reference Books:

1. D.M. Dhamdhere, *Systems Programming and Operating Systems*, (2nd Edition) TMH, 1996.
2. Garry Nutt, *Operating Systems Concepts*, Addison Wesley.
3. Harvey M. Deitel, *An Introduction to Operating Systems*, Addison Wesley Pub.

CE3108: Database Management System Lab

List of Experiments:

1. Draw an entity-relationship diagram for your proposed database.
2. Translate an E/R diagram to set of relations.
3. Normalize these relations to BCNF. Check normalized relations for loss-less join decomposition.
4. Write an SQL database schema for your application, using the CREATE TABLE command. Tables must be created by using on delete cascade, on update cascade, primary key, foreign key and any other integrity constraints like not null. Add CHECK constraints to relations of your database schema. Show the revised schema. Add a new column and constraint in any existing table which already has few tuples in that. Insert few tuples in newly created tables.
5. Write DML statements for your tables.
6. Write few queries on your database, using the select-from-where construct of SQL
7. Make use of various operators as between...and, in, not null, like etc. Also make use of order by clause.
8. Write queries involving single row functions.
9. Write queries using group functions. Make use of group by and having clause.
10. Write queries involving multiple tables using equijoin, non equijoin, and self join.
11. Write queries involving sub-queries.
12. Write queries involving set operators. Create two views on top of your database schema involving two or more tables.
13. Write stored functions and/or procedures in PL/SQL.
14. Write SQL Triggers.
15. Write a C program that takes input as set of Functional Dependency F and computes F closure.
16. Write a C program that takes input as set of Functional Dependency F and attributes of a relation and find out key of the given relation.
17. Write an embedded SQL program to add, modify and delete records from your table.
18. Write an embedded SQL program to execute given queries.
19. Write a C program that takes input as set of Functional Dependency F and a given attribute set and computes closure of given attribute set
20. Write a C program that takes input as set of Functional Dependency F and computes minimal cover of F.
21. Controlling user access to database (Oracle/MySql/PostGraySQL/Ms SQL Server).
22. A simple database application development for Library, Bank, and Railway reservation system using DBMS packages like ACCESS, SQL Server, ORACLE and Providing database connectivity through JDBC/ODBC and Web interface. Application should be involve E-R modeling use Database designer tools like relational designer.

Text Book:

1. Silberschatz, Korth and S.Sudarshan,'Database System Concepts', McGraw-Hill International Edition, Fifth Edition, 2006.
2. Elmasri and Navathe, 'Fundamentals of Database Systems', Addison Wesley, Second Edition, 1994.

Reference Books:

1. Thomas Connolly and Carolyn Begg,'Database Systems', Pearson Education Low Price Edition, Third Edition, 2003.
2. Ramakrishnan and Gehrke, 'Database Management Systems", McGraw-Hill International Edition, Third Edition, 2003.
3. Rob, Coronel, "Database system, design, implementation and management",Thomson learning, fourth edition, 2001.

CE3109: Design and Analysis of Algorithms Lab

List of Lab Experiments

1. Implementation of different series : arithmetic, geometric, harmonic, arithmetric-geometric.
2. Implementation of program for binary search.tree –inserting a node, deleting a node
3. Searching an element.
4. Implementation of program for tree traversal techniques
5. Implementation of different sorting techniques.
   (a) Implementation of program for merge sort.
   (b) Implementation of program for quick sort.
   (c) Implementation of program for selection sort.
   (d) Implementation of program for insertion sort.
   (e) Implementation of program for counting sort.
   (f) Implementation of program for bucket sort.
   (g) Implementation of program for radix sort.
   (h) Implementation of program for heap sort.
6. Implementation of program for Strassen's matrix multiplication.
7. Implementation of program for matrix chain multiplication problem.
8. Implementation of program for job sequencing with deadlines.
9. Implementation of program for container loading problem.
10. Implementation of program for direct address table and all it's operations
11. Implementation of program for chained hash table.
12. Implementation of program for finding minimum cost spanning tree using Prim's algorithm.
13. Implementation of program for finding single source shortest path using dijkstra's algorithm.
14. Implementation of program for finding single source shortest path using Bellman- Ford algorithm.
15. Implementation of depth first search algorithm.
16. Implementation of breadth first search algorithm

Text Books:

1. Corman , *Computer Algorithm*, PHI
2. Sara Base , *Computer algorithms: Introduction to Design and Analysis*, Addison Wesley

Reference Books:

1. Elise Horowitz , Sartaj Sahani, *Fundamentals of Computer Algorithms*, Galgotia Pub.
2. Aho, Ullman, *Data Structure and Algorithms*. TMH

CE3201: Compiler Construction

Prerequisite: Theory of Computation.

OBJECTIVES:
To make the student to know about various phases of the compilation and the various steps in designing the compiler.

Unit 1: **[6 Hrs]**
Introduction to Compiling and Lexical Analysis:
Definition, analysis of the source program, the phases of a compiler, the grouping of phases, Compiler- Construction tools, The role of the Lexical analyzer, Input buffering, Specification of Tokens, A Language for Specifying Lexical Analyzers, Design of a Lexical Analyzer generator.

Unit 2: **[6 Hrs]**
Syntax Analysis:
The role of the Parser, Context-free grammars, Writing a Grammar, Top-Down Parsing, Bottom-Up Parsing, Operator-precedence Parsing, LR-Parsers, Using Ambiguous Grammars, Parser Generators.

Unit 3: **[7 Hrs]**
Syntax-Directed Translation:
Definitions, Construction of Syntax Trees, Bottom-Up Evaluation of S-Attributed definitions, Top-Down Translation, Bottom-Up Evaluation of Inherited attributes.

Unit 4: **[7 Hrs]**
Intermediate Code Generation:
Intermediate Languages, Declarations, Assignment Statements, Boolean Expressions, Case Statements, Back patching, Procedure Calls.

Unit 5: **[7 Hrs]**
Code Generation:
Issues in the Design of a Code Generator, The target Machine, Run-Time Storage Management, Basic Blocks and Flow Graphs, Next-Use Information, Simple Code Generator, Register allocation and Assignment, The DAG Representation of Basic Blocks, Generating Code from DAGs, Dynamic Programming, Code-Generation Algorithm, Code-Generators.

Unit 6: **[3 Hrs]**
Code Optimization:
Peephole Optimization, Principal sources of optimization, Introduction to Global data flow analysis.

Text Books:

1. Aho, Sethi, Ullman, *Compilers-tools and Techniques*, Addison Wesley, 1987
2. Trembly, Sorenson,*Theory and Practice of Compiler Writing*, McGraw Hill, 1984.
3. Hopcroft, *Introduction to Automata Theory, Languages and Computation*, Pearson Publication.

Reference Books:

1. Paul G. Sorenson, "*Compiler Writing*" McGraw Hill.
2. Hunter, *The Essence of Compilers*, Pearson Publication.
3. Lewis, *Elements of the Theory of Computation*, Pearson Publication.

CE3202: Operating System Design

Prerequisite: Operating System

OBJECTIVES:
To make the student to learn design and implementation and design aspects of an operating system.

Unit 1: **[6 Hrs]**
General Overview of the System:
System Structure, User Perspective, Operating System Services, Assumption about Hardware.
Introduction to the Kernel:
Architecture of UNIX Operating System, Introduction to System Concept, Kernel Data Structure, System Administration.

Unit 2: **[6 Hrs]**
Buffer Cache:
Buffer Headers, Structure of the Buffer Pool, and Scenarios for Retrieval of a buffer, Reading and Writing Disk blocks, Advantages and Disadvantages of the Buffer Cache.
Internal Representation of Files:
Inodes, Structure of regular file, Directories, Conversion of a Path Name to an Inode, super block, Inode Assignment to a New File, Allocation of disk Blocks, Other File Types.

Unit 3: **[6 Hrs]**
System calls for the File System:
Open, Read, Write, File and Record Locking, Adjusting the Position of File I/O_LSEEK, Close, File Creation, Creation of Special files, Change Directory and Change Root, Change Owner and Change Mode, STAT and FSTAT, Pipes, Dup, Mounting and Unmounting File Systems, Link, Unlink, File System Abstractions, File System Maintenance.

Unit 4: **[6 Hrs]**
Process Control:
Process Creation, Signals, Process Termination, Awaiting process Termination, Invoking Other Programs**,** The User ID of a Process, Changing the Size of a Process, The Shell, System Boot and the INIT process.
Process Scheduling and Time: Process Scheduling, System Calls For Time, Clock.

Unit 5: **[6 Hrs]**
Memory Management Policies:
Swapping, Demand Paging, A Hybrid System With Swapping and Demand Paging.
The I/O Subsystem
Driver Interfaces, Disk drivers, terminal Drivers, Streams.

Unit 6: **[6 Hrs]**
Interprocess Communication:
Process Tracing, System V IPC, Network Communications, Sockets.
Multiprocessor System:
Problem of Multiprocessor Systems, Solution with Master and Slave processors, Solution with

Semaphores, The Tunis System, Performance Limitation.

Text Books:

1. M. J. Batch, *The Design of UNIX operating System*, PHI.

Reference Books:

1. Garry nutt, *Linux Kernel Project*, Addison Wesley.
2. ASilberschatz, Peter B Galvin, *Operating System Concepts*, Addison Wesley Publishing Company,1993.
3. Andrew S. Tanenbaum, *Modern Operating System*, PHI Pub, 1995.

CE3203: Software Engineering

Prerequisite: Data structures.

OBJECTIVE:

The student will be able to implement stepwise and systematic methodology approach for developing a software system design considering all software engineering principles. To understand the drawbacks of ad hoc system development, achieve the management skills necessary to execute a project within various technical and environmental constraints.

Unit 1: [6 Hrs]

Product and Process:

Evolving role of Software, Software Characteristics, Software Applications, Crisis on the Horizon, Software Myths, A layered Technology, software process model, Evolutionary software process models, Component based development, forth generation techniques, process and product.

Unit 2: [6 Hrs]

Managing Software Project :

Introduction, Project Management Concepts, Software Process and Project Metrics.

Unit 3: [6 Hrs]

Conventional Methods for Software Engineering:

Introduction, System Engineering, Analysis Concepts and Principles, Analysis Modeling.

Unit 4: [6 Hrs]

Design Concepts and Principles, Architectural Design, User Interface Design, Component-level Design.

Unit 5: [6 Hrs]

Software Testing Techniques:

Software testing Strategies, Testing tactics.

Unit 6: [6 Hrs]

Object- Oriented Software Engineering:

Introduction, Object-Oriented Concepts and principles, Objected-Oriented Analysis, Object-Oriented Design, Object-Oriented Testing, Technical Metrics for Object-Oriented Systems.

Text Books:

1. Pressman, *Software Engineering a Practitioners Approach*, 5th Edition, TMH.
2. Jalota Pankaj, *An integrated approach to software Engineering*, Narosa Pub.

Reference Books:

1. Jawadekar, *Software Engineering*, TMH Pub.
2. Sommerville, *Software Engineering* , Pearson Education.

CE3204: Computer Graphics

Prerequisite: Engineering Graphics and Computer Aided Drafting.

OBJECTIVES:
To make the students, understand basic aspects of the computer graphics with their use in industry including the 3-D applications.

Unit 1: **[5 Hrs]**
Basic Concepts:
Introduction to computer graphics, lines, line segments, pixels and frame buffers, anti-aliasing techniques and character generation methods. Graphics Display devices (monochrome, color) interactive devices, Scanners and digitizers, touch panels, tablets, mouse, joysticks, trackball, light pen.

Unit 2: **[7 Hrs]**
2-D Transformations:
Line and circle plotting using Breshemham's and other algorithms, transformation matrices, scaling, rotation, translation, picture transformation, mirror image.

Unit 3: **[6 Hrs]**
Windowing and Clipping:
Introduction, viewing transforms, 2-D clipping, Sutherland Cohen approach, Cyrus Beck Method, Midpoint subdivision algorithm, Liang-Barsky line clipping algorithm, polygon clipping, text clipping, generalized clipping.

Unit 4: **[8 Hrs]**
3-D Graphics
Introduction, 3-D geometry, Co-ordination system, 3D transformation , rotation about an arbitrary axis, orthogonal projections, multiple views, isomeric projection, perspective projections, 3-D clipping.

Unit 5: **[5 Hrs]**
Hidden Surfaces and lines:
Introduction, Back face removal algorithm, Z-buffers, Scan line and Painters algorithm hidden surface removal, curved surface generation, generation of solids, sweep method, interpolation.

Unit 6: **[6 Hrs]**
Graphical User Interface:
X-Windows, use of graphics tools like OPENGL, DirectX, Windows and Motif, Graphic Standards. Animation: Introduction, devices for producing animation, computer assisted animation, real time animation, method for controlling animation (fully explicit control, procedural).

Text Books:

1. Newman, Sprouall, Interactive Computer Graphics, McGraw Hill Pub.
2. Hearn, Baker, Computer Graphics, PHI Pub.

Reference Books:

1. Harrington, *Computer Graphics*, McGraw Hill Pub.
2. Rogers, Procedural Elements of Computer Graphics, McGraw Hill Pub.

CE3205: Computer Networks

Prerequisite: Data Communication.

Unit 1:
Introduction:
Uses of Computer Networks, Network hardware, Software, USI Reference model, example of network

Unit 2:
Physical Layer:
Guided and unguided transmission media, wireless communication, communication satellites, public switched telephone network, the mobile telephone system

Unit 3:
Data link layer:
Data link layer design issues, error detection and correction, elementary data link protocols, sliding window protocols, protocols verification, examples of data link protocols: HDLC

Unit 4:
Medium access control sub layer:
Channel allocation problem, multiple access protocols : AIOHA, CSMA, CSMA/CD Ethernet, wireless LAN, Broadband wireless, Bluetooth

Unit 5:
Network layer:
Design issues, Routing algorithm, optimality principle, shortest path routing, Flooding

Unit 6:
Distance vector routing, Link state routing, Hierarchical routing, multicast routing, congestion control algorithms

Text Books:

1. A. S. Tanenbaum, *Computer Network*, PHI Pub.
2. Forouzan, *Computer Network*, TMH.

Reference Books:

1. Black, *Computer Network*, PHI Pub.
2. Douglas E, Comer, *Internetworking with TCP/IP*, PHI Pub.

CE3206: Compiler Construction Lab

List of Experiments:

1. Implementation of Lexical analysis using C.
2. Study of LEX.
3. Implementation of lexical analysis using lex.
4. Study of YACC.
5. Implementation of desk calculator program.
6. Linking of LEX and YACC.

Text Books:

1. Aho, Sethi, Ullman, *Compilers-tools and Techniques*, Addison Wesley, 1987
2. Trembly, Sorenson, *Theory and Practice of Compiler Writing*, McGraw Hill, 1984.
3. Hopcroft, *Introduction to Automata Theory, Languages and Computation*, Pearson Publication.

Reference Books:

1. Allen Holub, McGraw Hill.
2. Hunter, *The Essence of Compilers*, Pearson Publication.
3. Lewis, *Elements of the Theory of Computation*, Pearson Publication.

CE3207: Operating System Design Lab

List of Experiment:

1. Study of general purpose utility commands
2. Understanding UNIX Commands
3. Navigating the file system
4. Study of handing Ordinary files.
5. Study of basic file attributes.
6. Study of basic communication commands.
7. Study of command line script.
8. script that compiles all C source files in home directory and creates executable files.
9. script for copy file contents
10. script that finds all the files in subdirectories that have the same file name.
11. script that can be executed from a specific terminal.
12. Study of different system calls.,like fork ,boot etc.
13. Study of administration of operating system.

Text Books:

1. M. J. Batch, *The Design of UNIX operating System*, PHI.

Reference Books:

1. Garry nutt, *Linux Kernel Project*, Addison Wesley.
2. ASilberschatz, Peter B Galvin, *Operating System Concepts*, Addison Wesley Publishing Company,1993.
3. Andrew S. Tanenbaum, *Modern Operating System*, PHI Pub, 1995.

CE3208: Software Engineering Lab

List of experiments:

1) Develop a Project in VB using all software engineering concepts.
2) Study of Rational Rose.

Text Books:

1. Pressman, *Software Engineering a Practitioners Approach*, 5th Edition, TMH.
2. Jalota Pankaj, *An integrated approach to software Engineering*, Narosa Pub.

Reference Books:

1. Jawadekar, *Software Engineering*, TMH Pub.
2. Sommerville,Pearson *Software Engineering*, Education.

CE3209: Computer Graphics Lab

List of Practical:

1. Study of inbuilt graphics functions.
2. A Program for moving the ball along the screen.
3. A program to implement clock.
4. A program to implement Digital Differential Analyzer algorithm.
5. A program to implement Bresenham's line generating algorithm.
6. A program to implement Bresenham's circle generating algorithm.
7. A program to implement 2-D transformation: Scaling, Translation and Rotation.
8. A program to implement Cohen-Sutherland line clipping algorithm.
9. A program to implement Liang-Barsky line clipping algorithm.
10. Mini project (Using knowledge of above lab work).

Text Books:

1. Newman, Sprouall, *Interactive Computer Graphics*, McGraw Hill Pub.
2. Hearn, Baker, *Computer Graphics*, PHI Pub.

Reference Books:

1. Harrington, Computer Graphics, McGraw Hill Pub.
2. Rogers, *Procedural Elements of Computer Graphics*, McGraw Hill Pub.
3. Plastock and Kalley, "Computer Graphics",, McGraw-Hill
4. Roger and Adamas, "Mathematical elements of computer graphics", McGraw-Hill

CE3210: Computer Networks Lab

The purpose of this lab is to give you a basic introduction to Computer Network, Network Simulator-2 (NS-2) and Linux socket programming. It might be too easy if you are already familiar with C/C++ programming skills and basics of socket API.

Assignment 0: Study of Network Simulator2 (NS-2) tool (use www.isi.edu/nsnam/ns url)
Assignment 1: Write C/C++ program for CRC simulation.
Assignment 2: Write C/C++ program for parity checking simulation.
Assignment 3: Write C/C++ program for checksum calculation.
Assignment 4: Write one C/C++ network program using socket API on Linux OS.

Following are the steps to write and execute socket programs:

- Use VI or any text editor (Linux platform)
- Write your client and server program
- Compile client and server program using cc/g++ compiler
- Execute first server program and then client program by opening two separate windows or you can execute server program in background using and option and client in foreground

Assignment 5: Study, installation and configuration of NS-2
Assignment 6: Study of different protocols (unrestricted simplex, simple stop and wait, positive act with retransmission and sliding window protocols) used in data link layer. Also see actual simulation using NS-2

Reference book:

1. Unix, Network programming, by Stevens, PHI Publication

CE3211 – Seminar

Seminar is, generally, a form of academic instruction, at a department or university. Students may engage in original research, exploration, practice, and/or synthesis of ideas. Results are exchanged through reports, demonstrations, and/or discussions.

A seminar may include a presentation by the student. Students are expected to prepare for and participate actively in seminars by giving a paper, answering questions or discussing subject matter in front of Head and faculty.

The idea behind the seminar system is to familiarize students more extensively with the methodology of their chosen subject and also to allow them to interact with examples of the practical problems that always crop up during research work.

It is essentially a place where assigned readings are discussed, questions can be raised and debates conducted. It is relatively informal, at least compared to the lecture system of academic instruction.

CE4101: Advanced Programming Technologies

Prerequisite: Programming languages and paradigms and Methodologies.

OBJECTIVE:

This course will introduce the essential topics of Internet Programming predominately with the Java programming language. Students will design and write interactive WWW pages using Java, HTML, CGI. Students will develop software that manipulates different forms of data such as hypertext, graphics, video, and sound. Advanced interactive executable web pages will be developed.

Unit 1: [6 Hrs]

Introduction to Internet Programming:

Client Server model, Browsers - Graphical and Hypertext Access to the Internet, HTTP - HyperText Transfer Protocol.

Unit 2: [5 Hrs]

Creating Internet, World Wide Web pages:

HTML - HyperText Markup Language, Headers, body, html tags, tables Text, graphics, sounds, video clips, multi-media, Client side image mapping, web page counters, HTML resources, HTML converters and tools.

Unit 3: [6 Hrs]

HTML forms and scripting:

Building a form, Text fields and value, size, maxlength, html buttons, radio, checkboxes, prechecked. Selection lists, Introduction to CGI scripting. Action and Method - GET and POST. HTML form interface with CGI scripts. Automating processing such as info forms and email. Programming CGI interfacing via forms.

Unit 4: [5 Hrs]

Introduction to Java, Javac, Java class libraries, JDK, jdbc, Java Byte Codes. Classes and Objects, Applets, Applet parameter passing Control Structures. Basic Windows, mouse and buttons Events, the Java event model. Basic I/O. JAR Files, Java archiver.

Unit 5: [8 Hrs]

Advanced Java Programmin:

Graphic User Interface with AWT. AWT calls, Windows, dialog boxes, pop-up menus. Graphics. Using a Layout manager. Manipulating Images. Image animation.Threads - Process Management. Socket programming - client-server processing. URL Connections. Java Beans.

Unit 6: [8 Hrs]

XML Technologies :

XHTML(Extensible HTML) - A stricter and cleaner XML based version of HTML. XML DOM (XML document object model)- A standard document model for accessing and manipulating XML. XSL(XML Style sheet Language)- transforms XML into other formats, like HTML ,XSL Formatting Objects)- for formatting XML to screen, paper, a language for navigating XML documents.

Text Books:

1. Deitel and Deitel. "Java - How to Program", Addison-Wesley Press, Reading, Mass.
2. “Web Technologies” by Kahate Godbole.
3. “Database and XML Technologies” by A.W. Ganczarski.

Reference Books:

1. Scott Oaks and Henry Wong. "Java Threads", O'Reilly and Associates Publishing, Sebastopol, CA.
2. Gary Cornell, Cay Horstmann. "Core Java", SUN Soft Press Publishing, Mountain View

CE4102: Internetworking Protocols

Prerequisite: Computer Networks.

OBJECTIVES:
To make the students to know the various internetworking protocols and their functionalities. To learn the new concepts in the computer networks.

Unit 1: **[6 Hrs]**
Review:
Review of networking Technologies and Internetworking Concepts and Architectural Model, Application level and Network level Interconnection, Properties of the Internet, Internet Architecture, and Interconnection through IP Routers.

Unit 2: **[6 Hrs]**
ARP and RARP:
Internet Addresses, Mapping Internet addresses to Physical addresses, Universal identifiers, three Primary classes of IP addresses, network and Broadcast Addresses, Limited Broadcast, Dotted decimal Notation, weakness in Internet addressing, Loopback addresses, resolution through Direct Mapping, Resolution Through Dynamic Binding, address resolution cache, ARP to other protocols, Reverse address resolution protocol, timing, RARP transaction, Primary and backup RARP severs.

Unit 3: **[6 Hrs]**
Routing:
Internet Protocol, Connectionless Datagram Delivery, Routing IP Datagrams, The concepts of unreliable delivery, purpose of the internet protocol, Routing in an internet, direct and indirect delivery, table driven IP routing, Next Hop Routing, default routes, host specific routes, The IP routing Algorithm, handling incoming datagram's, Establishing routing tables.

Unit 4: **[6 Hrs]**
ICMP Protocol:
Internet Protocol, Error and Control Message (ICMP), Subnet and Supernet Address, ICMP, Error reporting versus error detection, ICMP message format, Detecting and reporting various network problems through ICMP, Transparent Router, Proxy ARP, subset addressing, implementation of subnets with masks representation, Routing in the presence of subsets, a unified algorithm.

Unit 5: **[6 Hrs]**
User Datagram Protocol (UDP):
Format of UDP message, UDP pseudo header, UDP encapsulation and Protocols layering, UDP checksum computation, UDP multiplexing, De-multiplexing and Ports.

Unit 6: **[6 Hrs]**
Reliable Stream Transport service (TCP):
The Transmission control Protocol, pots, Connections and Endpoint, passive and active opens

the TCP segment format, TCP implementation issues.

Text Books:

1. Douglas E.Comer, *Internetworking with TCP/IP: Principles, Protocols*, PHI Pub.
2. Forouzan, *TCP-IP, Protocol Suit*, TMH.

Reference Books:

1. Comer, *Internetworking with TCP-IP Vol. 3*.
2. W. Richard Stevens, *UNIX Network Programming.*
3. Stallings, *SNMP*, Pearson.
4. Hunt Craig, *TCP-IP Network Administration*.
5. Loshin, Harwurt, *TCP-IP Cleanly Explained*.

CE4103: Advanced Database Techniques

Prerequisite: Database management system.

OBJECTIVES:

To learn the advanced technologies in the databases and applying basic database knowledge to develop the new technologies.

Unit 1: **[7 Hrs]**

Levels of distributed Database and Design:

Reference architecture for distributed database, types of data fragmentation, distributed transparency for read only and update applications, distributed database access primitives, integrity constraints in distributed database, Distributed Database Design, design of database fragmentation, allocation of fragments.

Unit 2: **[6 Hrs]**

Translation of global queries to fragments queries:

Equivalence transformation for queries, transforming global queries into fragment queries, distributed grouping and aggregate function evaluating parametric queries, Optimization of access strategies: A framework for query optimization joint queries, general queries.

Unit 3: **[6 Hrs]**

Management of distributed transactions:

A framework for transaction management, supporting atomicity of distributed transactions, concurrency control for distributed transaction, Architectural aspects of distributed transactions.

Unit 4: **[6 Hrs]**

Concurrency Control:

Foundations of distributed concurrency control, distributed deadlocks concurrency control based on time stamps, optimistic methods for distributed databases, authorization and protection.

Unit 5: **[6 Hrs]**

Reliability:

Basic concepts, non blocking commitment protocols, reliability and concurrency control, determining a consistent view of the network, detection and resolution inconsistency check-points and cost restart.

Unit 6: **[6 Hrs]**

Distributed Database Administration:

Catalog management in distributed database, authorization and protection.

Text Books:

1. Navathe, *Database Management System*, PHI Pub.
2. C. J. Date, *Database Management System*, TMH Pub.
3. Korth, Silberchatz, Sudarshan, *Database System concepts*, 3rd Edition, TMH Pub.

Reference books:

1. Stefano Ceri, Giuseppe Pelagatti, *Distributed databases-Principles and system*, MGH.
2. Desai Bipin, *An introduction to Database systems*, Galagotia Pub.

CE4104: Computer Architecture (Elective I)

Prerequisite: Computer Organization, Microprocessor and Interfacing

OBJECTIVES:

To learn the importance of parallelism in the computer field and various aspects of multiprocessor systems and also their design and implementation issues.

Unit 1: [6 Hrs]

Scalable compute platforms and models:

Evolution of computer architecture dimensions of scalability, parallel computer models, basic concepts of clustering, scalable design principles, Basics of parallel programming: overview, parallelism issues, and interaction/communication issues semantic issues in parallel programs.

Unit 2: [6 Hrs]

Performance metrics and benchmarks:

System and application benchmarks, performances versus cost, basic performance metrics, performance of parallel computers, performance of parallel programs, scalability and Speedup Analysis.

Unit 3: [6 Hrs]

Vector and pipelined processors:

Scalar and vector pipelines, classification of pipelined processors, performance evaluation factors, performance modeling, Vector processing concepts, pipelined vector processors, carry type vector processor design example, Associative memory processors issues and solutions Multithreaded architecture-latency hiding techniques principles of multithreading, Multiprocessor and Multicomputer systems.

Unit 4: [6 Hrs]

Interconnection Networks:

Various topologies like crossbar, multistage interconnection network, static and dynamic type of network, loosely coupled and tightly coupled architecture, Network topologies for MIMD system like star, mesh, tree hypercube etc.

Unit 5: [6 Hrs]

Support for clustering and availability:

Challenges in clustering, availability support for clustering, support for single system image, single system image in Solaris-MC, Clusters of servers and workstations: Microsoft wolf pack for Windows NT clusters, the IBM SP system, the Berkley NOW project, trademarks.

Unit 6: [6 Hrs]

Parallel paradigms and programming models:

Paradigms and programmability, parallel programming models, shared memory programming, Message passing paradigms and MPI, Data parallel programming, the data parallel model, paradigm and high performance FORTRAN.

Text Books:

1. Kai Hwang, S*calable parallel computing*, Mc Graw Hill.
2. Wilkinson, *Parallel Programming*, TMH Pub.

Reference Books:

1. Kai Hwang *Advanced Computer Architecture*, Mc Graw Hill.
2. William Stalling, *Parallel Programming*, Mc Graw Hill

CE4104: Advance Discrete Mathematics (Elective-I)

Prerequisite: Knowledge of discrete mathematics.

OBJECTIVE:

Relate the ideas of mathematical induction to recursion and recursively defined structures. Learning graphs trees and related algorithms. Relate, interpret and apply this concept to various areas of computer science.

Unit 1: [8 Hrs]

Properties of Integers:

Fundamental overview : Set theory, logic theory etc, Application to switching network, Orders and inequalities, division algorithm, Euclidian algorithm, Congruence relation, Equative relation.

Unit 2: [6 Hrs]

Coding Theory and Discrete Probability:

Preliminaries, Hamming metric, generation matrix, Parity check matrix, Group codes, Hamming matrices, Permutations and Combinations: rule of sum and product, Permutations, Combinations, Algorithms for generation of Permutations and Combinations. Discrete Probability, Conditional Probability, Information and Mutual Information, Binomial Coefficients and Combinatorial Identities.

Unit 3: [8 Hrs]

Recurrence Relation and Functions:

The Fibonacci Sequences, The Related Definitions, Divide and Conquer Methods, Generating functions, definition and construction, Exponential Generating Functions Solving Recurrence Relations using Generating Functions. Methods of Inspection, Telescoping Sums, Iteration, Substitution.

Unit 4: [8 Hrs]

Graph Theory:

Directed graph, Warshall's algorithm, Graph algorithms for Depth first search and breadth first search, Topological sort, Pruning algorithm for shortest path, Graph coloring: Vertex coloring, edge coloring, map coloring problems.

Unit 5: [4 Hrs]

Trees:

Trees, rooted trees, path length in rooted tree, binary search trees, complete and extended binary tree, Priority queue, Heaps and Huffman's algorithms, tree traversals.

Unit 6: [10 Hrs]

Algebraic Systems:

Algebraic Systems, Isomorphism and Homomorphism, Rings and Fields, Lattices, Boolean lattices and Boolean algebra, Permutation Groups, Codes and Group codes, Isomorphism and Automorphisms, Homomorphism and Normal Subgroups, Integral Domain, Field, Ring Homomorphism, Polynomial Rings and Cyclic Codes

Text Books:

1. C. L. Liu, *Elements of Discrete Mathematics*, 2nd Edition, McGraw Hill Pub 2002.
2. Kenneth H. Rosen, *Discrete mathematics*, 5th Edition, McGraw Hill Pub 2003.
3. R. Johnsonbaugh, "Discrete Mathematics", 5th Edition, Pearson Education, 2001

Reference Books:

1. Lipschutz Lipson, *Discrete Mathematics*, 2nd Edition TMH, 1999.
2. V. K. Balakrishn, *Graph Theory*, TMH (Recommended for Graph).
3. N. Deo, *Graph theory with application to Engineering and Computer Science*
4. F. Harary, *Graph Theory*, Narosa Publishing House

CE4104: Advanced Software Engineering (Elective-I)

Prerequisite: Nil

Unit 1: **[6 Hrs]**

Formal Methods:

Basic concepts, Mathematical preliminaries, Mathematical notation for formal specification, formal specification languages, using Z to represent an example software component, Ten Commandments of methods.

Unit 2: **[6 Hrs]**

Clean room and Component based software Engineering (CBSE):

Clean room approval and strategy, functional specification, clean room design , design room testing, Engineering of component based systems, the CBSE process, domain Engineering , component development , classifying and retrieving components.

Unit 3: **[6 Hrs]**

Client /server (C/S) system software Engineering:

Structure of C/S systems, software Engineering for C/S systems, analysis modeling issues, design for C/S systems, testing issues.

Unit 4: **[6 Hrs]**

Web Engineering (Web):

Attributes of web based applications, web process, frame work for Web, formulating / analyzing web based systems, design for web based applications, testing web based applications, management issues.

Unit 5: **[6 Hrs]**

Re-Engineering:

Business process Re-engineering, reverse Engineering, restructuring, forward engineering, and economics of re-engineering.

Unit 6: **[6 Hrs]**

Safety Critical Software and Computer aids software Engineering (CASE):

Safety critical Systems, safety specification, safety assurance, Introduction to CASE , component of CASE system, CASE software process support , CASE hardware platform, categories of CASE tools, CASE implementation consideration, software Life cycle changes, relationship to other software technologies characteristics of software automation, lab stable environments, Methodology driver, CASE and software reusability.

Text Books:

1. *Software Engineering-A practitioners approach,* 5th Ed, R. S. Pressman, TMH.
2. *Software Engineering, Sommerville, Pearson* Education.

Reference Books:

1. *Software Engineering*, Jawadekar, TMH Pub
2. *Object Oriented Software Engineering Practical Software Development*, Pimothy Lethbridge, Robert Laganire, TMH Pub.
3. *Software Engineering Concepts*, Fairley,TMH Pub.

CE4105: Advanced Programming Technologies Lab

1. Programs on Client-Server Interaction
2. HTML: Formatting and Developing Web pages Displaying various patterns, tables, etc :eg.
3. CGI Programming using Perl scripting language
4. Core Java:

    i] Design an Editor like Notepad

    ii] Check whether given string is palindrome or not.

    iii] Calculate the determinant of a Matrix.

    iv] Count the number of characters, symbols, digits, lowercase and uppercase letters and words in a sentence.

    Applet Programming

    i] Design an Hourglass shape

    ii] Design a calculator with basic arithmetic functions.(using Layouts)

    iii] Draw a circle in such a way that pressing S or D increases size of the circle while pressing L or B shrinks the circle.

    iv] Design an applet in such a way that clicking anywhere in the applet window displays the date and time in standard format. The string should blink every second.

    v] Animation using Threads.

    Advanced Java:

    i] Connecting Ms-Access database with a Java application.

    ii] Querying a database using JDBC connectivity with SQL statements.

5. XML:

    i]Creating XML Catalogue for a Library. Also develop an XML Stylesheet for it.

    ii] Writing Internal and External DTD’s for the XML documents.

CE4106: Internetworking Protocols Lab

List of Experiments:

1. Study of LAN technologies like Ethernet.
2. Performance evaluation LAN using Layer 2 devices like Bridges.
3. Study of expansion of current LAN.
4. Study of routing process in internet using software utilities like trace route and Ring.
5. Simulation of sliding window protocol by using socket programming
6. Study of different Internet work protocols like IP, IPX.
7. Study of different application layer protocols like SMTP, DHCP.
8. Study of DNS server configuration.

Text Books:

1. Douglas E.Comer, *Internetworking with TCP/IP: Principles, Protocols*, PHI Pub.
2. Forouzan, *TCP-IP*, *Protocol Suit*, TMH.

Reference Books:

1. Comer, *Internetworking with TCP-IP Vol. 3*.
2. W. Richard Stevens, *UNIX Network Programming.*
3. Stallings, *SNMP*, Pearson.
4. Hunt Craig, *TCP-IP Network Administration*.
5. Loshin, Harwurt, *TCP-IP Cleanly Explained*.

CE4107: Advanced Database Techniques Lab

List of Experiments:

1. Implementation of concurrency control protocols in database management system.
2. Implementation of Synchronization in distributed databases.
3. Real world problem Design exercise using ER model
4. Convert ER model of exercise (1) to set of tables and normalize it up to a given normal form.
5. Implementation of system designed in (2) using an existing DBMS Oracle/My SQL/SQL-server
6. Implementing algorithm of finding super-key of relation given a set of functional dependencies.
7. Implementing an algorithm to find closure of given attribute set.
8. Implementing an algorithm to find minimal cover of given set of functional dependencies
9. Implementation of 2NF algorithm.
10. Presentations on current trends/special issues/important topics from research papers in DBMS.
11. Finding set of functional dependencies given a relational table.
12. Case study of one Data mining / warehousing / design tool

Text Books:

1. Navathe, *Database Management System*, PHI Pub.
2. C. J. Date, *Database Management System*, TMH Pub.
3. Korth, Silberchatz, Sudarshan, *Database System concepts*, 3rd Edition, TMH Pub.

Reference books:

1. Stefano Ceri, Giuseppe Pelagatti, *Distributed databases-Principles and system*, McGraw Hill Pub.
2. Desai Bipin, *An introduction to Database systems*, Galagotia Pub.

CE4108: Project (Phase I)

The project should enable the student to combine the theoretical and practical concepts studied in his/her academics. The project work should enable the students to exhibit their ability to work in a team, develop planning and execute skills and perform analyzing and trouble shooting of their respective problem chosen for the project.

The student should be able to write technical report, understand the importance of teamwork and group task. The student will get knowledge about literature survey, problem definition, its solution, and method of calculation, trouble shooting, costing, application and scope for future development.

Project work

The project work is an implementation of learned technology. The knowledge gained by studying various subjects separately supposed to utilize as a single task. A group of 03/04 students will have to work on assigned work. The topic could be a product design, specific equipment, live industrial problem etc. The project work involves experimental/theoretical/computational work. It is expected to do necessary literature survey by referring current journals belonging to Computer Engineering reference books and internet. After finalization of project, requisites like equipments, data, tools etc. should be arranged.

Project Activity

The project groups should interact with guide, who in turn advises the group to carry various activities regarding project work on individual and group basis. The group should discuss the progress every week in the project hours and follow further advice of the guide to continue progress. Guide should closely monitor the work and help the students from time to time. The guide should also maintain a record of continuous assessment of project work progress on weekly basis.

Phase I

1. Submission of project/problem abstract containing problem in brief, requirements, area broad, applications, approximate expenditure if required etc.
2. Problem definition in detail.
3. Literature survey.
4. Requirement analysis.
5. System analysis (Draw DFD up to level 2, at least).
6. System design.

CE4109: Seminar based on project

Seminar topic is included to enable the students to apply their knowledge to understand advanced technologies, designs etc. Literature survey may help to select such topic which is invaluable to an engineer in Software industry. It will encourage students to develop their presentation skills, good communication skills, and skills of collecting the correct information regarding the technical topic.

The student will be able to deliver seminar with useful information. He/she should understand the technologies, designs and skills of writing technical report, to do literature survey and to attempt the queries from examiner.

Report and Assessment

The concerned guide will assess the term work as a continuous activity done by student to complete seminar. The student will have to deliver seminar for 20-25 minutes, during examination, and explain the topic in presence of all students and department faculties. Questions and answers session will be of five minutes to each student. Examiner, concerned guide and senior faculty of the department will assess the performance during examination. Report writing should be as per given format.

CE4110: Technical Project Related to Community Services (TPCS)

Every group of students working for their project work will have to complete a community project assigned to them by their guide. The guide will assess the work completed by each student within the group and group as a whole, award the appropriate grade (PP/NP) to every student.

The topic could be a product design, specific equipment, live problem, simulation, presentation, etc. related to community services. The project work involves experimental/theoretical/computational work. It is expected to do necessary literature survey.

The group should submit a completion and implementation certificate from the organization/social group for which the community project is implemented.

CE4111: Industrial Training

The students receive theoretical knowledge of the basic engineering and applied engineering in first six semesters. They have to do in-plant training of four weeks at least during vacation after sixth semester. The training enables the student to expose to industry during their training, provides orientation and improves their prospects for employment.

The students should prefer industrial training in the domain of Computer Engineering.

Training report and Assessment

During the industrial training he/she will observe layout, working environment, various equipments, tools, instruments etc. under the supervision of supervisor and engineer of the company.

Students are required to submit a printed report of industrial training in the seventh semester. The report should contain information about the major field of company, particularly about the section/department where he/she have undergone the training giving the details of equipments, product, tools their detailed specification, use etc. The training report and field work done by student will be assessed by internal examiner(s) and appropriate grade will be awarded.

*Industrial training is evaluated for PP and NP grades only. Students must obtain PP grade for Industrial Training. In case of NP grade awarded, he/she will have to repeat such training and will not be declared pass in corresponding semester until his/her re-assessment is completed and he/she obtains PP grade. Such student should contact the activity coordinator/guide for guidance.

CE4201: Information Security

Prerequisite: Nil

Unit 1: **[6 Hrs]**

Introduction:

Active vs Passive attacks, Layers and Cryptography, Authorization, Viruses, Works, Trojan Horses, The multi level Model of Security, Introduction to Cryptography: Breaking an encryption scheme, Types of Cryptographic Functions, Secrete Key Cryptography, Public key Cryptography, Hash algorithms.

Unit 2: **[6 Hrs]**

Secret Key Cryptography:

Generic Block encryption, Data encryption standards, International Data Encryption Algorithm, Advanced Encryption Standard.

Unit 3: **[6 Hrs]**

Modes of Operation:

Encrypting a Large Message, Generating MACs multiple Encryption DES Hashes and Message Digests: Introduction, MD2, MD4, MD5, SHA-1, and HMAC.

Unit 4: **[6 Hrs]**

Public Key Algorithms:

Modular Arithmetic, RSA, Diffie-Hellman, Digital Signature Standard, Elliptic Curve Cryptography.

Unit 5: **[6 Hrs]**

Number Theory and Authentication:

Password based and cryptographic based authentication protocol.

Unit 6: **[6 Hrs]**

Cryptographic Standards:

Kerberos, PKI, IPSec.

Text Books:

1. *Network Security: Private Communication in public World*, Charlie Kaufman, PHI Pub.
2. *Network Security essentials-applications and standards*, Stalling William, Pearson Education Pub.

Reference Books:

1. *Internet security protocol*, Vyless, Pearson Education Pub.
2. *Internetworking with TCP/IP*, Comer D.E., Pearson Education Pub.
3. *Information security-An overview*, Morrison, PHI Pub.
4. *Information security hand book-Computer communications and networks*, Hunter, Berlin, Springer Pub.

CE4202: Artificial intelligence

Prerequisites : Data Structure, Design and Analysis of Algorithm

Unit 1: **[07 Hrs]**

Introduction:

Definition of A.I, Foundation of A.I., History, intelligent Agents, Agent Architecture, A.I. A.I. Representation, Properties of internal representation, Futures of A.I, A.I Techniques – ,Importance of A.I – Representation of Knowledge, Knowledge Base Systems, State Space Search – Production Systems – Problem Characteristics,

Unit 2: **[07 Hrs]**

Heuristics Search Techniques:

Generate and test – Hill Climbing, Depth First Search, Breadth First Search, Best First Search, A* and AO* Algorithm, Problem reduction – Constraint satisfaction – Means-Ends Analysis. Game playing – Minimax and Alpha-Beta Cutoffs, waiting for Quiescence, Secondary search.

Unit 3: **[07 Hrs]**

Predicate Logic:

Using predicate logic: Predicate Calculus, Predicate and arguments, ISA Hierarchy, Frame notation, Resolution, Natural Deduction representing simple facts in Logic - Logic Programming, computable functions in predicates, resolution – unification, Forward and Backward reasoning , Forward and Backward chaining rules.

Unit 4: **[07 Hrs]**

Structured Knowledge Representation:

TMS (Truth maintenance system),Statistical and probabilistic reasoning ,Associative Networks, Semantic Nets, Frames Structures, Conceptual Dependencies and Scripts Learning – Concept of Learning – Learning Automata, Genetic Algorithm, Learning by induction, Planning: Block orld, strips, Implementation using goal stack, Non linear planning with goal stacks, Hierarchical planning, least commitment strategy.

Unit 5: **[07 Hrs]**

Natural Language Processing:

Overview of Linguistics, Grammars and Languages, basic Parsing techniques, Semantic analysis and representation structures. Natural Language generation and Natural Language Systems. Syntactic Processing, ATN, RTN..

Unit 6: **[07 Hrs]**

Expert Systems:

Architecture – Need and Justification of Expert Systems – knowledge representation, Knowledge acquisition and validation. Utilization and functionality, Perception and Action, real time search, perception, action, vision, robot architecture, Basics of PROLOG,

Text Books

1. Eugene, Charniak, Drew Mcdermott: "Introduction to artificial intelligence." Addison-Wilskey, 1985
2. Eiaine Rich and Kerin Knight: "Artificial Intelligence.", Tata McGraw-Hill, second edition.

Reference Books

1. Schalkoff R J "Artificial Intelligence – An Engineering Approach"
2. Peter Jackson "Introduction to Expert System "
3. Janakiraman "Artificial Intelligence – 1"
4. Stuart Russell and Peter Nerving: "Artificial Intelligence: A Modern Approach", Prentice Hall, 2nd Edition.
5. Ivan Bratko : "Prolog Programming For Artificial Intelligence" , 2nd Edition Addison Wesley, 1990.
6. Herbert A. Simon, "The Sciences of the Artificial ", MIT Press, 3rd Edition (2nd Printing), 1995.
7. Tim Jones "Artificial Intelligence Application Programming" M. Dreamtech Publication

CE4203: Distributed Systems

Prerequisite: Computer Networks.

Unit 1: **[5 Hrs]**

Fundamentals:

Introduction, Distributed Computing System, Evolution of Distributed Computing System, Distributed Computing System models, Distributed Computing System Gaining Popularity, Distributed Operating System, Introduction to Distributed Computing Environment (DCE), network Types, LAN Technologies, WAN technologies, Communication Protocols, Internetworking, ATM Technology, Desirable Features of a Good Message- Passing System, Isses in IPC by Message- Passing, Synchronization, Buffering, Multidatagram message, Encoding and Decoding of message data, Process addressing, Failure Handling, Group Communication, Case Study: BSD UNIX IPC Mechanism.

Unit 2: **[8 Hrs]**

Remote Procedure Calls:

Introduction, the RPC model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC messages, Marshaling arguments and Results, Server Management, Parameter Passing Semantics, Call Semantics, Communication Protocols for RPCs, Complicated RPCs, Client- Server Binding, Exception Handling, Security, Some Special Types of RPCs, RPC in Heterogeneous Environments, Lightweight RPC, Optimizations for Better Performance, Case studies: Sun RPC, DCE, RPC

Unit 3: **[8 Hrs]**

Distributed Shared Memory:

Introduction, general Architecture of DSM Systems, Design and Implementation Issues of DSM, Granularity, Structure of Shared Memory Space, Consistency Models, Replacement Strategy, Thrashing, Other Approaches to DSM, Heterogeneous DSM, Advantages of DSM.

Unit 4: **[6 Hrs]**

Synchronization:

Introduction, Clock Synchronization, Event Ordering, Mutual Exclusion, Deadlock, Election Algorithms.

Unit 5: **[9 Hrs]**

Resource Management And Process Management:

Introduction, Desirable Features of a Good Global Scheduling Algorithm, Task assignment Approach, Load- Balancing Approach, load Sharing Approach, Process Migration, Threads.

Unit 6: **[6 Hrs]**

Distributed File System:

Introduction, Desirable Features of a Good Distributed File System, File Models, File Accessing Models, File Sharing Semantics, File Caching Schemes, File Replication, Fault Tolerance, Atomic Transactions, Design Principles, Case Study: DCE Distributed File Service.

Text Books:

1. P. K. Sinha, *Distributed Operating System*, PHI Pub.
2. Colorouis, *Distributed Systems*, Addison Wesley Pub.

Reference Books:

1. Tanabaum, *Distributed Systems*, PHI Pub.

CE4204: Wireless Mobile Communication (Elective-II)

Prerequisite: Nil

Unit 1: [7 Hrs]

Introduction:

A Short history of wireless communication, a market for mobile communication, Some research topics, A simplified reference model, Wireless Transmission, Frequencies for Radio transmission: Signal antennas, signal propagation, Multiplicity, modulation, spread spectrum, cellular systems.

Unit 2: [7 Hrs]

Medium Access Control:

Motivation for a specialized MAC, SDMA, FDMA, TDMA, CDMA, Comparison of S/T/F/CDMA Telecommunication Systems: GSM, DECT, TETRA, UMTS.

Unit 3: [6 Hrs]

Satellite Systems:

Basics, Routing, Localization, Handover, And Broadcast System: Cyclic repetition of data, digital audio broadcasting digital video broadcasting.

Unit 4: [7 Hrs]

Wireless LAN:

Infrared vs. radio transmission, ad-hoc networks, EEE802.11, Bluetooth, Wireless ATM, Motivation for WATM, WATM services reference model, functions, radio access layer, handover, location management, addressing, mobile quality of service, access point control protocol.

Unit 5: [6 Hrs]

Mobile Network Layer:

Mobile IP, Dynamic host configuration protocol, Ad-hoc Networks, Mobile Transport Layer: Traditional TCP, Indirect TCP, Mobile TCP.

Unit 6: [5 Hrs]

Support Layer for Mobility:

File system, WWW, WAP

Text Books:

1. Jochen Schiller, Mobile Communication, Pearson Education Asia.
2. Mallick, *Mobile and wireless design essentials*, Wiley computer pub.

Reference Books:

1. Andy Dornan, *the Essential Guide of Wireless communications Applications*, Pearson Education Asia
2. Weisman, *the Essential guide to RF and wireless*, Pearson Education Asia Lee, *Mobile Cellular Telecommunications*, MGH

CE4204: Software Testing (Elective-II)

Prerequisite: Software Engineering

OBJECTIVE:

This course will enable students to understand the importance, principles, and limitations of software testing. This course is designed to enable a clear understanding and knowledge of the foundations, techniques, and tools in the area of software testing and its practice in the industry. It will also enable them to understand the broad approaches and techniques for test case design and the aspects involved in planning for software testing. It helps to learn strengths and weaknesses of a variety of software testing techniques.

Unit 1: [7Hrs.]

Principles of Testing:

Software Development Life Cycle Model: Phases of software project, Quality, Quality assurance and quality control, Testing, Verification and validation, Process models to represent various phases, Life cycle models, Software testing life cycle.

Unit 2: [7Hrs.]

White Box Testing (WBT):

Static testing, Structural testing, Challenges in WBT.

Black Box Testing:

What, Why and When (W^3), How to do BBT.

Unit 3: [7Hrs.]

Integration Testing:

As a type of testing, As a phase testing, Scenario testing, Defect bash.

Unit 4: [7Hrs.]

System and Acceptance Testing:

What, Why (W^2), Functional Vs Non Functional, Functional system testing, Non-functional system testing, Acceptance testing.

Unit 5 [7Hrs.]

Performance testing, Regression testing, Internationalization testing, Adhoc testing.

Unit 6 [7Hrs.]

Testing Object Oriented Software: Introduction, Comparison of OO and Procedural software, System testing example, Unit testing of classes, Tools for testing OO software.Testing Web Application

Text Books

1. Shriniwasan Desikan, Gopalswamy Ramesh, *Software Testing Principles and Practices*, Pearson publication.
2. Loise Tamres, *Introducing Software Testing*, Pearson publication.

Reference Books

1. Boris Beizer, *Software Testing Techniques*, Dream Tech. publication.
2. Ross Patton, *Software Testing*, Pearson publication.

CE4204: Multimedia Systems (Elective-II)

Prerequisite: Computer Graphics

OBJECTIVE:

To make students familiar with the multimedia and introduce them with key technology issues related to multimedia .

Unit 1: [6 Hrs]

Introduction To Multimedia System:

Multimedia Elements, Applications, System Architecture, Technologies for Multimedia System, Objects in Multimedia System, Overview of devices such as Image Scanners, Video and Image Display System, Print output Technology. Animation and its types, Computer based Animation, full motion video.

Unit 2: [6 Hrs]

Video Processing And Animation:

Digital Image Representation, Image Format, Graphics Format(BMP, JPEG, GIF, TIFF),Video Signal Representation, Computer Video Format, Television, computer image processing, Need for Data Compression, broad categories of compression techniques.

Unit 3: [6 Hrs]

Audio and Speech Processing:

Basic sound concept, computer representation of sound, audio formats. **Music:** MIDI Concepts, MIDI devices, MIDI messages, MIDI and SMPTE Timing standards, MIDI software. **Speech:** speech generation, speech analysis, speech transmission.

UNIT 4: [4 Hrs]

MULTIMEDIA DOCUMENTS:

Documents, Hypertext and Hypermedia, SGML, ODA, MHEG. **User Interfaces**: characteristics for presentations, presentation function, presentation design knowledge, effective human computer Interaction**.**

UNIT 5: [5 Hrs]

Multimedia Application Development:

Introduction, software life cycle overview, ADDIE model, conceptualization, content collection and processing, story, flow line, storyboard, implementation, authoring metaphors, testing and feedback, final delivery, case study, virtual reality.

Unit 6: [**5 Hrs]**

Distributed Multimedia Systems:

Components, distributed client-server operation, multimedia object servers, Multiserver network topologies, Distributed multimedia databases, managing distributed objec**ts.**

Text book/References:

1. Multimedia: Computing, Communication and Applications- Ralf Steinmetz and Klara Nahrstedt- Pearson Education-8th Edition-2005.
2. Multimedia System Design-P.K.Andleigh and k. Thakrar- Pearson Education-3rd Edition-2008.
3. Principles of Multimedia – Ranjan Parekh - TataMcGraw-Hill Publication Company, NewDelhi.

CE4205: Information Security Lab

List of Experiments:

1. Implementation of public-key cryptography (RSA).
2. Implementation of cryptography using hash algorithm.
3. Study of number theory.
4. Implementation of DSA.
5. Implementation of Elliptic Cryptography.
6. Study of PKI, IPSec.
7. Study of different viruses and worms.
8. Implementation of generation of virus programs.
9. Study of different antivirus software.

Text Books:

1. *Network Security: Private Communication in public World*, Charlie Kaufman, and PHI Pub.
2. *Network Security essentials-applications and standards*, Stalling William, Pearson Education Pub.

Reference Books:

1. *Internet security protocol*, Vyless, Pearson Education Pub.
2. *Internetworking with TCP/IP*, Comer D.E., Pearson Education Pub.
3. *Information security-An overview*, Morrison, PHI Pub.
4. *Information security hand book-Computer communications and networks*, Hunter, Berlin, and Springer Pub.

CE4206: Artificial Intelligence Lab

List of Experiments:

1. Implement 8 puzzle problem using A* algorithm.

2. Implement AO* algorithm for tower of Hanoi.

3. Implementation of Unification Algorithm.

4. Implementation of Truth maintenance system using prolog

5. Implementation of Min/MAX search procedure for game Playing

6. Parsing Method Implementation using Prolog.

7. Development of mini expert system using Prolog.

Text Books:

11. Eugene, Charniak, Drew Mcdermott: "Introduction to artificial intelligence." Addison-Wilskey, 1985
12. Eiaine Rich and Kerin Knight: "Artificial Intelligence.", Tata McGraw-Hill, second edition.

Reference Books:

1. Schalkoff R J "Artificial Intelligence – An Engineering Approach"
2. Peter Jackson "Introduction to Expert System "
3. Janakiraman "Artificial Intelligence – 1"
4. Stuart Russell and Peter Nerving: "Artificial Intelligence: A Modern Approach", Prentice Hall, 2nd Edition.
5. Ivan Bratko : "Prolog Programming For Artificial Intelligence" , 2nd Edition Addison Wesley, 1990.
6. Herbert A. Simon, "The Sciences of the Artificial ", MIT Press, 3rd Edition (2nd Printing), 1995.
7. Tim Jones "Artificial Intelligence Application Programming" M. Dreamtech Publication

CE4207: Distributed Systems Lab

List of Experiments:

1. Demonstration of RPC through java.
2. Implementation of RMI using sockets.
3. Implementation of Synchronization algorithms.
4. Implementation of Election algorithm.
5. Demonstration of Distributed File system.
6. Demonstration of shared memory.

Text Books:

1. P. K. Sinha, *Distributed Operating System*, PHI Pub.
2. Colorouis, *Distributed Systems,* Addison Wesley Pub.

Reference Books:

1. Tanabaum, *Distributed Systems*, PHI Pub.

CE4208: Project (Phase II)

This is continuous work to the project phase I. Every student will have to submit a completed report (3 copies)* of the project work. Report preparation guidelines should be followed as per given format. The students will prepare a power point presentation of the work[1]. Panel of examiners comprising of guide, internal examiner, senior faculty, external examiner, etc. will assess the performance of the student considering their quality of work.

Phase II

1. Coding/Implementation.
2. Use cases.
3. Testing/Trouble shooting.
4. Data dictionary/ Documentation.
5. Finalization of project in all respect.

*(For guide, Personal copy, Departmental library.)

[1] In addition to the execution model. In a presentation, the students should focus to clarify problem definition and analysis of the problem.