Annexure-A3

BACHELOR'S DEGREE PROGRAMME

B.Tech

Syllabus

Academic Curricula-2024-28

Department Computer Science & Engineering

Raffles University, Neemrana, Rajasthan [INDIA]-301705

www.rafflesuniversity.edu.in

ACADEMIC CURRICULAM

2024-2028

BACHELOR'S DEGREE PROGRAMME

B.Tech

Detailed Syllabus

For student admitted in 2024-2028

Academic Session

Department Computer Science & Engineering

Raffles University, Neemrana, Rajasthan [INDIA]-301705

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Semester III (Second year) curriculum

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 201	Data structure & algorithm using C	3	0	0	3

Total Hrs:45

Unit I: Arrays, Records and Pointers (9Hr)

Introduction to Linear Arrays, Arrays ADT, Representation Linear in Memory, Traversing Array

Inserting and deleting, Sorting; Bubble Sort, Searching; Linear Search, Binary Search, Multidimensional Arrays, Representation of Polynomials Using Arrays, Pointers; Pointer Arrays, Dynamic Memory Management, Records; Record Structures, Representation of Records in Memory; Parallel Arrays, Matrices, Sparse Matrices.

Unit II: Linked List (9Hrs)

Introduction Linked Lists, Representation of Linked Lists in Memory Traversing a Linked List Searching a Linked List, Memory Allocation; Garbage Collection, Insertion into a Linked List, Deletion from a Linked List, Header Linked List, Circularly Linked Lists, Two-Way Lists (or Doubly Linked Lists), Josephus Problem and its Solution, Buddy Systems.

Unit III: Stacks, Queue and Recursion (9Hrs)

Introduction Stacks, Array Representation of Stacks, Linked Representation of Stacks, Stack as ADT, Arithmetic Expression; Polish Notation, Application of Stacks, Recursion, Towers of Hanoi, Implementation of Recursive Procedures by Stacks, Queue, Linked Representation of Queues, Queues as ADT, Circular of Queues, Deques, Priority Queues, Applications of Queues.

Unit IV: Trees (9Hrs)

Introduction Binary Trees ,Representing Binary Tree in Memory ,Traversing Binary Trees, Traversal Algorithms Using Stacks, Header Nodes; Threads, Threaded Binary Trees ,Binary Search Trees ,Searching and Inserting in Binary Search Trees ,Deleting in a Binary Search Tree, Balanced Binary Trees, AVL Search Trees ,Insertion in an AVL Search Tree ,Deletion in an AVL Search Tree, m-way Search Trees ,Searching, Insertion and Deletion in an m-way Search tree, B-Trees ,Searching, Insertion and Deletion in a B-tree, B+-Trees.

Unit V: Graphs and their Applications (9Hrs)

Introduction, Graph Theory Terminology, Sequential Representation of Graphs; Adjacency Matrix; Path Matrix, Warshall ‟s Algorithm; Shortest Paths, Linked Representation of a Graph, Operations on Graphs, traversing a Graph, Topological Sorting, Spanning Trees
Sorting and Searching: Introduction, Sorting, Insertion Sort, Selection Sort, Merging, Merge-Sort, Shell Sort, Radix Sort,Searching and Data Modification, Hashing.

Text Books:

1. Seymour Lipschutz, Schaums Outlines, „Data Structures with C‟‟,Tata Mc Graw Hill

Reference Books:

1. S. Sahani, „Data Structures in C‟‟

2. D.Samantha, „„Classic Data Structure‟‟, PHI Publications

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 202	Object oriented programming through C++	3	0	0	3

Total Hrs:45

Unit-I: Principles of Object Oriented Programming (8 Hrs)

Differences between C and C++.A look at procedure Oriented programming, object oriented programming paradigm, basic concepts of OOP, Benefits of OOP, OO languages, A sample program, structure of C++ program. Introduction to OOPS: The origins of C++, What is Object Oriented Programming? Some C++ fundamentals, Headers & Name Spaces, Introducing C++ Classes & Object.

Unit-II: Overloading

(10Hrs)

Introduction of overloading, Function overloading, Operator overloading, Inheritance, Constructors & Destructors,Function & Operator Overloading constructor functions, Localizing variables, Function overloading & Ambiguity, Finding the address of an overloaded function, this Pointer, References, Using reference to overload a unary operator, overriding.

Unit-III: Inheritance, Virtual Functions and polymorphism (7 Hrs)

Inheritance and the access specifies, Constructors and Destructors in derived classes, Multiple Inheritance, Passing parameters to a basic class, Pointers and references to derived types, Virtual Functions, Why virtual functions?, Pure virtual functions and abstract types, Early Vs Latebinding.

Unit-IV: Static & Dynamic memory allocation (10 Hrs)

Static & Dynamic allocation using new and delete, static class members, Virtual base classes, const member functions and mutable, volatile member functions, Using the as keyword, linkage specification, The .* and ->* operators, Creating conversion functions, Copy constructors, Granting access, namespaces, Explicit constructors, type name and export.

Unit-V: Exceptions Handling (10 Hrs)

Exception Handling, fundamentals, options the uncaught exception ( ), Applying exception Handling, and RTTI, casting operators, Recent trends in Object Oriented Programming in C++ , Advanced topics & its Application.

Templates : Class templates, class templates with multiple parameters, function templates, function templates with multiple parameters.

Text Books:

1. Object Oriented Programming in C++ -Robert Lafore, edition, Galgotia publications
2. The Complete Reference C++, Herbert Schildt, 4th Edition, TMH

Reference Books:

1. Y. Kanetkar, „Let‟s C++‟, BPB publications
2. E Balagurusamy, „Object oriented programming with C++‟, 4th edition, TMH
3. Sourav Sahay , „Object-Oriented Programming with C++‟ , Oxford University Press, 2006.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 203	Database Management System	3	0	0	3

Total Hrs: 45

UNIT – I: Database System Applications: (8 Hrs)

Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model

Unit-II: Database Design Theory (9 Hrs)

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views. Relational Algebra, Tuple relational Calculus, Domain relational calculus.

Unit-III: Physical Database Design and Memory Management in database (9 Hrs)
SQL: Queries, Constraints, Triggers: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases. Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

Unit -IV: Query Optimization and Performance Tuning (9 Hrs)
Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

Unit-V: Transaction Management (10Hrs)

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

Text Books:

1. Fundamentals of Database Systems – Emissary ,Navathe & Gupta, Pearson Education
2. Database System Concepts by Henry Korth

Reference Books:

1. Database Systems by S. K. Singh, Pearson Education.
2. Principles of Database Systems – Ullman, Golgotia Publications 1998.
3. Database Systems by Connolly, 3rd edition, Pearson Education.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 204	Unix & Shell Programming	3	0	0	3

Total Hrs:45

UNIT-I INTRODUCTION (9Hrs)

Introduction to Unix-Brief History-What is Unix-Unix Components-Using Unix-Commands in Unix-Some Basic Commands-Command Substitution-Giving Multiple Commands.

UNIT-II INTRODUCTION TO FILE (9Hrs)

The File system –The Basics of Files-What's in a File-Directories and File Names-Permissions-I,Nodes-The Directory Hierarchy, File Attributes and Permissions-The File Command knowing the File Type-The Chmod Command Changing File Permissions-The Chown Command Changing the Owner of a File-The Chgrp Command Changing the Group of a File.

UNIT-III REGULAR EXPRESSIONS: (9Hrs)

Using the Shell-Command Line Structure-Met characters-Creating New Commands-Command Arguments and Parameters-Program Output as Arguments-Shell Variables- -More on I/O Redirection-Looping in Shell Programs.

UNIT-IV KORN SHELL: (9Hrs)

Filters-The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters.

File Management: The Process-The Meaning-Parent and Child Processes-Types of Processes-More about Foreground and Background processes-Internal and External Commands-Process Creation-The Trap Command-The Stty Command-The Kill Command-Job Control.

UNIT-V INTERACTIVE C SHELL (9Hrs)

Shell Programming-Shell Variables-The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The Read Command-Positional parameters-The $? Variable knowing the exit Status-More about the Set Command-The Exit Command-Branching Control Structures-Loop Control Structures-The Continue and Break Statement-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-The Sleep Command-Debugging Scripts-The Script Command-The Eval Command-The Exec Command.

Text Book:

1. UNIX and Shell Programming Richard F. Gilberg.

Reference Books:

1. Mastering UNIX Shell Scripting: Bash, Bourne, and Korn Shell.
2. "UNIX and Shell Programming: A Textbook" by Behrouz A. Forouzan and Richard F. Gilberg

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
BSC	BSC 201	Mathematics - III	3	0	0	3

Total Hrs:45

Unit –I (9Hours)

Fourier transform: Discrete and Fast Fourier transform Complex form of Fourier transform and its inverse, Fourier sine and cosine transform and their inversion. Properties of F-transform, Convolution theorem for F-transform, Parse Val‟s identity of for F-transforms Applications of Fourier transform for the solution of partial differential equations having constant coefficients with special reference to heat equation and wave equation.

Unit –II (9Hours)

Laplace transform, Inverse transform, properties, Transforms of derivatives and integrals, Unit step function, Dirac‟s delta function, Differentiation and integration of transforms, Applications to differential equations.

Unit –III (9Hours)

Statistical Techniques: Discrete and Continuous random variables–Moments–Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions, Moments, Moment generating functions, Curve fitting, Method of least squares, Fitting of straight lines, Polynomials, Exponential curves etc., Correlation, Linear, non –linear

Unit –IV (9Hours)

Functions of Complex Variable: Definition, Exponential function, Trigonometric and Hyperbolic functions, Logarithmic functions. Limit and Continuity of a function, Differentiability and Analyticity.

Unit –V (9Hours)

Cauchy-Riemann equations: Necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations. Harmonic functions, application to flow problems. Integration of complex functions.

Text books:

1. Chandrika Prasad, Mathematics for Engineers, Prasad Mudralaya
2. Jeffrey, Advanced Engineering Mathematics , ELSEVIER

Reference books:

1. Chandrika Prasad , Advanced Mathematics for Engineers, Prasad Mudralaya
2. Grewal B. S., Higher engineering Mathematics, Khanna Publication, New Delhi
3. Keyszig E., Advanced Engineering Mathematics, Wiley Eastern Publication
4. Peter V. O. Neil, Advanced Engineering mathematics, Thomson Publication
5. Gerald, C.F., and Wheatley, P.O., Applied Numerical Analysis, Addison Wesley.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
HSMC	HSMC 201	Human Values	2	0	0	2

Total Hrs:45

UNIT-I: Course Introduction (9Hrs)

Need, basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self-Exploration - what is it? - its content and process; 'Natural Acceptance' and Experiential Validation - as the mechanism for self -exploration. Continuous Happiness and Prosperity - A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities - the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT-II: Harmony in the Human Being (9Hrs)

Understanding Harmony in the Human Being - Harmony in Myself! : Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

UNIT-III: Relationship and Goals (9Hrs)

Understanding Harmony in the Family and Society - Harmony in Human - Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human - human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in thesociety (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astiva as comprehensive Human Goals. Visualizing a universal harmonious order in society - Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family!

UNIT-IV: Nature and Values (9Hrs)

Understanding Harmony in the nature and Existence - Whole existence as Co-existence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature - recyclability and self-regulation in nature. Understanding Existence as Co-existence (Sah-astiva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT-V: Ethics and Ability (9Hrs)

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: Ability to utilize the professional competence for augmenting universal human order, Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, Ability to identify and develop appropriate technologies and management patterns for above production systems.

Text books:

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition.

Reference books:

1. Ivan IIlich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
3. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 205	Data structure & algorithm using C lab	0	0	2	1

Total Hrs: 20

List of Practical's-

1. Write and execute a program in C to implement stack using arrays
2. Write and execute a program in C to implement queue using arrays
3. Write and execute a program in C to implement simple linked list
4. Write and execute a program in C to implement stack using linked list
5. Write and execute a program in C to implement queue using linked list
6. Write and execute a program in C to implement doubly linked list
7. Write and execute a program in C to implement circular linked list.
8. Write and execute a program in C to reverse a singly and doubly linked list
9. Write and execute a program in C to insert a node in a linked list in a sorted fashion 154
10. Write and execute a program in C to implement binary tree, finding the depth of a tree
11. Write and execute a program in C to implement in order, preorder and post order traversals
12. Write and execute a program in C to find if two trees are identical

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 206	Object oriented programming through C++ lab	0	0	2	1

Total Hrs:20

List of Practical's-

1. Write a C++ program to find the sum of individual digits of a positive integer.
2. Write a C++ program to generate the first n terms of the sequence
3. Write a C++ program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
4. Write a C++ program to find both the largest and smallest number in a list of integers.
5. Write a C++ program to sort a list of numbers in ascending order.
6. Write a Program to illustrate New and Delete Keywords for dynamic memory allocation
7. Write a program Illustrating Class Declarations, Definition, and Accessing Class Members.
8. Program to illustrate default constructor, parameterized constructor and copy constructors
9. Write a Program to Demonstrate the i)Operator Overloading.ii) Function Overloading.
10. Write a Program to Demonstrate Friend Function and Friend Class.
11. Write a Program to Access Members of a STUDENT Class Using Pointer to Object Members.
12. Write a Program to Generate Fibonacci Series use Constructor to Initialize the Data Members.
13. Write C++ programs that illustrate how the following forms of inheritance are supported:
    a. Single inheritance b)Multiple inheritance c)Multi level inheritance d)Hierarchical inheritance
14. Write a C++ program that illustrates the order of execution of constructors and destructors when new class is derived from more than one base class.
15. Write a Program to Invoking Derived Class Member Through Base Class Pointer
16. Write a Program Containing a Possible Exception. Use a Try Block to Throw it and a Catch Block to Handle it Properly.
17. Write a Program to Demonstrate the Catching of All Exceptions.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 207	Database Management System Lab	0	0	2	1

Total Hrs: 20

List of Practicals:

1. Creation of a database and writing SQL queries to retrieve information from the database.
2. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based onconditions.
3. Creation of Views, Synonyms, Sequence, Indexes, save point.
4. Creating an Employee database to set various constraints.
5. Creating relationship between the databases.
6. Study of PL/SQL block.
7. Write a PL/SQL block to satisfy some conditions by accepting input from the user.
8. Write a PL/SQL block that handles all types of exceptions.
9. Creation of Procedures.
10. Creation of database triggers and functions.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 208	Unix & Shell Programming Lab	0	0	2	1

Total Hrs:20

List of Practical's-

1. Write a shell script to write your user name as a banner to the front of the file being sent to the printer
2. Write a shell script to print the first five arguments in reverse order
3. Write a shell script to append a line to the file. Both the file name and line have to be specified to the script at the command line. Ensure that it runs the sh shell script. Print the number of lines in the file after you done.
4. Write a shell script that tests and print outs the name of all the files in a directory that are executable. Do not print any other file or directory names. If there are subdirectories, go down recursively. How would you change this script to not go down recursively?
5. Write a shell script that given a person‟s UID, tells you how many times that person is logged on
6. Write a shell script called lsdirs which lists just the directories in the current directory
7. Write a shell script called see taking a filename name as argument which uses ls if the file is a directory and more if file is otherwise
8. Write a shell script that asks a user to type w word in, then tells the user how long that wordis.
9. In many versions of UNIX there us a –i argument for cp so that you will be prompted for confirmation if you are about to overwrite a file. Write a script called cpi which will prompt if necessary without using the –i argument.
10. Write a shell script that takes a uid as an argument and prints out that person‟s name, home directory, shell and group number, and other groups that person may belong to.
11. Sort /etc/passwd using the uid as the key.
12. a. Write a program to generate Machine OpCode Table, Symbol Table and PseudoOpCode table during First Pass Assembler.

    b. Write a program to generate Machine Opcode table using two pass Assembler.

Semester IV (Second year) curriculum

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC- CSE 209	Digital Electronics	2	1	0	3

Total Hrs:45

Unit –I (9Hrs)

Overview of electronics: Electronic Components-Resistor, capacitor and Inductors, Semiconductor devices: Diodes, transistors (BJT and FET). Integrated circuits, Popular IC packages, Analog vs digitalelectronics, Transistor as a switch.

Boolean algebra: Representation of values and complements, De'Morgans theorem-simplifyingexpressions.

Unit –II (9Hrs)

Logic gates: AND, OR, NOT, XOR, XNOR, NAND, NOR gates and their truth tables, combining logic circuits for expressions using NAND and NOR gates, Logic circuit families and characteristics, SSI, MSI,LSI and VLSI circuits. Combinational and sequential circuits: (Simple block diagrams, truth tables and IC packages only required).

Adders, decoders, multiplexers, encoder circuits , Flip-flops: RS, clocked RS, JK, D and T flip flops, Master-slave flip flops, edge and level triggering, Multivibrators - A stable, Bistable, Monostable,counters-ripple and decade. Registers, latches and Tristate buffers.

Unit –III (9Hrs)

Building blocks of a computer system: Basic building blocks-I/O, memory, ALU, Control and their interconnections, Control unit and its functions- Instruction-word, Instruction execution cycle, organizational sequence of operation of control registers; controlling of arithmetic operations; branch, skip, jump and shift instructions, ALU-its components.

Unit –IV (9Hrs)

Addressing techniques and registers: Addressing Techniques-Direct, immediate addressing; paging, relative, Indirect and indexed addressing. Memory buffer register; accumulators; Registers-Indexed, General purpose, Special purpose; overflow, carry, shift, scratch registers; stack pointers; floating point; status information and buffer registers

Unit –V (9Hrs)

Memory: Main, RAM, static and Dynamic, ROM, EPROM, EAROM, EEPROM, Cache and Virtual memory. Interconnecting System components: Buses, Interfacing buses, Bus formats-address, data and control,Interfacing keyboard, display, auxiliary storage devices, and printers. I/O cards in personal computers. Development of Indian Super Computer 'PARAM': History, Characteristics, Strengths, Weakness and basic Architecture.

Text Books:

1. A.S.Tannenbaum : Structured Computer Organization, Pearson
2. Thomas C. Bartee : Digital Computer Fundamentals, McGraw-Hill

Reference Books:

1. Duglus V Hall : Microprocessors and Interfacing: programming and Hardware, McGraw-Hill, 1986.
2. Introduction to Computer Architecture, Stone S.Galgotia Publicatons 1996.
3. Microprocessor Architecture Programming & Applications, R. Gaonkar, Wiley Eastern-1987.
4. Computer Architecture and Organization by N.P. Carter, 4th Edition, McGraw-Hill, 2014.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC- CSE 210	Discrete Mathematics	3	0	0	3

Total Hrs:45

UNIT-I: Set Theory, Relation: Definition, Function: (10Hrs)

Definition of Sets, Venn Diagrams, complements, Cartesian products, power sets, counting principle, cardinality and count ability (Countable and Uncountable sets), proofs of some general identities on sets, pigeonhole principle. Types of relation, composition of relations, domain and range of a relation, pictorial representation of relation, properties of relation, partial ordering relation. Definition and types of function, composition of functions, recursively defined functions.

UNIT-II: Propositional logic: (8Hrs)

Proposition logic, basic logic, logical connectives, truth tables, tautologies, contradiction, normal forms (conjunctive and disjunctive), modus ponens and modus tollens, validity, predicate logic, universal and existential quantification. Notion of proof: proof by implication, converse, inverse, contrapositive, negation, and contradiction, direct proof, proof by using truth table, proof by counter example.

UNIT-III: Combinatories: (8Hrs)

Mathematical induction, recursive mathematical definitions, basics of counting, permutations, combinations, inclusion-exclusion, recurrence relations (nth order recurrence relation with constant coefficients, Homogeneous recurrence relations, Inhomogeneous recurrence relation), generating function (closed form expression, properties of G.F., solution of recurrence relation using G.F, solution of combinatorial problem using G.F.)

Unit-IV: Algebraic Structure: (9Hrs)

Binary composition and its properties definition of algebraic structure; Groyas Semi group, Monoid Groups, Abelian Group, properties of groups, Permutation Groups, Sub Group, Cyclic Group, Rings and Fields (definition and standard results).

UNIT-V: Graphs: (10Hrs)

Graph terminology, types of graph connected graphs, components of graph, Euler graph, Hamiltonian path and circuits, Graph coloring, Chromatic number. Tree: Definition, types of tree(rooted, binary), properties of trees, binary search tree, tree traversing (preorder, inorder,

postorder). Finite Automata: Basic concepts of Automation theory, Deterministic finite Automation(DFA), transition function, transition table, Non Deterministic Finite Automata (NDFA), Mealy and Moore Machine, Minimization of finite Automation.

Text Books:

1. Kenneth H. Rosen, “Discrete Mathematics and its Applications”, Mc.Graw Hill, 2002.

Reference Books:

1. J.P.Tremblay & R. Manohar, “Discrete Mathematical Structure with Applications to Computer Science” Mc.Graw Hill, 1975.
2. "Discrete Mathematics and Its Applications" by Kenneth H. Rosen

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC- CSE 211	Computer Organization & Architecture	3	0	0	3

Total Hrs:45

Unit I: Basic Structure of Computers (9 Hrs)

Functional Units, Basic operational concepts, Bus structures Addressing modes, subroutines: parameter passing, Instruction formats, expanding op codes method.

Basic Processing Unit: Bus architecture, Execution of a Complete Instruction, sequencing of control signals, Hardwired control, Micro programmed Control, microinstruction format, Bit slice concept.

Unit II: Arithmetic Unit (9 Hrs)

Number representations and their operations, Design of Fast Adders, Signed multiplication, Booth‟s Algorithm, bit pair recoding, Integer Division, Floating point numbers and operations, guard bits and rounding.

Unit III: The Memory System (9 Hrs)

Various technologies used in memory design, higher order memory design, multimodal memories and interleaving, Associative Memory, Cache memory, Virtual Memory.

Unit IV: Input /Output Organization (9 Hrs)

I/O mapped I/O and memory mapped I/O, interrupts and interrupts handling mechanisms, vectored interrupts, synchronous vs. asynchronous data transfer, Direct Memory Access COMPUTER PERIPHERALS: I/O devices such as magnetic disk, magnetic tape, CDROM systems.

Unit V: RISC (9 Hrs)

Pipelining, basic concepts in pipelining, delayed branch, branch prediction, data dependency, influence of pipelining on instruction set design, multiple execution Units, performance considerations, Basic concepts in parallel processing & classification of parallel architectures. Vector Processing0, Array Processors. Recent trends in Computer Architecture & Organization.

Text Books:

1. V.C.Hamacher,Z.G.Vranesic and S.G.Zaky, „Computer Organization‟, McGraw Hill,5th edition ,2002.

References Books:

1.A.S.Tanenbaum, “Structured Computer Organization” 4th Edition, Pearson Education.
2.M Mano, “Computer System and Architecture”, Pearson Education
3.W. Stallings, “Computer Organization & Architecture”, Pearson Education.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC- CSE 212	Design & Analysis of Algorithm	2	1	0	3

Total Hrs:45

Unit – I: Introduction (8 Hrs)

INTRODUCTION: Algorithm, pseudo code for expressing algorithms, performance analysis-space complexity, time complexity, asymptotic notation- big (O) notation, omega notation, theta notation and little (o) notation, recurrences, probabilistic analysis, disjoint set operations, union and find algorithms.

Unit – II: Asymptotic notations (8 Hrs)

DIVIDE AND CONQUER: General method, applications-analysis of binary search, quick sort, merge sort, AND OR Graphs. GREEDY METHOD: General method, Applications-job sequencing with deadlines, Fractional knapsack problem, minimum cost spanning trees, Single source shortest path problem.

Unit – III: Advanced data structures (9 Hrs)

GRAPHS (Algorithm and Analysis): Breadth first search and traversal, Depth first search and traversal, Spanning trees, connected components and bi-connected components, Articulation points. DYNAMIC PROGRAMMING: General method, applications - optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design

Unit – IV: Greedy Method & Dynamic Programming (10Hrs)

BACKTRACKING: General method, Applications- n-queen problem, Sum of subsets problem, Graph coloring and Hamiltonian cycles. BRANCH AND BOUND: General method, applications - travelling sales person problem, 0/1 knapsack problem- LC branch and bound solution, FIFO branch and bound solution.

Unit-V: Traversal and Search Techniques (9 Hrs)

NP-HARD AND NP-COMPLETE PROBLEMS: Basic concepts, non-deterministic algorithms, NP-hard and NP-complete classes, Cook‘s theorem

Text Books:

1. Thomas H. Cormen et. al. “Introduction to Algorithms”, Prentice Hall of India.
2. Design & Analysis of Computer Algorithms by Aho,. Horowitz, Sahani, Rajsekharam, Pearsoneducation

Reference Books:

1. “Computer Algorithms”, Galgotia Publications Pvt. Ltd. Brassard, Bratley, “Fundamentals ofAlgorithms”, Prentice Hall
2. Computer Algorithms: Introduction to Design and analysis, 3rd Edition, By Sara Baase & A. V. Gelder Pearson Education.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC- CSE 213	Operating Systems	2	1	0	3

Total Hrs:45

Unit-I: Introduction (9Hrs)

Evolution of OS, Types of OS, Basic h/w support necessary for modern operating systems, services provided by OS, system programs and system calls, system design and implementation.

Unit-II: File Systems (9Hrs)

File systems: File concept, Access methods, Disk space management and space allocation strategies, directory structures, Recovery, Log-structured File System, disk arm scheduling strategies.

Unit-III: Process and Its Scheduling (9Hrs)

Process concept, process control block, Types of scheduler, context switch, threads, multithreading model, goals of scheduling and different scheduling algorithms.

Unit-IV: Memory Management (9Hrs)

Contiguous allocation, Relocation, Paging, Segmentation, Segmentation with paging, demand paging , Virtual Memory Concepts, page faults and instruction restart , page replacement algorithms , working sets ,Locality of reference, Thrashing, Garbage Collection.

Unit-V: Process management and synchronization (9Hrs)

Concurrency conditions, Critical section problem, software and hardware solution, semaphores, conditional critical regions and monitors, classical inter process communication problems.
Deadlocks detection & avoidance: Deadlock definitions, Prevention, Avoidance, detection and Recovery, Goals of Protection,access matrix, Deadlock implementation.

Text Books:

1. Operating System concepts – Silberchatz & Galvin, Addison Wesley, 6th Edn.
2. Modern Operating Systems – Tanenbaum, Pearson Edn. 2ndedn.

Reference Books:

1. Operating Systems – S R Sathe, Macmillan Publishers, India, 2008
2. Operating System –Milan Milenkovik, McGraw-Hill, 1987

Category	Code	Course Title	Hours PerWeek			Credit
			L	T	P	
HSMC	HSMC 401	Organizational Behavior	2	0	0	2

Total Hrs: 45

Unit-l: OrganizationalBehavior (9 Hrs)

Definition - Importance - Historical Background - Fundamental concepts of OB - 21st Century corporate - Different models of OB i.e. autocratic, custodial, supportive, collegial and SOBC.

Unit II: Perception Process & Personality & Attitudes (9 Hrs)

Nature & Importance - Perceptual Selectivity - Perceptual Organization - Social Perception – Impression Management Meaning of personality - Development of personality - Nature and dimensions of attitude - Job Satisfaction - Organizational Commitment.

Unit III: Learning & Motivation (9 Hrs)

Process of Learning - Principles of Learning - Organizational Reward Systems - Behavioral Management Motives - Characteristics - Classification of motives - Primary Motives - Secondary motives - Morale - Definition and relationship with productivity - Morale Indicators Theories of Work Motivation - Maslow's theory of need hierarchy - Herzberg's theory of job loading.

Unit IV: Leadership & Organizational Design (9Hrs)

Definition - Importance - Leadership Styles - Models and Theories of Leadership Styles Various organizational structures and their effects on human behaviour - Organizational Climate - Organizational Culture - Organizational Effectiveness.

Unit V: Conflict Management (9 Hrs)

Modern view of conflict - Constructive and Destructive conflict - Conflict Process - Strategies for encouraging constructive conflict - Strategies for resolving destructive conflict. Stress Management - Concept of stress - Sources of stress - Effects of stress on humans - Managementof Stress.

Text Books:

1. Organizational Behaviour, 9th Ed. - Stephen Robbins

2. Human Behaviour at work - Davis and Newstorm

3. Organizational Behaviour - Uma Sekaran

Reference Books:

4. Organizational Behaviour - Fred Luthans

5. Organizational Behaviour - K.Aswathappa

6. Human Behaviour at Work - Keith Davis

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 214	Computer Organization & Architecture Lab	0	0	2	1

Total Hrs: 20

List of practicals -

1. Machine and assembly languages (generic)
2. The process of assembly and linking
3. Special assembly language programming issues
4. Parameter passing: assembly language and "external"a.Return addresses and co-routines

b.Traps and interrupts: mechanism and handling

c. Worms and viruses: malicious code and defending against it

5. Special miscellaneous topics
6. Operating system interface: traps and interrupts

a.Access to IO devices: display, keyboard, real-time clocks, DMA

b.Communications (serial and parallel), simple error detection and correction codes (parity, Hamming),

7. Low level programming in C. This includes all sorts of "tricks" that emphasize the power of low-level computing, as an aid to understanding computing systems in depth: Pointers tofunctions and their applications for self modifying code and applications.
8. Write the working of 8085 simulators GNUsim8085 and basic architecture of 8085 along with small introduction.
9. Study the complete instruction set of CPU and write the instructions in the instruction set of8085 along with examples.
10. Write an assembly language code in GNUsim8085 to implement data transferinstruction.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 215	Operating Systems Lab	0	0	2	1

Total Hrs:20

List of practical's -

1. Basics of UNIX commands.
2. Shell programming
3. Implementation of CPU scheduling. a) Round Robin b) SJF c) FCFS d) Priority
4. Implement all file allocation strategies
5. Implement Semaphores
6. Implement File Organization Techniques
7. Implement Bankers algorithm for Dead Lock Avoidance
8. Implement an Algorithm for Dead Lock Detection
9. Implement the all page replacement algorithms a) FIFO b) LRU c) LFU
10. Implement Shared memory and IPC
11. Implement Paging Technique f memory management.
12. Implement Threading & Synchronization Applications

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 216	Design & Analysis of Algorithm Lab	0	0	2	1

Total Hrs: 20

List of practicals -

1. To find HCF and LCM of two numbers
2. Code and analyses to find median element in an array of integers.
3. Code and analyse to find majority element in an array of integers.
4. Code and analyse to sort an array of integers using merge sort
5. Code and analyse to sort an array of integers using quick sort
6. To implement maximum and minimum problem using divide and conquer strategy
7. To implement binary search using divide and conquer strategy
8. To implement program of Heap Sort.
9. WAP of minimum spanning tree using Kruskal algorithm.
10. WAP of minimum spanning tree using Prim‟s algorithm.
11. WAP to implement matrix chain multiplication
12. Code to find the shortest path in graph using Dijkstra‟s algorithm.
13. Code to find the shortest path using Bellman-Ford algorithm.
14. To implement LCS problem using Dynamic Programming.
15. To implement matrix chain multiplication problem using dynamic programming.
16. Code and analyze to find the minimum spanning tree in a weighted, undirected graph.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	MC-III	Constitutional Law	2	0	0	2

Total Hrs:40

Unit – I (10 Hrs)

Salient features of the Indian constitution. Preamble Definition of State (Art. 12) Doctrines of Ultra-virus, severability, eclipse, waiver (Art, 13)

Unit – II (10 Hrs)

Right to equality (Art. 14) Prohibition of discrimination, Rights to equality of opportUNITy (Art. 15-16) Right to freedom under Article 19: Freedom of association; Freedom of movement; Freedom of residence; Freedom of assembly; Freedom of association; Freedom of movement; Freedom of residence; Freedom of occupation, trade and business; Right to take out processions; Right of the State to impose reasonable restrictions

Unit – III (10 Hrs)

Protection in respect of Conviction under Article 20, Ex-post-facto law; Double jeopardy; Self-incrimination; Right of Life and Personal Liberty (Act. 21), Protection in respect of arrest and detention Right to freedom of Religion (Articles 25-28)

Unit – IV (10 Hrs)

Cultural and Education Rights (Articles 29-30) Enforcement of Fundamental Right, Writ Jurisdiction of the Supreme Court and High Court (Article 32, 226) Right to property before and after the Constitution 42nd Amendment Act, 1976 Abolition of Untouchability, Titles (Articles 17-18) Right against exploitation (Articles 23, 24)

Text Books:

1. Austin Granville: Constitution of India: Cornerstone of a Nation and Working A Democraticconstitution
2. Narender Kumar : Constitutional Law of India.

Reference Books:

3. Basu D. D : Shorter Constitution of India
4. Jain, M.P.: Constitutional Law of India,
5. Seervai, H.M. : Constitutional Law of India, Vols. I-III
6. Shukla, V.N. : Constitutional of India (ed. M.P.Singh)
7. B.R. Sharma : Constitutional Law and judicial Activism

Semester V (Third Year) curriculum

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 301	Data Communication	2	1	0	3

Total Hrs: 45

Unit-l: Signals (8Hrs)

ANALOG AND DIGITAL: Analog and digital data, Analog and digital signals; PERIODIC AND APERIODIC SIGNALS, ANALOG SIGNALS: Simple analog signals; TIME AND FREQUENCY
DOMAINS; COMPOSITE SIGNALS: Frequency spectrum and Bandwidth; DIGITAL SIGNALS: Decomposition of digital signal; TRANSMISSION MODES: Serial and Parallel transmission, Asynchronous and Synchronous Transmission, Simplex, Half-Duplex and Full-Duplex communication.

Unit II: Encoding And Modulation (8Hrs)

DIGITAL-TO-DIGITAL CONVERSION: Unipolar, Polar, Bipolar; ANALOG-TO-DIGITAL CONVERSION: Pulse Amplitude Modulation (PAM), Pulse Code Modulation (PCM), Sampling Rate, How many Bits per Sample? Bit rate; DIGITAL-TO-ANALOG CONVERSION: Aspects of Digital-to-Analog conversion, Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase shift Keying (PSK), Quadrature Amplitude modulation (QAM), Bit / Baud comparison; ANALOG-TO-ANALOG CONVERSION: amplitude modulation (AM), Frequency Modulation (FM), Phase Modulation(PM).

Unit III: Interfaces and Modems (8Hrs)

DIGITAL DATA TRANSMISSION: Parallel transmission, Serial Transmission; DTE-DCE INTERFACE: Data Terminal Equipment (DTE), Data Circuit-Terminating Equipment (DEC), Standards, EIA-232 Interface; OTHER INTERFACE STANDARDS: EIA-449, EIA-530.

Unit IV: Communication Media (7Hrs)

GUIDED MEDIA: Twisted pair cable, Coaxial cable, Optical Fiber cable; UNGUIDED MEDIA: Radio frequency allocation, Propagation of Radio waves, Terrestrial microwave, Satellite communication, Cellular Telephony; TRANSMISSION IMPAIRMENTS: Attenuation, Distortion, Noise; PERFORMANCE: Throughput, Propagation Speed, Propagation time.

Unit V: MULTIPLEXING (7Hrs)

FREQUENCY DIVISION MULTIPLEXING (FDM), TIME DIVISION MULTIPLEXING (TDM): Inverse Multiplexing, WAVE-DIVISION MULTIPLEXING, MULTIPLEXING APPLICATIONS: THE TELEPHONE SYSTEM: Common carrier services and hierarchies, Analog services, Digital Services.

Data Compression: Huffman code, Run-Length Encoding, Relative Encoding, Lempel-Ziv Encoding, ImageCompression, PEG, MPEG.

Text Book:

1. Behrouz A. Forouzan , „Data Communications and 161 Networking", 4th edition, Tata McGraw Hill.

Reference Book:

1. William A.Shay,„Understanding Data Communications and Networks", 2nd Edition,Vikas Publication.
2. William Stallings, "Data and Computer Communications", Eighth Edition, Pearson Education India, 2007.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 302	Software Engineering	2	1	0	3

Total Hrs: 45

Unit-I: Introduction (9 Hrs)

An Introduction to Software Engineering, Software Myths, Software Engineering- A Layered Technology, Software Process Framework, Software Process Models, The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, The Unified Process Model, Agile Process Models.

Unit-II: Software Planning (9 Hrs)

Software Engineering Practice An overview, Communication Practices, Planning Practices, Modeling Practices, Construction Practice & Deployment, System Engineering Hierarchy, Business Process Engineering, Product Engineering, System Modeling, Requirements Engineering.

Unit-III : Software Analysis And Design (9 Hrs)

Software Engineering Analysis & Design An overview, Requirements Analysis, Analysis Modeling Approaches, Data Modeling, Object-Oriented Analysis, Scenario Based Modeling, Flow-Oriented Modeling, Class-based Modeling, Behavioral Model. Design Engineering Concepts, DesignModel, Pattern-Based Software Design.

Unit-IV: Software Testing (9 Hrs)

Testing Strategies and Tactics An overview, level of testing: Unit Testing, Integration Testing, Validation Testing, System Testing, Debugging techniques. Software Testing Fundamentals, Black-Box Testing, White-Box Testing.

Unit-V: Trends in Software Engineering And Project Management (9 Hrs)

Software project management (PERT/CPM): Developing a network plan, overview of PERT /CPM, basic rules for developing network, basic rules for developing project network. Recent trends in Software Engineering and Project. Software Project Management An overview, Software Measurements, Metrics for Software Quality, Software Project Estimation Techniques, Project Scheduling, Risk Management, Quality Management, Change Management, Software Reengineering.

Text Book:

1. Software Engineering- A Practitioner‟s Approach (Sixth Edition) - Roger Pressman (TMH)

Reference Books:

1. Software Engineering (Seventh Edition)- Ian Summerville, Pearson Education.
2. Software Engineering Theory and Practice by Pfleeger, Pearson Education.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 303	Formal Language & Automata Theory	3	0	0	3

Total Hrs: 45

Unit-I: Fundamentals (9Hrs)

Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings, and languages, deterministic finite automaton and nondeterministic finite automaton, transition diagrams and Language recognizers.

Unit-II: Finite Automata & Regular Languages (8Hrs)

NFA with Î transitions – Significance, acceptance of languages. Conversions and Equivalence: Equivalence between NFA with and without Î transitions, NFA to DFA conversion, minimization of FSM, equivalence between two FSM"s, Finite Automata with output- Moore and Melay machines. Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Pumping lemma of regular sets, closure properties of regular sets (proofs not required).

Unit-III: Context Free Grammars & Grammar Formalism (9Hrs)

Ambiguity in context free grammars. Minimization of Context Free Grammars. Chomsky normal form, Greibach normal form, Pumping Lemma for Context Free Languages. Enumeration of properties of CFL (proofs omitted).Regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, Context free grammar, derivation trees, sentential forms. Right most and leftmost derivation of strings.

UNIT-IV: Push Down Automata & Turing Machine (9Hrs)

Push Down Automata: Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA, interconversion. (Proofs not required). Introduction to DCFL and DPDA. Turing Machine: Turing Machine, definition, model, design of TM, Computable functions, recursively enumerable languages. Church"s hypothesis, counter machine, types of Turing machines (proofs not required).

UNIT-V: Computability Theory (10Hrs)

Chomsky hierarchy of languages, linear bounded automata and context sensitive language,LR(0) grammar, decidability of, problems, Universal Turing Machine, undecidability of posts. Correspondence problem, Turing reducibility, Definition of P and NP problems, NP complete and NP hard problems.

Text Book:

1. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.

Reference Book:

1. Introduction to languages and the Theory of Computation ,John C Martin, TMH.

2. Hopcroft and Ullman, Introduction to Automata Theory, Languages and Computation, Addison Wesley.

3. Mishra, KLP, Chandrasekaran, N. Theory of Computer Science, (Automata, Languages and Computation) PHI, 2002.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 304	Java Programming	2	1	0	3

Total Hrs: 45

UNIT-I: (9Hrs)

Introduction to OOP, procedural programming language and object-oriented language, principles of OOP, applications of OOP, history of java, java features, JVM, program structure. Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, flow of control.

UNIT-II: (9Hrs)

Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector, the importance of static keyword and examples, this keyword, arrays, command line arguments, nested classes.

UNIT-III: (9Hrs)

Inheritance, types of inheritance, super keyword, final keyword, overriding an abstract class. Interfaces, creating the packages, using packages, the importance of CLASSPATH and java.lang package. Exception handling, the importance of try, catch, throw throws and finally block, user-defined exceptions, Assertions.

UNIT-IV: (9Hrs)

Multithreading: introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file,

UNIT-V: (9Hrs)

AWT: introduction, components and containers, Button, Label, Checkbox, Radio Buttons, List Boxes, Choice Boxes, Container class, Layouts, Menu and Scrollbar.

Text Book:

1. Cay S. Horstmann and Gary Cornell, “Core Java: Volume I – Fundamentals”, Eighth Edition, Sun Microsystems Press, 2008.

References Books:

1. K. Arnold and J. Gosling, “The JAVA programming language”, Third edition, Pearson Education, 2000.
2. Timothy Budd, “Understanding Object-oriented programming with Java”, Updated Edition, Pearson Education,

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
HSMC	HSMC-CSE-301	Human Resource Management	2	0	0	2

Total Hrs: 45

Unit-I:INTRODUCTION (9Hrs)

Overview of Human Resources, Historical evolution, Integrated HR function, Corporate and HR environment, Strategic environment, Strategic Management

UNIT-II: PLANNING (9Hrs)

HR planning at Enterprise level, Need for systematic planning, Planning process, Operating Environment- Internal & External, Job description, Models & techniques of Manpower demand and Supplyforecasting. Retention-Redeployment and Exit strategies

UNIT-III:SKILLES DEVELOPMENT (9Hrs)

Career management-Recruitment and Selection, Employee Induction Programme, Employee training, Training needs & objective setting, Methods of training, Development & Development needs, Human Resource Development, Development process

UNIT-IV: PERFORMANCE PLANNING (9Hrs)

Performance planning – Performance appraisal, Measures of appraisal, System components appraisal methods, Ethics of appraisal, Problems & issues

UNIT-V: HUMAN RESOURCE (9Hrs)

Human Resource Information System- Concept, Objectives of HRIS, Types of information, Sources of Information, Method of Data collection, Procedure of maintaining HRIS at Micro & Macro level

Text Book:

1. Praveen Durai (2010), Human Resource Management, Pearson Education, South Asia

Reference Books

1. John Storey, Graeme Salaman, Christopher Mabey(1998): Strategic Human Resource Management: A
   Reader, SAGE Publications, 1998
2. Christopher Mabey, Rosemary Thomson (2011): Developing Human Resources,Routledge, Taylor and francis group, New York, USA.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PEC	PEC-CSE 301	Soft Computing	2	0	0	2

Total Hrs: 45

UNIT-I: NEURAL NETWORKS (9 hours)

Fundamentals of Neural Networks – History- Architectures- Learning methods XOR problem-Delta rule-derivation-Back propagation- applications- parameters in BPN- Associative memory – Hetero associative- BAM-energy function problems-applications of associative memories- ART1-ART2- applications of adaptive networks.

UNIT-II: FUZZY LOGIC (9 hours)

Fuzzy set theory – crisp sets – fuzzy sets – crisp relations – Fuzzy relations – Fuzzy systems- Crisp logic – predicate logic – fuzzy logic- fuzzy based systems Defuzzification methods – applications.

UNIT-III: GENETIC ALGORITHMS (9 hours)

Fundamentals of GA – creation of offspring‟s – encoding – fitness function reproduction – crossover- insertioo & deletion- mutation- bitwise operators – applications.

UNIT-IV: HYBRID SYSTEMS (9 hours)

Hybrid systems – Neuro Fuzzy – Neuro Genetic – fuzzy Genetic hybrids- GA based weight determination and applications- fuzzy BPN – simplified fuzzy ARTMAP.

UNIT-V: PROGRAMMING USING MATLAB (9 hours)

Using Neural Network toolbox – Using Fuzzy Logic toolbox- Using Genetic Algorithm & directedsearch toolbox.

TEXT BOOKS:

1. Rajasekaran S. and VijayalakshmiPai G.A, “Neural Networks, Fuzzy Logic and GeneticAlgorithms”, PHI, 2011.
2. Timothy J.Ross, “Fuzzy Logic with Engineering applications”, John Wiley and Sons, 2010.

REFERENCES

1. Jang J.S.R, Sun C.T, Mizutani E, “Neuro fuzzy and Soft Computing”, PHI Learning Pvt. Ltd., 2012.
2. Davis E. Goldberg, “Genetic Algorithms: Search, Optimization and Machine Learning”, Addison Wesley, N.Y.,

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PEC	PEC-CSE 302	Image Processing	2	0	0	2

Total Hrs: 45

Unit-I: Introduction (9Hrs)

Origins of digital image processing, Various Imaging techniques, components of an image processing system, Image sensing and acquisition, Image sampling and quantization, neighbors of a pixel, Adjacency, Connectivity, Regions and boundaries.

Unit-II: Filtering (9Hrs)

Basic intensity transformation and spatial filtering, Image negatives, log transforms power-law transformations, median filtering, Histogram equalization, Histogram matching spatial correlation and convolutions.

Transformation: Two-dimensional orthogonal and Unitary Transforms, properties of unitary transforms 2D-DFT, Cosine transforms, Sine transforms, Hadamard transform, Haar transforms, Slant transforms.

Unit-IV: Image Degradation /Restoration Process (9Hrs)

Model of image Degradation/Restorations process, Noise models, Restoration in the presenceof noise only, periodic noise reduction by Frequency domain filtering, Image reconstructionfrom Projections, Image compression models, Huffman coding, LZW coding, Run length coding,Bit-plane coding.

Unit-V: Image Morphology (9Hrs)

Some basic algorithms, Boundary extraction, convex hull, thinning, morphological Reconstruction. Colorimage color models. skeletons, morphological processing, color models, RGB color models, CMY and CMYK color models the HIS.

Unit-VI: Image Segmentation (9Hrs)

Image segmentation, Fundamentals, Point, Line and edge detection, of segmentation, Thresholding, Regionbased segmentation, watershed segmentation algorithm Applications of segmentation.

Text Book:

1. Digital image processing by Rafael C. Gonzalez, Richard E. Woods, 3rd Edition, Pearson PHIPublication.

Reference Books:

1. Fundamental of Digital Image Processing by A. K. Jain, P. H. I. Publication.
2. Digital image processing by S. Jayaraman, S. Esakkirajan, T. Virakumar, McGraw Hill.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PEC	PEC-CSE 303	Embedded System	2	0	0	2

Total Hrs: 45

Unit- I: Microcontrollers (10Hrs)

Microprocessors and Micro-controllers, Types of Microcontrollers, External memory, Processor Architecture – Harvard v/s Van Neumann; CISC v/s RISC, Microcontroller, Memory types, Software development tools like assembler, cross- compiler, emulator, and 173 simulator, 8051 controller, Block Diagram &Architecture.

Unit-II: Device and Communication Bus for Devices Network (10Hrs)

IO Types and examples, Serial communication devices, Parallel Device ports, Sophisticated Interfacing Feature in Devices Ports, Wireless Devices, Timer and Counting Devices, Watch dog timer, Real time clock, Network Embedded Systems, Serial Bus Communication Protocols, parallel Bus Devices protocol Parallel communication Network using ISA, PCI, PCI-X and advanced buses, Internet Enabled Systems- Network protocols, Wireless and mobile system protocol.

Unit-III: Device Drivers and Interrupt Services Mechanism (10Hrs)

Programmed-I/O Busy-wait Approach without Interrupt Services Mechanism, ISR Concept, Interrupt Sources, Interrupt Servicing (Handling) Mechanism, Multiple Interrupts, Context and the Periods for Context Switching, Interrupt Latency and Deadline, Classification of Processor Interrupt Service Mechanism from Context-Saving Angle, Direct Memory Access, Device Driver Programming.

Unit-IV: Inter process Communication and Synchronization (8Hrs)

Multiple process in an application, Multiple Threads in an application, Task and Task state, Task and Data, Clear-cut Distinction between Functions, ISRS and Tasks by their Characteristics, Concept of Semaphores, Shared Data, Inter process Communication, Signal Function, Semaphore Functions, Message Queue Functions, Mailbox Functions, Pipe Functions, Socket Functions, RPC Functions.

Unit-V: Interfacing Buses (7Hrs)

Industrial Interfacing Buses (10 Hrs) PCI, ESA, EISA, I2C, USB, RS232. Advance topics on embedded system.

Text Book

1. Myke Predko, “Programming and Customizing The 8051 Micro-controller”, Tata McGrawHill edition.

2. John B. Peatman, “Design with PIC Microcontrollers”, Low Price Edition, Pearson Education Asia.

Reference Books:

1. Embedded System :Architecture, programming and design by Rajkamal,TMH

2. ARM Assembly Language: Fundamentals and Techniques, William Hohl, CRC Press

3. ARM Architecture Reference Manual / Edition 2, by David Seal.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 305	Software Engineering lab	0	0	2	1

List of Practical's-

1. Develop requirements specification for a given problem (The requirements specification should include both functional and non-functional requirements. For a set of about 20 sample problems
2. Develop DFD Model (Level 0, Level 1 DFD and data dictionary) of the sample problem(Use of a CASE tool required). (1 class)
3. Develop structured design for the DFD model developed. (1 class)
4. Develop UML Use case model for a problem (Use of a CASE tool any of Rational rose,Argo UML, or Visual Paradigm etc. is required)
5. Develop Sequence Diagrams
6. Develop Class diagrams.
7. Develop code for the developed class model using Java
8. Use testing tool such as Joint.
9. Use configuration management tool
10. Use any one project management tool such as Microsoft Project or Gantt Project, etc.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 306	Java Programming Lab	0	0	2	1

Total Hrs:20

List of Practical's:

1. Create a java program to implement stack and queue concept.
2. Write a java package to show dynamic polymorphism and interfaces.
3. Write a java program to show multithreaded producer and consumer application.
4. Create a customized exception and also make use of all the exception keywords.
5. Convert the content of a given file into the uppercase content of the same file.
6. Develop an analog clock using applet.
7. Develop a scientific calculator using swings.
8. Create an editor like MS-word using swings.
9. Create a servlet that uses Cookies to store the number of times a user has visited your servlet.
10. Create a simple java bean having bound and constrained properties.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 307	Data Communication Lab	0	0	2	1

Total Hrs: 20

List of Practical's:

1. Study of basic data communication system.
2. Demonstrate Analog and digital signals.
3. To Convert Analog signal into digital signal.
4. To Convert digital signal into Analog signal.
5. Study of Amplitude modulation.
6. Study of Frequency modulation.
7. Study of Phase modulation.
8. Study of Amplitude shift keying.
9. Study of Frequency shift keying.
10. Study of Binary Phase shift keying.
11. Study of Quadrature amplitude shift keying.
12. Study of Frequency division Multiplexing (FDM)
13. Study of Time division Multiplexing (TDM)
14. Study of various interface standards.
15. Study of Twisted pair cable, Coaxial cable and Optical Fiber cable

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PROJ	PROJ- CSE 301	Industrial Training/ Project Seminar	0	0	4	1

Objective of Industrial Training: The objective of industrial training is to provide work experience so that students engineering knowledge is enhanced and employment prospects are improved. The student should take this course as a window to the real World and should try to learn as much as possible from real life experiences by involving and interacting with industry staff. Industrial training also provides an opportunity to students to select an engineeringproblem and possibly an industry guide for their Major Project in final semester.

Scheme of Studies: Duration 4 weeks in summer break after IV semester, assessment to be done in V semester practical examination. During training students will prepare a first draft of training report in consultation with section in charge. After training they will prepare final draft with the help of Faculty of the concern Department of mechanical engineering. Then they will present a seminar on their training and present it in the institute in front of the committee headed by the HOD/Faculty Member.

Learning through Industrial Training: During industrial training students must observe followingto enrich their learning:

- Industrial environment and work culture.
- Organizational structure and inter personal communication. Hardware
- / Software configuration knowledge and specifications.Project
- Planning, development and maintenance.
- Problems related to various areas of work etc.
- Students are supposed to acquire the knowledge on above by Direct Observations without disturbing personnel at work.
- Interaction with officials at the workplace in free/ tea time Study of Literature at the workplace (e.g. User Manual, standards, processes, schedules, etc.)
- Hands on" experience Undertaking/assisting project work. Solving problems at the work place.
- Presenting a seminar participating in group meeting/discussion.
- Consulting current technical journals and periodicals in the library.

Semester VI (Third Year) curriculum

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 308	Compiler Design	3	0	0	3

Total Hrs: 45

Unit-I: INTRODUCTION TO COMPILERS (8Hrs)

Translators-Compilation and Interpretation-Language processors -The Phases of Compiler-Errors Encountered in

Different Phases-The Grouping of Phases-Compiler Construction Tools - Programming Language basics.

Unit-II: LEXICAL ANALYSIS (8Hrs)

Need and Role of Lexical Analyzer-Lexical Errors-Expressing Tokens by Regular Expressions-Converting Regular Expression to DFA- Minimization of DFA-Language for Specifying Lexical Analyzers-LEX-Design of Lexical Analyzer for a sample Language.

Unit-III: SYNTAX ANALYSIS (10Hrs)

Need and Role of the Parser-Context Free Grammars -Top Down Parsing -General Strategies-Recursive Descent Parser Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser-LR (0)Item-Construction of SLR Parsing Table -Introduction to LALR Parser - Error Handling and Recovery in Syntax Analyzer-YACC-Design of a syntax Analyzer for a Sample Language .

Unit-IV: SYNTAX DIRECTED TRANSLATION & RUN TIME ENVIRONMENT (10Hrs)

Syntax directed Definitions-Construction of Syntax Tree-Bottom-up Evaluation of S-Attribute Definitions- Design of predictive translator - Type Systems-Specification of a simple type checker-Equivalence of Type Expressions-Type Conversions. RUN-TIME ENVIRONMENT: Source Language Issues-Storage Organization-Storage Allocation-Parameter Passing-Symbol Tables-Dynamic Storage Allocation-Storage Allocation in FORTAN.

Unit-V: CODE OPTIMIZATION AND CODE GENERATION (9Hrs)

Principal Sources of Optimization-DAG- Optimization of Basic Blocks-Global Data Flow Analysis- Efficient Data Flow Algorithms-Issues in Design of a Code Generator - A Simple Code Generator Algorithm.

Text Book:

1. A Retarget able C Compiler: Design and Implementation Fraser and Hansen, Benjamin-Cummings, 1995.

References Books:

1. Advanced Compiler Design and Implementation, Much nick, Morgan and Kaufmann,1998.
2. Crafting a Compiler, Fischer and LeBlanc, Benjamin-Cummings, 1988.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 309	Data Mining & Warehousing	3	0	0	3

Total Hrs: 45

UNIT-I (9Hrs)

Data warehouse: Introduction to Data warehouse, Difference between operational database systems and data warehouses, Data warehouse Characteristics, Data warehouse Architecture and its Components, Extraction-Transformation-Loading, Logical(Multi-Dimensional), Data Modeling, Schema Design, Star and Snow-Flake Schema, Fact Constellation, Fact Table, Fully Addictive, Semi-Addictive, Non Addictive Measures; Fact-Less-Facts, Dimension Table Characteristics; OLAP Cube, OLAP Operations, OLAP Server Architecture-ROLAP, MOLAP and HOLAP.

UNIT-II (9Hrs)

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major issues in Data Mining. Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration &Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT-III (9Hrs)

Association Rules: Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIOIRI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set-Maximal Frequent Item Set, Closed Frequent Item Set.

UNIT-IV (9Hrs)

Classification: Problem Definition, General Approaches to solving a classification problem, Evaluation of Classifiers , Classification techniques, Decision Trees-Decision tree Construction, Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction ; Naive-Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbor classification-Algorithm and Characteristics. Prediction: Accuracy and Error measures, Evaluating the accuracy of classifier or a predictor, Ensemble methods.

UNIT-V (9Hrs)

Clustering: Clustering Overview, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, , Partitioning Clustering-K-Means Algorithm, PAM Algorithm; Hierarchical Clustering-Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm, Key Issues in Hierarchical Clustering, Strengths and Weakness, Outlier Detection.

Text Book:

1. Han, Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann.

References:

1. Data Mining-Concepts and Techniques- Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, 2 Edition, 2006.
2. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 310	Computer Network	3	0	0	3

Total Hrs:45

UNIT – I (9Hrs)

INTRODUCTION: Network applications, network hardware, network software, reference models: OSI, TCP/IP, Internet, Connection oriented network - X.25, frame relay. THE PHYSICAL LAYER: Theoretical basis for communication, guided transmission media, wireless transmission, the public switched telephone networks, mobile telephone system.

UNIT – II (9Hrs)

THE DATA LINK LAYER: Design issues, error detection and correction, elementary data link protocols, sliding window protocols, example data link protocols - HDLC, the data link layer in the internet. THE MEDIUM ACCESS SUBLAYER: Channel allocations problem, multiple access protocols, Ethernet, Data Link Layer switching, Wireless LAN, Broadband Wireless Bluetooth.

UNIT – III (9Hrs)

THE NETWORK LAYER: Network layer design issues, routing algorithms, Congestion control algorithms, Internetworking, the network layer in the internet (IPv4 and IPv6), Quality of Service.

UNIT – IV (9Hrs)

THE TRANSPORT LAYER: Transport service, elements of transport protocol, Simple Transport Protocol, Internet transport layer protocols: UDP and TCP.

UNIT – V (9Hrs)

THE APPLICATION LAYER: Domain name system, electronic mail, World Wide Web: architectural overview, dynamic web document and http. APPLICATION LAYER PROTOCOLS: Simple Network Management Protocol, File Transfer Protocol, Simple Mail Transfer Protocol, Telnet..

Text Books:

1. Data Communication & Networking by Behrouz A. Forouzan McGraw Hill.

References:

1. Tanenbaum, A.S. (2002) Computer Networks, Prentice Hall.
2. William Stallings, “Data and Computer Communications”, Eighth Edition, Pearson Education India, 2007.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PEC	PEC-CSE 304	Distributed System	2	1	0	3

Total Hrs:45

UNIT – I (9Hrs)

Characterization of Distributed Systems-Introduction, Examples of Distributed systems, Resource sharing and web, challenges, System models -Introduction, Architectural and Fundamental models, Networking and Internetworking, Interprocess Communication, Distributed objects and Remote Invocation-Introduction, Communication between distributed objects, RPC, Events and notifications, Case study-Java RMI.

UNIT – II (9Hrs)

Operating System Support- Introduction, OS layer, Protection, Processes and Threads, Communication and Invocation, Operating system architecture, Distributed File Systems-Introduction, File Service architecture.

UNIT – III (9Hrs)

Peer to Peer Systems–Introduction, Napster and its legacy, Peer to Peer middleware, Routing overlays, Overlay case studies-Pastry, Tapestry, Application case studies-Squirrel, Ocean Store.

Time and Global States-Introduction, Clocks, events and Process states, Synchronizing physical clocks, logical time and logical clocks, global states, distributed debugging.

Coordination and Agreement-Introduction, Distributed mutual exclusion, Elections, Multicast communication, consensus and related problems.

UNIT – IV (9Hrs)

Transactions and Concurrency Control-Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering. Distributed Transactions-Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.

UNIT – V (9Hrs)

Replication-Introduction, System model and group communication, Fault tolerant services, Transactions with replicated data.

Distributed shared memory, Design and Implementation issues, Consistency models.

Text Books:

1. Singhal&Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill

2. Ramakrishna,Gehrke," Database Management Systems", McGraw Hill

Reference Books:

1. Vijay K.Garg Elements of Distributed Compuitng , Wiley

2. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Education

3. Tenanuanbaum, Steen," Distributed Systems", PHI.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PEC	PEC-CSE 305	Theory of computation	2	1	0	3

Total Hrs:45

Unit I: Mathematicalpreliminaries (7Hrs)

Sets, operations, relations, strings, transitive closure, count ability and diagonalisation, induction and proof methods-pigeon-hole principle and simple applications – concept of language – grammars and production rules –Chomsky hierarchy.

Unit II: Finite automata & regular expressions (8Hrs)

Finite State machine, regular languages, deterministic finite automata, conversion to deterministic automata, E-closures – regular expressions, finite automata, and minimization of automata, Moore and Mealy machine and their equivalence.

Unit III: Regular grammar & context free grammar (9Hrs)

Pumping lemma for regular sets- closure properties of regular sets- decision properties for regular sets, equivalence between regular language and regular grammar. Context – freelanguages – parse trees and ambiguity, reduction of CFGS ,Chomsky and Griebach normalforms.

Unit IV: Push – down Automata (PDA) (9Hrs)

Non Determinism – acceptance by two methods and their equivalence, conversion of PDA to CFG CFLs and PDAs-closure and decision properties of CFLs.

Unit V: Turing machines (12Hrs)

Variants – recursively enumerable (r.e.) set – recursive sets ,TM as computer of function – decidability and solvability – Halting Problem – reductions – Post correspondence Problem (PCP) and un solvability of ambiguity problem of CFGs, Church‟s hypothesis, Introduction to recursive function theory – primitive recursive and partial recursive functions.

Text Books

1. Introduction Of Automata Theory, Languages and computation- J.E. Hopcroft , J.D.Ulman, Pearson education.

Reference Books

1. John Martin, „Introduction Of Automata Theory, Languages and computation‟
2. Peter Linz , „Introduction to formal languages and automata‟,Norasa,2000.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PEC	PEC-CSE 306	Speech and Natural Language Processing	2	1	0	3

Total Hrs: 45

UNIT-I: INTRODUCTION (9Hrs)

Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM – Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance

UNIT-II: WORD LEVEL ANALYSIS (9Hrs)

Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.

UNIT-III: SYNTACTIC ANALYSIS (9Hrs)

Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs – Feature structures,Unification of feature structures.

UNIT-IV: SEMANTICS AND PRAGMATICS (9Hrs)

Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

UNIT-V: DISCOURSE ANALYSIS AND LEXICAL RESOURCES (9Hrs)

Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Co reference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill‟s Tagger, WorldNet, Prop Bank, Frame Net, Brown Corpus, British National Corpus (BNC).

Text Books:

1. Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction toNatural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.

2. Steven Bird, Ewan Klein and Edward Loper, ―Natural Language Processing with Python, First Edition,
OReilly Media, 2009.

Reference Books:

1. Breck Baldwin, ―Language Processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015.
2. Richard M Reese, ―Natural Language Processing with Java, OReilly Media, 2015.
3. Nitin Indurkhya and Fred J. Damerau, ―Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010.
4. Tanveer Siddiqui, U.S. Tiwary, ―Natural Language Processing and Information Retrieval, Oxford
University Press,
2008.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PEC	PEC-CSE 307	Advance Operating System	2	1	0	3

Total Hrs: 45

UNIT-I: FUNDAMENTALS OF OPERATING SYSTEMS (9 Hrs)

Overview – Synchronization Mechanisms – Processes and Threads - Process Scheduling – Deadlocks: Detection, Prevention and Recovery – Models of Resources – Memory Management Techniques.

UNIT-II: DISTRIBUTED OPERATING SYSTEM (9 Hrs)

Issues in Distributed Operating System – Architecture – Communication Primitives –Lamport‟s Logical clocks – Causal Ordering of Messages – Distributed Mutual Exclusion Algorithms – Centralized and Distributed Deadlock Detection Algorithms – Agreement Protocols.

UNIT-III: DISTRIBUTED RESOURCE MANAGEMENT (9 Hrs)

Distributed File Systems – Design Issues - Distributed Shared Memory – Algorithms for Implementing Distributed Shared memory–Issues in Load Distributing – Scheduling Algorithms – Synchronous and Asynchronous Check Pointing and Recovery – Fault Tolerance – Two-Phase Commit Protocol – Nonblocking Commit Protocol – Security and Protection.

UNIT-IV: REAL TIME AND MOBILE OPERATING SYSTEMS (9 Hrs)

Basic Model of Real Time Systems - Characteristics- Applications of Real Time Systems –Real Time Task Scheduling - Handling Resource Sharing - Mobile Operating Systems –Micro Kernel Design - Client Server Resource Access – Processes and Threads - Memory Management - File system.

UNIT-V: CASE STUDIES (9 Hrs)

Linux System: Design Principles - Kernel Modules - Process Management Scheduling -Memory Management - Input-Output Management - File System - Interprocess Communication. iOS and Android: Architecture and SDK Framework - Media Layer -Services Layer - Core OS Layer - File System.

Text Books:

1. "Operating System Concepts" by Abraham Silberschatz, Peter B. Galvin, and Greg Gagne
2. Modern Operating Systems" by Andrew S. Tanenbaum and Herbert Bos

References Books:

1. Mukesh Singhal and Niranjan G. Shivaratri, “Advanced Concepts in Operating Systems Distributed, Database, and Multiprocessor Operating Systems”, Tata McGraw-Hill, 2001.
2. Abraham Silberschatz; Peter Baer Galvin; Greg Gagne, “Operating System Concepts”, Seventh Edition, John Wiley & Sons, 2004.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PEC	PEC-CSE 308	Real Time Operating System	2	1	0	3

Total Hrs:45

Unit-I: Introduction (9Hrs)

Real-time Versus Conventional Software, Computer Hardware for Monitoring and Control, Software Engineering Issues. SOFTWARE ARCHITECTURES: Process and State-based Systems model, Periodic and Sporadic Process, Cyclic Executives, CE definitions and Properties, Foreground-Background Organizations, Standard OS and Concurrency, Systems Objects and Object-Oriented Structures, Abstract Data Types, General Object Classes.

Unit-II: Requirements and Design Specifications (9Hrs)

Classification of Notations, Data Flow Diagrams, Tabular Languages, State Machine, Communicating Real Time State Machine- Basic features, Timing and clocks, Semantics Tools and Extensions, State chartsConcepts and Graphical Syntax, Semantics and Tools.

Unit-III: Declarative Specifications And Deterministic Scheduling (9Hrs)

DECLARATIVE SPECIFICATIONS Regular Expressions and Extensions, Traditional Logics-Propositional Logic, Predicates, Temporal logic, Real time Logic. DETERMINISTIC SCHEDULING Assumptions and Candidate Algorithms, Basic RM and EDF Results, Process Interactions-Priority Inversion and Inheritance.

Unit-IV: Execution Time Specification (9Hrs)

Measurement of Software by software, Program Analysis with Timing Schema, Schema Concepts, Basic Blocks, Statements and Control, Schema Practice, Prediction by optimization, System Interference and Architectural Complexities Timer Application, Prosperities of Real and ideal clocks, Clock Servers – Lamport "s Logical clocks, Monotonic Clock service, A software Clock server, Clock Synchronization Centralized Synchronization, Distributed Synchronization.

Unit-V: Programming Language (9Hrs)

PROGRAMMING LANGUAGES: Real Time Language Features, Ada-Core Language, Annex Mechanism for Real Time Programming, Ada and Software Fault Tolerance, Java and Real-time Extensions, CSP and Occam.

Text Book:

1. Real – Time Systems and software by Alan C. Shaw ; John Wiley & Sons Inc, 2001.
2. "RTOS: Building Real-Time Embedded Systems" by Girish Patil.

Reference Book:

1. Real-Time Systems, Jane W.S. Liu, Prentice Hall, 2000.

2. "Real-Time Systems and Programming Languages: Ada 95, Real-Time Java and Real-Time C/POSIX" by Alan Burns and Andy Wellings.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PEC	PEC-CSE 309	Web and Internet Technology	2	1	0	3

Total Hrs: 45

UNIT I: (9Hrs)

Web Basics and Overview: Introduction to Internet, World Wide Web, Web Browsers, URL, MIME, HTTP, Web Programmers Toolbox. HTML Common tags: List, Tables, images, forms, frames, Cascading Style Sheets (CSS) & its Types. Introduction to Java Script, Declaring variables, functions, Event handlers (onclick, on submit, etc.,) and Form Validation.

UNIT II: (9Hrs)

Introduction to XML: Document type definition, XML Schemas, Presenting XML , Introduction to XHTML, Using XML Processors: DOM and SAX. PHP: Declaring Variables, Data types, Operators, Control structures, Functions.

UNIT III: (9Hrs)

Web Servers and Servlets: Introduction to Servlets, Lifecycle of a Servlet, JSDK, Deploying Servlet, The Servlet API, The javax. Servlet Package, Reading Servlet parameters, Reading Initialization parameters. The javax. servlet HTTP package, Handling Http Request & Responses, Cookies and Session Tracking.

UNIT IV: (9Hrs)

Database Access: Database Programming using JDBC, JDBC drivers, Studying Javax.sql.* package, Connecting to database in PHP, Execute Simple Queries, Accessing a Database from a Servlet. Introduction to struts frameworks.

UNIT V: (9Hrs)

JSP Application Development: The Anatomy of a JSP Page, JSP Processing. JSP Application Design and JSP Environment, JSP Declarations, Directives, Expressions, Scripting Elements, implicit objects. Java Beans: Introduction to Beans, Deploying java Beans in a JSP page.

Text Book:

1. Greenlaw R and Hepp E "Fundamentals of Internet and www" 2nd EL, Tata McGrawHill,2007.

Reference Book:

2. Ivan Bayross, "HTML, DHTML, JavaScript, Perl CGI", 3rd Edition, BPB Publications.

3.D. Comer, "The Internet Book", Pearson Education, 2009.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
OEC	OEC-CSE 301	Management & employee performance	2	1	0	3

Total Hrs: 45

Unit I: Performance Management (PM) Conceptual FrameWork (9 Hrs)

Introduction to Performance Management, Definition, nature, scope, importance, Business and sub functional Performance Management, Performance Management as a management Tool, Performance objectives and standards, Standards of Performance. Performance Domains and dimensions.

Unit II: Performance Planning (9 Hrs)

Performance Planning Process, Contents of Performance Plan, 8 Step Model, Individual and Group Performance Planning, Role clarity and Job description, Meaning of Performance appraisal, methods and approaches to performance appraisal, Obstacles in appraisal, Designing appraisal for better results, Performance Appraisal Interview, Potential Appraisal.

Unit III: Performance Appraisal (9 Hrs)

Introduction, Definition, Purpose and Role of appraisal in Performance Management, Methods and Steps in Performance Appraisal. Why Appraisal Fail, Types of Appraisal, Approaches and Design, MBO, 360*, Potential Appraisal, Performance Review, Performance counseling/ Mentoring. Team Performance Appraisal.

Unit IV: Performance Management System (9Hrs)

Introduction to PMS, Importance, Features, Process of Building PMS, PMS Dimensions, Conceptual Framework. 4 pillars of PMS, PMS Prism, Strategic Performance Management, Performance and Strategy linkage, Components of SPM, SPM- Balanced Score Card, SPM and Metrix, SPM Environment teatre and Risks.

Unit V: Latest trends in Performance Management (9 Hrs)

Competency Based Performance Management System, Performance Measurement, Performance Measurement through BSC, Performance and Succession Plan/ Career Development, International Performance Management, Performance Audit, Human Resource Valuation accounting andAudit.

Text Book:

1. D. K. Bhattacharya, Performance Management Systems and Strategies- Text book, Pearson.

Reference Books:

1. Aquinis, Performance Management, Pearson. Chadha, Performance Management, Macmillan.
2. Armstrong, Michael, Baron, Jaico, Performance Management.Cardy, Performance Management, PHI.
3. Kohli, Deb, Performance Management, Oxford.D Sharma, Performance Management, HPH.
4. R.K. Sahu, Performance Management System, EB.
5. TV Rao, Performance Management and Appraisal, Sage.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
OEC	OEC-CSE 302	Cyber law & ethics	2	1	0	3

Total Hrs:45

Unit-I: Introduction (9 Hrs)

Concepts of Technology and Law Understanding Technology, Basic Concepts ofTechnology and Law Understanding the Technology of Internet, Scope of Cyber Laws, CyberJurisprudence.

Unit-II: Law of Digital Contracts (9 Hrs)

The Essence of Digital Contracts, the System of Digital Signatures, The Role and Function of Certifying Authorities, The Science of Cryptography.

Unit-III: Intellectual Property Issues in Cyber Space (9 Hrs)

Domain Names and Related issues, Copyright in the Digital Media, Patents in the Cyber World, Rights of Netizens and E-Governance ,Privacy and Freedom Issues in the Cyber World, E-Governance E-Governance, Cyber Crimes and Cyber Laws.

Unit-IV: International Scenario in Cyber Laws (9Hrs)

Data Protection Laws in EU and USA ,Child Abuse Protection Laws in EU and USA, Cyber Laws - the Malaysian Approach.

Unit-V: Cyber law Issues For Management (9Hrs)

Cyber Law Issues in E-Business Management, Major issues in Cyber Evidence Management ,Cyber Law Compliancy Audit

Text Book:

1. “The Law of the Internet” by J. Rosenoer, Cyber Law (Springer Verlag).

Reference Books:

1. "Cyber Laws in India.. ITA-2000 and Beyond" by Navvi
2. “Handbook of Cyber Laws” By Sharma Vakul.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
OEC	OEC-CSE 303	Non- Conventional Energy Sources	2	1	0	3

Total Hours: 45

Unit-I (9 Hrs)

Global and National scenarios, Form and characteristics of renewable energy sources.

Solar Energy: Solar radiation, its measurements and prediction, Solar thermal collectors, flat plate collectors, concentrating collectors, Basic theory of flat plate collectors, solar heating of buildings, solar still, solar water heaters, solar driers, conversion of heat energy in to mechanicalenergy, solar thermal power generation systems.

Solar Photovoltaic: Principle of photovoltaic conversion of solar energy, types of solar cells and fabrication, Photovoltaic applications: battery charger, domestic lighting, street lighting, water pumping, power generation schemes.

Unit-II (9 Hrs)

Wind Energy: Atmospheric circulations, classification, factors influencing wind, wind shear, turbulence, wind speed monitoring, Betz limit, WECS- classification, characteristics and applications.

Unit-III (9 Hrs)

Ocean Energy: Ocean energy resources, ocean energy routes, Principles of ocean thermal energy conversion systems, ocean thermal power plants, Principles of ocean wave energy conversion and tidal energy conversion.

Unit-IV (9 Hrs)

Other Sources: Nuclear fission and fusion, Geothermal energy- Origin, types of geothermal energy sites, site selection, geothermal power plants, Magneto-hydro-dynamic (MHD) energy conversion, Formation of biomass, photosynthesis, Biomass resources and their classification, Chemical constituents and physicochemical characteristics of biomass, Biomass conversion processes.

Unit-V (9 Hrs)

Fuel Cells: Thermodynamics and electrochemical principles, Basic design, types, applications. Hydrogen Energy: Economics of hydrogen, Production methods.

Text Books:

1. "Non-Conventional Energy Sources" by G.D. Rai
2. "Introduction to Renewable Energy" by Vaughn Nelson and Kenneth L. Starcher

References Books:

1. Power Generation through Renewable Source of Energy, Rai and Ram Prasad, Tata McGraw-Hill,

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 311	Compiler Design Lab	0	0	2	1

Total Hrs:20

List of Practical's-

1 & 2 implement a lexical analyzer in "C".

3. Use LEX tool to implement a lexical analyzer.

4. Implement a recursive descent parser for an expression grammar that generates arithmetic expressions with digits, + and *.

5. Use YACC and LEX to implement a parser for the same grammar as given in problem

6. Write semantic rules to the YACC program in problem 5 and implement a calculator that takes an expression with digits, + and * and computes and prints its value.

7 & 8. Implement the front end of a compiler that generates the three address code for a simple language with: one data type integer, arithmetic operators, relational operators, variable declaration statement, one conditional construct, one iterative construct and assignment statement.

9 &10. Implement the back end of the compiler which takes the three address code generatedin problems 7 and 8, and produces the 8086 assembly language instructions that can be assembled and run using a 8086 assembler. The target assemblies instructions can be simple move, add, sub, and jump. Also simple addressing modes are used.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 312	Computer Network Lab	0	0	2	1

Total Hrs:20

List of Practical's-

1. To demonstrate the operation of the Ethernet – network using OPNET IT Guru
2. To demonstrate the implementation of the token ring network using OPNET IT Guru
3. To demonstrate the implementation of the Switched local area network using OPNET IT Guru
4. To demonstrate the basics of designing a network using OPNET IT Guru
5. To examine the effect of ATM adaptation layers and service classes on the performance of network using OPNET IT Guru.
6. To Configure & analyze the performance of routing information protocol (RIP) model using OPNET IT Guru
7. To configure & analyze the performance of open shortest path first (OSPF) routing protocol using OPNET IT Guru
8. To demonstrate the congestion control algorithm implemented by the TCP using OPNET ITGuru
9. To create a network cable using RJ-45 connectors. 10. To install a network interface card
10. Simulation of Dijkstra Algorithm in C
11. Simulation of Spanning tree algorithm in C
12. To configure a Wireless access point in a local network
13. To install and configure wireless LAN card in the computer
14. To understand the working of layer-3 switch for address sub netting in the network.

Semester VII (Fourth Year) curriculum

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE401	Cyber Security & Cryptography	3	0	0	3

Total Hrs: 45

UNIT– I: Security Concepts (9 Hrs)

Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT– II: Symmetric key Ciphers (9 Hrs)

Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4. Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

UNIT– III: Cryptographic Hash Functions (9 Hrs)

Message Authentication, Secure Hash Algorithm (SHA-512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme. Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastruct ure

UNIT – IV: Transport-level Security (9 Hrs)

Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH) Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE

802.11i Wireless LAN Security

UNIT – V: E-Mail Security (9 Hrs)

Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, Internet Key Exchange Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Crosssite Scripting Vulnerability.

Text Books:

1. Cryptography and Network Security – Principles and Practice: William Stallings, PearsonEducation, 6th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition

Reference Books:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, WileyIndia, 1st Edition.
2. Cryptography and Network Security : Forouzan Mukhopadhyay, Mc Graw Hill, 3rdEdition.

Categor	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PEC	PEC-CSE401	Data Analytics	2	1	0	3

Total Hrs: 45

UNIT-I: INTRODUCTION TO BIG DATA [9 hours]

Introduction to Big Data Platform – Challenges of conventional systems – Web data – Evolution of Analytic scalability, analytic processes and tools, Analysis v/s reporting – Modern data analytic tools, Statical concepts: Sampling distributions, re-sampling, statistical inference, prediction error

UNIT-II: DATA ANALYSIS [9 hours]

Regression modeling, Multivariate analysis, Bayesian modeling, inference and Bayesiannetworks, Support vector and kernel methods, Analysis of time series: linear systems analysis, nonlinear dynamics – Rule induction – Neural networks: learning and generalization, competitive learning, principal component analysis and neural networks; Fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, Stochastic search methods.

UNIT-III: MINING DATA STREAMS [9 hours]

Introduction to Streams Concepts – Stream data model and architecture – Stream Computing, Sampling data in a stream – Filtering streams – Counting distinct elements in a stream –Estimating moments – Counting oneness in a window – Decaying window – Realtime Analytics Platform(RTAP) applications – case studies – real time sentiment analysis, stock market predictions.

UNIT-IV: FREQUENT ITEMSETS AND CLUSTERING [9 hours]

Mining Frequent item sets – Market based model – Apriori Algorithm – Handling large data sets in Main memory – Limited Pass algorithm – Counting frequent itemsets in a stream – Clustering Techniques – Hierarchical – K- Means

– Clustering high dimensional data – CLIQUE and PROCLUS – Frequent pattern based clustering methods – Clustering in non-euclidean space – Clustering for streams and Parallelism.

UNIT-V: FRAMEWORKS AND VISUALIZATION [9 hours]

Map Reduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases – S3 – Hadoop Distributed file systemsVisualizations – Visual data analysis techniques, interaction techniques; Systems andapplications:

Text Books:

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
2. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, CambridgeUniversity Press, 2012.

Reference Books:

1. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streamswith advanced analystics, John Wiley & sons, 2012.
2. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007 Pete Warden, Big DataGlossary,
   O‟Reilly, 2011.
3. Jiawei Han, Micheline Kamber “Data Mining Concepts and Techniques”, Second Edition, Elsevier,
   Reprinted 2008.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PEC	PEC-CSE402	Parallel and Distributed Algorithm	2	1	0	3

Total Hrs: 45

Unit - I: Fundamentals: (9 Hrs)

Introduction to distributed systems, synchronous / asynchronous network models, leader election problem in ring and general networks; Type of faults, fail safe systems, Byzantine faults, distributed consensus with link and process failures.

Unit- ll: The PRAM Model: (9 Hrs)

Balancing, divide and conquer, parallel prefix computation, pointer jumping, symmetry breaking, list ranking, sorting and searching, graph algorithms, parallel complexity and complexity classes, lower bounds.

Unit - lll: Interconnection Networks: (9 Hrs)

Topologies (arrays and mesh networks, trees, systolic networks, hyper cubes, butterfly) and fundamental algorithms, matrix algorithms, sorting, graph algorithms, routing, and relationship with PRAM models; Asynchronous Parallel Computation; Distributed Models and Algorithms.

Unit- IV: Concepts of Distributed Computation: (9Hrs)

Termination; Failure tolerance; Network topology. Distributed Search: Algorithms for BFS, DFS,shortest paths and spanning trees in distributed systems.

Unit - V: Distributed Networks: (9 Hrs)

Broadcasting; Robust distributed networks. Processor organizations such as mesh andhypercube, embedding of problem graphs into processor graphs.

Text Books:

1. "Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers" by Barry Wilkinson and Michael Allen.

References Book:

1. V. Kumar, A. Grama, A. Gupta, G. Kaarypis, Introduction to Parallel Computing, Addison Wesley Press.
2. "Introduction to Parallel Algorithms and Architectures: Arrays, Trees, Hypercubes" by F. Thomson Leighton

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PEC	PEC-CSE403	Neural Networks and Deep Learning	2	1	0	3

Total Hrs: 45

Unit - I: Introduction: Neuro Computing andNeuroscience (9 Hrs)

Historical notes, human Brain, neuron Mode l, Knowledge representation, Al and NN. Learning process: Supervised and unsupervised learning, Error correction learning, competitive learning, adaptation, statistical nature of the learning process.

Unit - II: Data processing (9 Hrs)

Scaling, normalization, Transformation (FT/FFT), principal component analysis, regression, co-variance matrix, Eigen values & eigen vectors. Basic Models of Artificial neurons, activation Functions, aggregation function, single neuron computation, multilayer perceptron, least mean square algorithm, gradient descent rule, nonlinearly separable problems and bench mark problems in NN.

Unit - III: Multilayered network architecture (9 Hrs)

Back propagation algorithm, heuristics for making BP-algorithm performs better. Accelerated learning BP (like recursive least square, quick prop, RPROP algorithm), approximation properties of RBF networks and comparison with multilayer perceptron.

Unit - IV: Deep Learning (9 Hrs)

Deep Feed Forward network, regularizations, training deep models, dropouts, Convolutional Neural Network, Recurrent Neural Network, Deep Belief Network. Deep Learning research: Object recognition, sparse coding, computer vision, natural language processing.

Unit - V: Deep Learning Search and tools (9 Hrs)

Various paradigms of earning problems, Perspectives and Issues in deep learning framework, review of fundamental learning techniques. Deep Feed Forward network, regularizations, training deep models, dropouts, Convolutional Neural Network, Recurrent Neural Network, Deep Belief Network. Deep Learning research: Object recognition, sparse coding, computer vision, natural language processing.Deep Learning Tools: Caffe, Theano,Torch.

Text Books:

1. Goodfellow, I., Bengio,Y., and Courville, A., Deep Learning, MIT Press, 2016.T2. Bishop, C.,M., Pattern Recognition and Machine Learning, Springer, 2006

Reference Books:

1. J.A. Anderson, An Introduction to Neural Networks, MIT
2. Hagen Demuth Beale, Neural Network Design, Cengage Learning

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PEC	PEC-CSE 404	Multi-agent Intelligent	2	1	0	3

Total Hrs: 45

Unit I:- **Introduction to Agents** (9 Hrs)

Agents and Environment; Performance measure; Nature of Environment; Abstract and Concrete Architecture for intelligent agents; Problem solving and planning: Result sharing, Task sharing and Distributed planning

Unit - II: The design of Intelligent Agents (9 Hrs)

Deductive reasoning agents: AgentO, Practical Reasoning Agents: HOMER architecture; Reactive agents: Subsumption architecture; Hybrid agents: Touring Machines, InteRRaP.

Unit - III: Agent Communication and Interaction Protocols (9 Hrs)

Agent Communications: Knowledge Query and manipulation Language (KQML), Knowledge Interchange Format (KIF), Ontology, Coordination protocols, Cooperation Protocols, Contract Net, Blackboard Systems, Negotiation, Multi-agent Belief Maintenance, Market Mechanisms.

Unit - IV: Multi-Agent System Interactions & Agreements (9 Hrs)

Classifying multi-agent interactions: Multi-agent Encounters - Dominant Strategies and Nash Equilibria - Competitive and zero-sum and other interactions; Cooperation: the Prisoner's dilemma and Axelrod's experiments; Reaching Agreements: Interactions between self-interested agentsauctions & voting systems – negotiation - Argumentation; Interactions between benevolent agents: Cooperative Distributed Problem Solving (CDPS), partial global planning; coherence and coordination

Unit -V: Multi-agent Methodologies and Applications (9 Hrs)

Agent Methodologies- Mobile agents; Typical application areas of agent systems: Business Process Management, Distributed Sensing, Information Retrieval and Management, Electronic Commerce, Human-Computer Interfaces, Social Simulation etc.

Text Books:

1.K.-H. Dietsche, M. Klingebiel, Automotive Handbook; Robert Bosch GmbH, Plochingen, 2007.

2.N.P. Padhy, Artificial Intelligence and Intelligent Systems; Oxford University Press, Oxford, 2005.

Reference Books:

1. M. Wooldridge, An Introduction to Multiagent Systems; John Wiley & Sons, New York, NY, 2002.

2. J.M. Vidal, Fundamentals of Multiagent Systems with NetLogo Examples; Lecture Notes, University of South Car olina, Columbia, SC, 2007.

3. St. Preitl, R.-E. Precup, Regulatoare pentru servosisteme: metode de proiectare; Editura Orizonturi Universitare, T imisoara, 2007 (in Romanian + slides in English).

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PEC	PEC-CSE-405	Internet of Things	2	1	0	3

Total Hrs: 45

UNIT-I: FUNDAMENTALS OF IoT (9Hrs)

Evolution of Internet of Things – Enabling Technologies – IoT Architectures: oneM2M, IoT World Forum (IoTWF) and Alternative IoT models – Simplified IoT Architecture and Core IoT Functional Stack -– Fog, Edge and Cloud in IoT – Functional blocks of an IoT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects

UNIT-II: IoT PROTOCOLS (9Hrs)

IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e,
1901.2a, 802.11ah and LoRaWAN – Network Layer: IP versions, Constrained Nodes and Constrained Networks –
Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks – Application
Transport Methods: Supervisory Control and Data Acquisition – Application Layer Protocols: CoAP and MQTT

UNIT-III:DESIGN AND DEVELOPMENT (9Hrs)

Design Methodology – Embedded computing logic – Microcontroller, System on Chips – IoT system building blocks – Arduino – Board details, IDE programming – Raspberry Pi – Interfaces and Raspberry Pi with Python Programming.

UNIT-IV: DATA ANALYTICS AND SUPPORTING SERVICES (9 Hrs)

Structured Vs Unstructured Data and Data in Motion Vs Data in Rest – Role of Machine Learning
– No SQL Databases – Hadoop Ecosystem – Apache Kafka, Apache Spark – Edge StreamingAnalytics and Network Analytics
– Xively Cloud for IoT, Python Web Application Framework – Django – AWS for IoT – System Management with
NETCONF-YANG

UNIT-V: CASE STUDIES/INDUSTRIAL APPLICATIONS (9Hrs)

Cisco IoT system – IBM Watson IoT platform – Manufacturing – Converged Plantwide EthernetModel (CPwE) – Power Utility Industry – GridBlocks Reference Model – Smart and Connected

Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control Analyze applications of IoT in real time scenario.

Text Book:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, ―IoT Fundamentals:
2. Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017

Reference Books:

1. Arshdeep Bahga, Vijay Madisetti, ―Internet of Things – A hands-on approach,Universities Press, 2015
2. Olivier Hersent, David Boswarthick, Omar Elloumi , ―The Internet of Things – Keyapplications and Protocols, Wiley, 2012 (for Unit 2).

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PEC	PEC-CSE 406	Cloud Computing	2	1	0	3

Total Hrs: 45

Unit-l: Introduction to Cloud Computing (9Hrs)

Virtualization Concepts, Cloud Computing Fundamental: Overview of Computing Paradigm, Evolution of cloud computing, Defining cloud computing, Components of a computing cloud, Essential Characteristics of Cloud Computing, Cloud Taxonomy.

Unit-II: Cloud Computing Architectural Framework (10Hrs)

Cloud architectural principles, Role of Networks in Cloud computing, Role of Web services, Benefits and challenges to Cloud architecture, Cloud Service Models, cloud computing vendors. Cloud Services Management, Performance and scalability of services, tools and technologies used to manage cloud services deployment.

Unit-III: Exploiting Cloud Services (9Hrs)

Software as a Service(SaaS): Introduction to SaaS, Inspecting SaaS technologies, Implementing web services, Deploying Infrastructure as a Service(IaaS): Introduction to IaaS, Scalable server clusters, Machine Image, Virtual Machine (VM). Elastic storage devices, Data storage in cloud computing, Delivering Platform as a Service(PaaS): Introduction to PaaS, Service Oriented Architecture (SOA), Cloud Platform and Management, Hardware-as-a-service: HaaS.

Unit-IV: Cloud Application Development (9 Hrs)

Role of business analyst, Technical architecture considerations, Service creation environmentsto develop cloud based applications, Technologies and the processes required when deploying web services; Deploying a web service from inside and outside a cloud architecture, advantages and disadvantages, Cloud Economics.

Unit-V: Cloud Security and Risk Management (9Hrs)

Cloud Security: Understanding cloud based security issues and threats, Data security and Storage, Identity & Access Management, Risk Management in cloud, Governance and Enterprise Risk Management.

Text Books:

1. Distributed and Cloud Computing: Clusters, Grids, Clouds, and the Future Internet by Kai Hwang, Jack Dongarra & Geoffrey C. Fox., Morgan Kaufmann Publishers, 2012.

2. Cloud Computing Bible, Barrie Sosinsky, WileyIndia, 2010

Reference Books:

1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011.

2. Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, LeeGillam, Springer, 2012.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
OEC	OEC-CSE 401	Economics Policy in India	2	1	0	3

Total Hrs: 45

Unit – I: Economic Development and its Determinants (9 Hrs)

Approaches to economic development and its measurement – sustainable development; Role of State, market and other institutions; Indicators of development – PQLI, Human Development Index (HDI), gender development indices.

Unit-II: Planning in India (9 Hrs)

Objectives and strategy of planning; Failures and achievements of Plans; Developing grass-root organizations for development – Panchayats, NGOs and pressure groups.Demographic Features, Poverty and Inequality. Broad demographic features of Indian population; rural-urbanmigration; Urbanization and civic amenities; Poverty and

Unit-III: Inequality (9 Hrs)

Resource Base and Infrastructure**.** Energy; social infrastructure – education and health; Environment; Regional imbalance; Issues and policies in financing

Unit-IV: Infrastructure development and Polices (9 Hrs)

The Agricultural Sector, Institutional Structure – land reforms in India; Technological change in agriculture – pricing of agricultural inputs and output; industry; Agricultural finance policy; Agricultural Marketing and Warehousing; Issues Terms of trade between agriculture and in food security – policies for sustainable agriculture. Industrial policy; Public Sector enterprises and their performance; Problem of sick units in India; Privatization and policy – issues in labour market reforms; approaches for employment generation.

Unit-V: Public Finances (9 Hrs)

Fiscal federalism – Centre-State financial relations; Finances of central government; Finances of state governments; Parallel economy; Problems relating to fiscal policy; Fiscal sector reforms in India. Money, Banking and Prices. Analysis of price behavior in India; Financial sector reforms; Interest rate policy; Review of monetary policy of RBI; Money and capital markets; Working of SEBI in India. External Sector Structure and direction of foreign trade; Balance of payments; Issues in export-import policy and FEMA; Exchange rate.

Text Book:

1. Ahluwalia, I. J. and I. M. D Little (Eds.) (1999), India's Economic Reforms and Development (Essays in honour of Manmohan Singh), Oxford University Press, New Delhi.

Reference Books:

1. Bardhan, P. K. (9th Edition) (1999), The Political Economy of Development in India, Oxford University Press, New Delhi.
2. Bawa, R. s. and P. S. Raikhy (Ed.) (1997), Structural Changes in Indian Economy, Guru Nanak Dev University Press.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
OEC	OEC-CSE 402	Reliability & Maintenance engineering	2	1	0	3

Total Hours=45

Unit-I Introduction: (9Hrs)

Maintenance Objectives and Functions, Maintenance Systems, Need of planned maintenance, Maintenance policies, Breakdown, time based maintenance, Block replacement, age replacement and periodic replacement policy, Corrective and preventive maintenance, Maintenance planning, Scheduled maintenance, Costof maintenance versus Cost of equipment and production delays.

Inspection: Inspection intervals, Inspection reports, card history system.

Unit-II Predictive Maintenance: (9Hrs)

Equipment wear records, standards, Equipment used in predictive maintenance. Computerized maintenance, Total Productive Maintenance, Methods of conditionmonitoring, Non-destructive testing, Liquid Penetrate, Magnetic particles, Ultrasonic testing, and Vibration analysis, Oil analysis, Radiographic testing.

Unit-III Reliability: (9Hrs)

Definition, failure data analysis, Mean failure rate, mean time to failure(MTTF), mean time between failures (MTBF), hazard rate, Bathtub curve, Use of Weibull probability chart foe assessing characteristics life, guarantee period etc.

Unit-IV System Reliability Improvement: (9Hrs)

Series, parallel and mixed configuration, Simple problems. Techniques, use of Pareto analysis-Design for reliability, redundancy unit and stand by redundancy, Optimization of reliability.

Unit-V Spare Parts Management: (9Hrs)

Spare parts, features and categorization of spares, cost considerations, Techniques of cost reduction, Selective controls used in spare parts control, ABCanalysis, FSN, XYZ, VED and other approaches, Inventory control of spares.

Text Book:

1. "Reliability Engineering and Risk Analysis: A Practical Guide" by Mohammad Modarres, Mark Kaminskiy, and Vasiliy Krivtsov.
2. "Reliability and Maintenance Engineering" by R. C. Mishra and K. Pathak.

Reference Books:

1. Reliability Engineering, Srinath L.S., Affiliated East West Press.
2. Maintainability Principles and Practices, Blanchand, B.S., McGraw Hill

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
OEC	OEC-CSE 403	Management training & development	2	1	0	3

Total Hours: 45

Unit-I: Training (9 Hrs)

Training: Introduction - Conceptual framework of training - approaches on training – Difference between Training and Development - Training and applied psychology - principles of training - Learning and skills acquisition - Transfer and retention of skills.

Unit-II: Need for Training (9 Hrs)

Methods of Identification of Training needs - Training policy - Planning and organizing the training programmes - Methods of Training - – on the job training – off the job training – choosing optimum method – the lecture –panel discussion – behavior modeling – interactive demonstrations – brain storming – case studies, incident process, in- transactional analysis, exception analysis.

Unit-III: Management Development (9 Hrs)

Management Development (MD) and Organizational Development (OD) - Difference between MD and OD - Aims and objectives of MD and OD - Methods of MD -OD interventions – Succession Planning and Career development.

Unit-IV: Evaluation of training (9 Hrs)

Evaluation of training-need for evaluation, Principles of evaluation, Criterion and Approaches: Return on investment in training, Process of calculating ROI in training; emerging trends in training and development; new perspectives on training- Cross culture training.

Unit-V: Technology in training

Technology in training: CBT, Multimedia training, e-learning/Online (9 Hrs)

Text Book:

1. B.L.Gupta(2011), Management Training and Development, Vrinda Publication, New Delhi.

Reference Books:

1. Alan M. Saks, Robert R. Haccoun (2010): Managing Performance Through Training and Development, 5e, Nelson Education ltd. USA.
2. Craig Eric Schneier, Craig J. Russell (1994): The Training and Development Sourcebook
3. 2e, Human Resource Development Press Inc, USA.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE-402	Network Security & Cryptography lab	0	0	2	1

Total Hrs: 20

List of Practical's-

1. Write a program to implement the Caesar Cipher
2. Write a program to implement the Play air Cipher
3. Write a program to implement the Hill Cipher
4. Write a program to implement the Vigenere Cipher
5. Write a program to implement the Rail fence row & Column Transformation
6. Write a program to implement the DES algorithms
7. Write a program to implement the RSA Algorithm
8. Write a program to implement the Diffiee-Hellman algorithms
9. Write a program to implement the MD5 algorithms
10. Write a program to implement the SHA-1 algorithms
11. Implement the SIGNATURE SCHEME -Digital Signature Standard
12. Demonstrate how to provide secure data storage, secure data transmission.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PEC-CSE-407	Data Analytics Lab	0	0	2	1

Total Hrs: 20

COURSE OBJECTIVES:

The objectives of this course are,

1. To implement MapReduce programs for processing big data.
2. To realize storage of big data using MongoDB.
3. To analyze big data using machine learning techniques such as Decision tree classification and clustering.

List of Experiments:

1. Install, configure and run python, numPy and Pandas.
2. Install, configure and run Hadoop and HDFS.
3. Visualize data using basic plotting techniques in Python.
4. Implement NoSQL Database Operations: CRUD operations, Arrays using MongoDB.
5. Implement Functions: Count – Sort – Limit – Skip – Aggregate using MongoDB.
6. Implement word count / frequency programs using MapReduce.
7. Implement a MapReduce program that processes a dataset.
8. Implement clustering techniques using SPARK.
9. Implement an application that stores big data in MongoDB / Pig using Hadoop / R.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PEC-CSE-407	Parallel & Distributed Algorithms Lab	0	0	2	1

Total Hrs: 20

LIST OF EXPERIMENTS:

1. Implementation FTP Client
2. Implementation of Name Server
3. 3 Implementation of Chat Server
4. Understanding of Working of NFS (includes exercises Configuration of NFS) 20
5. Implementation of Bulletin Board.
6. Implement a word count application which counts the number of occurrences of each word a large collection of documents Using Map Reduce model.
7. Develop an application (small game like scrabble, Tic-tac-Toe Using Android SDK)
8. Implementing Publish/Subscribe paradigm using Web Services, ESB and JMS
9. Implementing Stateful grid services using Globus WS-Core 4.0.3.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PEC-CSE-407	Deep Learning Lab	0	0	2	1

Total Hrs: 20

Course Outcomes:

CO1: Make use of deep learning APIs like Keras
CO2: Implement multiple conversions for Analysis
CO3: Apply deep learning techniques for object identification and segmentation
CO4: Implement RNN and CNN for multiple problems
CO5: Implement Autoencoders and GAN.

LIST OF EXPERIMENTS:

1. Build a deep neural network model start with linear regression using a single variable.
2. Build a deep neural network model start with linear regression using multiple variables.
3. Write a program to convert speech into text.
4. Write a program to convert text into speech.
5. Write a program to convert video into frames.
6. Write a program for Time-Series Forecasting with the LSTM Model.
7. Build a feed forward neural network for prediction of logic gates.
8. Write a program to implement deep learning Techniques for image segmentation.
9. Write a program for object detection using image labeling tools.
10. Write a program to predict a caption for a sample image using LSTM.
11. Write a program for character recognition using CNN.
12. Write a program to predict a caption for a sample image using CNN.
13. Write a program for character recognition using RNN and compare it with CNN.
14. Write a program to detect Dog image using YOLO Algorithm.
15. Write a program to develop Autoencoders using MNIST Handwritten Digits.
16. Write a program to develop a GAN for Generating MNIST Handwritten Digits.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PROJ	PROJ-CSE-401	Minor Project	0	0	12	6

The minor project work can be a design project, experimental fabrication project or software development project on any of the topics of mechanical engineering interest - it can be allotted as a group project with groups consisting of three or four students The assessment of all the minor projects should be done by a committee consisting of three or four faculty members specialized in the various fields of Mechanical Engineering - the students will present their project work and give a seminar on that topic for about thirty minutes - a committee consisting of at least three faculty members (preferably specialized in different fields of mechanical engineering) will assess the presentation of the seminars before the committee - the relative grading and group average marks for the various projects will be fixed by the committee - the guide will award the marks for the individual students in the project maintaining the group average - each group will prepare the project report and submit one copy of a write up of his minor project to the department through the guide - the Head of the Department will certify the copies and keep them in the departmental library

INSTRUCTIONS FOR PROJECT REPORT/ DISSERTATION WRITING

It is important that the procedures listed below be carefully followed by all the students of B.E. (Computer Science engineering).

1. Prepare one spiral Bound Copies of your manuscript
2. Limit your Dissertation report to 50– 60 pages (preferably)
3. The footer must include the following: Institute Name, B.E. (CSE) Times New Roman 10 pt.and centrally aligned.
4. Page number as second line of footer, Times New Roman 10 Pt, centrally aligned.
5. Print the manuscript using

I. Letter quality computer printing.
II. The main part of manuscript should be Times New Roman 12 pt. with alignment - justified.
III. Use 1.5 line spacing.

Semester VIII (Fourth Year) curriculum

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 404	Artificial Intelligence & Expert System	3	0	0	3

Total Hrs:45

Unit-I: Introduction (9Hrs)

Introduction: Aim and objective of AI, AI problems, AI technique, Production system Characteristics, Basics of problem solving: problem representation paradigms defining problem as a state space representation. Intelligent Agents, Performance Measure, Rationality, Structure of Agents, Problem solving agents, Problem Formulation.

Unit-II: Search Techniques (9Hrs)

Search Techniques: Uninformed Search Strategies Problem size, complexity, approximation and search; depth, breadth and best search; Informed Heuristic Based Search: Informed (Heuristic) Search and Exploration, Greedy best first search, Memory bounded heuristic search, Heuristic functions, inventing admissible heuristic functions, Hill climbing, best-first search, branch and bound And OR Graph: A* algorithm and AO* Algorithm. Simulated Annealing, Online search.

Unit-III: A.I Problems (9Hrs)

Constraint Satisfaction Problems, Backtracking Search, variable and value ordering, constraint propagation, intelligent backtracking, local search for CSPs, Adversarial Search, Games, The minimax algorithm, Alpha-Beta pruning, Imperfect Real-Time Decisions, Games that include an Element of Chance

Unit-IV Structured Knowledge Representation (9Hrs)

Structured Knowledge Representation: Semantic Nets, Frames, and Scripts. Learning: Block architecture of learning system, Types of learning, performance Measures First order logic, Unification, and Resolution in Predicate Logic Uncertainty Treatment: formal and empirical approaches including Exact and Approximate inference in Bayesian Networks, Bayesian theory, belief functions, certainty factors

Unit-V: Inference Techniques (9Hrs)

Inference Techniques: Types of reasoning deductive, inductive, abductive, analogical, common-sense and non-monotonic, types of inference forward and backward chaining, inference using full joint distributions, fuzzy logic. Recent advances in Artificial Intelligence, Algorithms for artificial intelligence, Genetic algorithms. Tools for development of Artificial Intelligence: Open Neural network library. Applications of artificial Intelligence.

Text Books:

1. Artificial Intelligence a Modern Approach: Russel and Norvig , Pearson Education, 2nd
2. 2. Artificial Intelligence – A Practical Approach: Patterson, Tata McGraw Hill, 3rd

Reference Books:

1. Maus, R. and Keyes, J., “Handbook of Expert Systems in Manufacturing”, McGraw Hill, 1991
2. Robert Levine, “A comprehensive guide to artificial intelligence and expert systems",
3. Elain Rich ,”Artificial Intelligence”, PHI Publication
4. Introduction to Artifitial Intelligence by E.Charniack and D. Mcdermott, Pearson Education.
5. Artifitial Intelligence structures and strategies for complex problem solving, 4 th edition, Pearson education.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PEC	PEC-CSE-407	Optimization Techniques	3	0	0	3

Total Hours: 40

UNIT- I: LINEAR PROGRAMMING (10 Hrs)

Introduction – formulation of linear programming model-Graphical solution–solving LPP using simplex algorithm – Revised Simplex Method.

UNIT- II: ADVANCES IN LPP (10 Hrs)

Duality theory- Dual simplex method – Sensitivity analysis–-Transportation problems Assignment problems-Traveling sales man problem -Data Envelopment Analysis.

UNIT- III: NON LINEAR PROGRAMMING (10 Hrs)

Classification of Non Linear programming – Lagrange multiplier method – Karush – Kuhn Tucker conditions– Reduced gradient algorithms–Quadratic programming method – Penalty and Barrier method.

UNIT- lV: DYNAMIC PROGRAMMING (10 Hrs)

Formulation of Multi stage decision problem–Characteristics–Concept of sub-optimization and the principle of optimality–Formulation of Dynamic programming–Backward and Forward recursion–Computational procedure– Conversion offinal value problem in to Initial value problem.

Text Books:

1.Hillier and Lieberman “Introduction to Operations Research”, TMH, 2000.
2.R.Panneerselvam, “Operations Research”, PHI, 2006

Reference Books:

1. Philips, Ravindran and Solberg, “Operations Research”, John Wiley, 2002.
2. Ronald L.Rardin, “Optimization in Operation Research” Pearson Education Pvt. Ltd. New Delhi, 2005.
3.Hamdy ATaha, “Operations Research –An Introduction”, Prentice Hall India, 2003.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PEC	PEC-CSE-408	Human Computer Interaction	3	0	0	3

Total Hours:45

UNIT- I: FOUNDATIONS OF HCI (9Hrs)

The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity-Paradigms.

UNIT- II: DESIGN & SOFTWARE PROCESS (9Hrs)

Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

UNIT- III: MODELS AND THEORIES (9Hrs)

Cognitive models –Socio-Organizational issues and stake holder requirements –Communication and collaboration models-Hypertext, Multimedia and WWW.

UNIT- IV: MOBILE HCI (9Hrs)

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of MobileDesign, Tools.

UNIT- V: WEB INTERFACE DESIGN (9Hrs)

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.

Text Books:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, “Human Computer Interaction”, 3rd Edition,
   Pearson Education, 2004 (UNIT I , II & III)

Reference Books:

1. Brian Fling, “Mobile Design and Development”, First Edition , O“Reilly Media Inc., 2009.
2. Bill Scott and Theresa Neil, “Designing Web Interfaces”, First Edition, O“Reilly,2009.

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PEC	PEC-CSE-409	Digital Signal Processing	3	0	0	3

Total Hours: 45

UNIT-I: SIGNALS AND SYSTEMS (9 Hrs)

Basic elements of DSP – concepts of frequency in Analog and Digital Signals – sampling theorem – Discrete – time signals, systems – Analysis of discrete time LTI systems – Z transform – Convolution – Correlation.

UNIT – II: FREQUENCY TRANSFORMATIONS (9 Hrs)

Introduction to DFT – Properties of DFT – Circular Convolution - Filtering methods based on DFT – FFT Algorithms - Decimation – in – time Algorithms, Decimation – in – frequency Algorithms – Use of FFT in Linear Filtering – DCT – Use and Application of DCT.

UNIT – III: IIR FILTER DESIGN (9 Hrs)

Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR filter design by Impulse Invariance, Bilinear transformation, Approximation of derivatives – (LPF, HPF,BPF, BRF) filter design using frequency translation.

UNIT – IV: FIR FILTER DESIGN (9 Hrs)

Structures of FIR – Linear phase FIR filter – Fourier series - Filter design using windowing techniques (Rectangular Window, Hamming Window, Hanning Window), Frequency sampling techniques.

UNIT-V: FINITE WORD LENGTH EFFECTS IN DIGITAL FILTERS (9 Hrs)

Binary fixed point and floating point number representations – Comparison - Quantization noise – truncation and rounding – quantization noise power- input quantization error- coefficient quantization error – limit cycle oscillations-dead band- Overflow error-signal scaling.

Text Book:

1. Emmanuel C..Ifeachor, & Barrie.W.Jervis, “Digital Signal Processing”, Second Edition, Pearson Education / Prentice Hall, 2002.

Reference Books:

1. Sanjit K. Mitra, “Digital Signal Processing – A Computer Based Approach”, Tata Mc Graw Hill, 2007.
2. "Digital Signal Processing: A Computer-Based Approach" by Sanjit K. Mitra

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PCC	PCC-CSE 405	Artificial Intelligence & Expert system Lab	0	0	4	2

Total Hours: 20

List of Practical's-

1. Study of facts, objects, predicates and variables in PROLOG
2. Study of Rules and Unification in PROLOG
3. Study of "cut" and "fail" predicate in PROLOG
4. Study of arithmetic operators, simple input/output and compound goals in PROLOG
5. Study of recursion in PROLOG. 6 Study of Lists in PROLOG
6. Study of dynamic database in PROLOG
7. Implement string operations like substring, string position, palindrome etc.)
8. Write a prolog program to maintain family tree.
9. Write a prolog program to implement all set operations (Union, intersection, complement etc.)
10. Write a prolog program to solve "Water Jug Problem".

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
SI	SI-CSE-401	Seminar	0	0	4	4

Guidelines for preparing B. Tech Seminar:

1. Selection of topic/area

Select a paper according to the specialisation of students. Papers from any other approved journals can also be selected.

2. Approval to the selected topic

After selecting the paper, get approval from the concerned faculty in charge.

3. Study of topic

Students are requested to acquire a thorough knowledge on the subject by referring back papers and reference books (These may be included as references at the end of the paper) on the corresponding area.

4. Preparation of slides for presentation

Slides may be presented in MS power point. Time allowed for presentation is 20 minutes for presentation and 5 minutes for discussions. So, number of slides may be around 20 - 25 to adhere the time limit.

5. Organisation of slides

a. The first slide will be a title page showing the title, name of author (presenter), roll no. and Class.

b. 2nd page will contain overview of the seminar

c. Successive pages will contain

- Objectives of the paper
- Introduction
- Body of the paper includes system dynamics, methodology, graphs, block diagrams etc. arranged in a logical sequence depending on the problem.
- Results and discussions
- Conclusion

d. Last page will contain references and bibliography. References must be presented in IEEE format, which is given as Annexure 2.

6. Each slide consists of 4 or 5 lines with enough space between lines.
7. All equations must be typed using equation editor (available with MS office/other office suite)
8. Each slide will have a title and each figure have a caption.
9. An abstract of the work (seminar) is to be circulated among the faculty and fellow students before presentation of the seminar. The abstract is prepared as follows. The seminar abstract is an important record of the coverage of topic and provides a valuable source of leading references for students and faculty alike. Accordingly, the abstract must serve as an introduction to your seminar topic. It will include the key hypotheses, the major scientific findings and a brief conclusion. The abstract will be limited to 500 words, excluding figures and tables. The abstract must contain references to the research articles upon which the seminar is based as well as research articles that have served as key background material. The references should be listed using a standard format (IEEE format given in App. 1). The abstract must be submitted to the faculty in charge and get approval before the presentation.
10. Draft copy of the Seminar report should also be submitted before the presentation

Category	Code	Course Title	Hours Per Week			Credit
			L	T	P	
PROJ	PROJ-CSE-402	Major Project	0	0	16	8

The major project work can be a Modeling and Simulation, Case study, Design or Experiments in the field of Mechanical Engineering. It can be allotted as a group project with groups consisting of 3 to 4 students. The major project work started in the seventh semester (minor project) may be continued in this semester - the students should complete the project work in this semester and present it before the assessment committee The assessment committee will assess the various projects, fix the relative grading and group average marks - the guides will award the marks for the individual students in a project maintaining the group average - each group should submit three copies of a write up of his major project of the completed project report signed by the department (in the format prescribed by the department) through the guide - the Head of the Department-Dean of School of engineering and Technology will certify the copies and one copy return them to the students - other copy will be kept in the departmental and university library

INSTRUCTIONS FOR PROJECT REPORT/ DISSERTATION WRITING

It is important that the procedures listed below be carefully followed by all the students of B.E. (Mechanical Engineering).

1. Prepare Three Hard Bound Copies of your manuscript and if possible publish at least one international journal paper by each group for value addition of your project.

2. Limit your Dissertation report to 80 – 120 pages (preferably)

3. The footer must include the following: Institute Name, B.E. (Mechanical) Times New Roman10 pt. and centrally aligned.

4. Page number as second line of footer, Times New Roman 10 Pt, centrally aligned.

5. Print the manuscript using

a. Letter quality computer printing.

b. The main part of manuscript should be Times New Roman 12 pt. with alignment - justified.

c. Use 1.5 line spacing.

d. Entire report shall be of 5- 7 chapters.

6.Use the paper size 8.5,,,,× 11,,,,or A4 (210 × 197 mm).

Margin Location	Paper 8.5,,,,× 11,,,,	Paper A4 (210 × 197 mm)
Top	1,,,,	25.4 mm
Left	1.5,,,,	37 mm
Bottom	1.25,,,,	32 mm
Right	1,,,,	25.4mm

7.All paragraphs will be 1.5 line spaced with a one blank line between each paragraph. Each paragraph will begin with without any indentation.

8.Section titles should be bold with 14 pt typed in all capital letters and should be left aligned.

9.Sub-Section headings should be aligning at the left with 12 pt, bold and Title Case (the firstletter of each word is to be capitalized).

10. Illustrations (charts, drawings, photographs, figures) are to be in the text. Use only illustrations really pertinent to the text. Illustrations must be sharp, clear, black and white. Illustrations downloaded from internet are not acceptable.

1. Illustrations should not be more than two per page. One could be ideal
2. Figure No. and Title at bottom with 12 pt
3. Legends below the title in 10 pt
4. Leave proper margin in all sides
5. Illustrations as far as possible should not be photo copied.

11. Photographs if any should of glossy prints

12. Please use SI system of units only.

13. Please number the pages on the front side, centrally below the footer

14. References should be either in order as they appear in the thesis or in alphabetical order bylast name of first author

15. Symbols and notations if any should be included in nomenclature section only

16. Following will be the order of report

i. Cover page and Front page as per the specimen on separate sheet
ii. Certificate from the Institute as per the specimen on separate sheet
iii. Acknowledgements
iv. List of Figures
v. List of Tables
vi. Nomenclature vii. Contents
vii. Abstract

(A brief abstract of the report not more than 150 words. The heading of abstract i.e. word ―Abstract‖ should be bold, Times New Roman, 12 pt and should be typed at the centre. The contents of abstract should be typed on new line without space between heading and contents.

Try to include one or two sentences each on motive, method, key-results and conclusions in bstract

1) Introduction (2-3 pages) (TNR – 14 Bold) Problem statement (TNR – 12)
1.1 Objectives
1.2 Scope
1.3 Methodology
1.4 Organization of Dissertation

2) Literature Review (20-30 pages) Discuss the work done so far by researchers in the domain area and their significant conclusions. No derivations, figures, tables, graphs are expected.

3)This chapter shall be based on your own simulation work (Analytical/ Numerical/FEM/CFD)(15- 20 pages)

4) Experimental Validation - This chapter shall be based on your own experimental work (15-20 pages)

5) Concluding Remarks and Scope for the Future Work (2-3 pages) References ANNEXURE (ifany) (Put all mathematical derivations, Simulation program as Annexure)

17. All section headings and subheadings should be numbered. For sections use numbers 1, 2, 3, …. and for subheadings 1.1, 1.2, …. etc and section subheadings 2.1.1, 2.1.2, …. etc.

18. References should be given in the body of the text and well spread. No verbatim copy orexcessive text from only one or two references. If figures and tables are taken from any reference then indicate source of it.

Please follow the following procedure for references / Reference Books/ Patent/ Internet

- Collier, G. J. and Thome, J. R., Convective boiling and condensation, 3rd ed., Oxford University Press, UK, 1996, pp. 110 – 112.
- 2. Papers from Journal or Transactions Jung, D. S. and Radermacher, R., Transport properties and surface tension of pure and mixed refrigerants, ASHRAE Trans, 1991, 97 (1), pp. 90 – 98.
- Bansal, P. K., Rupasinghe, A. S. and Jain, A. S., An empirical correction for sizing capillarytubes, Int. Journal of Refrigeration, 1996, 19 (8), pp.497 – 505.
- Papers from Conference Proceedings Colbourne, D. and Ritter, T. J., Quantitative assessment of flammable refrigerants in room air conditioners, Proc. of the Sixteenth International Compressor Engineering Conference and Ninth International Refrigeration and Air Conditioning Conference, Purdue University, West Lafayette, Indiana, USA, 2002, pp. 34 – 40.

Reports, Handbooks etc.

- United Nations Environmental Programme, Report of the Refrigeration, Air Conditioning and Heat Pumps, Technical Option Committee, 2002, Assessment - 2002ASHRAE Handbook: Refrigeration, 1994 (Chapter 44)

Patent

- Patent no., Country (in parenthesis), date of application, title, year.

Internet

- www.(Site) [Give full length URL]