Mahatma Jyotiba Phule Rohilkhand University, Bareilly

Syllabus

Course

Bachelor of Technology

Computer Science and Information Technology

(Effective from the Session: 2014-2015)

W. e. f. 2014-15

Minutes

.A meeting of ***Board oJ Studies (BOS)*** held on 29/05/20.14 at 11!30 AM in the departiaaent of computer › ience & 1. 1, MIP Rohilkhand University, Bareilly. The followin g embers were present in the meeting.

1.	Dr. Rawendra Singh	Member and Head
2.	Dr. Asliutosh Gupta	Internal Mem her
3.	Dr. S.S. Bedi	Convener
4.	Dr. V inay Rislaiwal	Internal Member
5.	Mr. B.R. .Ambedkar	Internal Member
6.	Mr. Aslawani Gupta	Internal Member
7.	Dr. A.K. Denial MMM University of Technology, Gorakpur	External Member

Following point s were discussed and resolved.

1. The recommended list of examiners for the *E.Tech.* Theory and Lab Exams for academic session 2014-2015 is enclosed (Annexure 1).
2. The recommended I ist of examiners for the **MCA** Theory and Lab Exam s for academic session 20.14
3. 20.15 is enclosed (Annexure 2).
   The recommended list of examiners for the **ECA** Theory and 1.ab Exam s for academic session 2014-20.15 is enclosed(Annexure 3).
4. The new course structure and syllabus for the B.Tech has been recommended for its approval from
5. the faculty Board and Higher authorities for its implementation from academic year 2014-201 5
   Accordinp• to the availability of the faculty and necessity with respect to emerg ing trends, it is recommended that any elective may be included(in addition of ex isting elective list) by the recommendation of the Departmental Board.
6. As per AICTE approval of MCA course, it is mandatory to consider it is a part of departmental of CS&IT. Department of CS&I L, IET/FET deal with the admission procedure for MCA and fees obtain from this course are also being deposit in the account of FET. All the faculty members and the statf members of this department are devoted for conducting the classes an d laboratories ot MCA course. University also right the name of institute on their award I ist as well as degree cert ificiite of the students. Hence, It is recommended that the MCA course shell be considered as an integrated part of department of CS&IT, Institute of Engineering and Technology along with B.'Tech. Courses and the same should be sent to the Chancellor to change the act and status of the university.

The faculty members of Department of CS&IT were also presented in the meeting. The convener is very thankful to all the BOS members and all the faculty members for their valuable suggestions.

The meeting ended with thank to chair.

Course Structure for B.Tech

Features of the syllabus

The syllabus for B.Tech (CSE/CSIT) programs match to outcome based teaching learning process. The structure of the syllabus is formed for eight semesters and the subjects have been offered in a manner so that the prerequisite knowledge is obtained first in the preceding semester. The syllabus has been designed as per guidelines of All India Council for Technical Education, N. Delhi and each subject meets out one or more of the following:

1. An ability to apply knowledge of mathematics, science, and engineering
2. An ability to design and conduct experiments, as well as to analyze and interpret data
3. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
4. An ability to function on multidisciplinary teams
5. An ability to identify, formulates, and solves engineering problems
6. An understanding of professional and ethical responsibility
7. An ability to communicate effectively
8. The broad education necessary to understand the impact of engineering solutions in global, economic, environmental, and societal context
9. A recognition of the need for, and an ability to engage in life-long learning
10. A knowledge of contemporary issues
11. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

These outcomes explain what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire as they progress through the program. Further each subject in the course spells out clear instructional objectives which are mapped to the student outcomes.

Course Structure for B.Tech

B.Tech I year, I Semester

SI. No.	Course No.	Subject	Credits	Teaching Schedule Hrs. LTP	Total
1.	PH-101T	Engineering Physics-I	4	310	4
2.	MA-101T	Engineering Mathematics-I	4	310	4
3.	ME-107 T	Engineering Graphics	2	120	3
4.	EI-101T	Basic Electronics Engineering	4	310	4
5.	CY-103T	Environments Studies	2	300	3
6.	HU-103T	Fundamentals of Economics	2	300	3
7.	ME-101T	Manufacturing Techniques	4	310	4
		Total	22		25
Laboratory Courses					
8.	PH-101P	Engineering Physics Lab	2	003	3
9.	EI-101P	Basic Electronics Engg. Lab	2	003	3
10.	ME-101P	Workshop Practice Lab	2	003	3
		Total	6		9
		G. Total	28		34

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Course Structure for B.Tech

B.Tech I year, II Semester

SI. No.	Course No.	Subject	Credits	Teaching Schedule Hrs. LTP	Total
1.	PH-102T	Engineering Physics-II	4	310	4
2.	CY-101T	Engineering Chemistry	4	310	4
3.	MA-102T	Engineering Mathematics-II	4	310	4
4.	HU-101T	Communicative English	3	210	3
5.	CS-101T	Computer Fundamentals & Programming	4	310	4
6.	EE-101T	Basic Electrical Engineering	4	310	4
		Total	23		23
Laboratory Courses					
7.	CY-101P	Engineering Chemistry Lab	2	003	3
8.	CS-101P	Computer Programming Lab (CS, CH & ME)	2	003	3
9.	EE-101P	Basic Electrical Engg. Lab	2	003	3
		Total	29		32

Course Structure for B.Tech

B.Tech SECOND YEAR, **SEMESTER-III**

S. No.	Courses No.	Subject	Credits	Teaching schedule			Contact Hrs
1	CS-201N	Discrete Mathematical Structure	4	3	1	0	4
2	CS-203N	Data Structure	4	3	1	0	4
3	CS-205N	Object Oriented Programming	4	3	1	0	4
4	MA-201T	Engineering Mathematics-III	4	3	1	0	4
5	EC- 205T	Digital Electronics	4	3	1	0	4
6	EI- 201T	Analog Electronic	4	3	1	0	4
Total			**24**	**18**	**6**	**0**	**24**
Laboratory Course							
7	CS-203P	Data Structure Lab	2	0	0	3	3
8	CS-205P	Object Oriented C++ Lab	2	0	0	3	3
9	EC-201P	Devices & Digital Lab	2	0	0	0	3
Total			**6**	**0**	**0**	**9**	**9**
Semester Total			**30**	**18**	**6**	**9**	**33**

Note: Practical CS-201P (Computer Programming Lab II) for EC and EI branches.

Course Structure for B.Tech

SECOND YEAR, **SEMESTER-IV**

S. No.	Courses No.	Subject	Credits	Teaching schedule			Contact Hrs
1	CS-202N	Analysis & Design of Algorithm	4	3	1	0	4
2	CS-204*N	Computer Organization	4	3	1	0	4
3	CS-206N	Data Communication	4	3	1	0	4
4	CS-208N	Data Base Management System	4	3	1	0	4
5	CS-210N	Java Programming	4	3	1	0	4
6	EC-202T	Signal & Systems	4	3	1	0	4
Total			**24**	**18**	**6**	**0**	**24**
Laboratory Course							
7	CS-202P	Analysis &Design of Algorithm Lab	2	0	0	3	3
8	CS-208P	DBMS Project Lab	2	0	0	3	3
9	CS-210P	Java Programming Lab	2	0	0	3	3
Total			**6**	**0**	**0**	**9**	**9**
Semester Total			**30**	**18**	**6**	**9**	**33**

Note: 1. CS-204N is assigned for B. Tech (CSIT, EC, EI & EE) branches.

2. For summer training after IV sem, see the guidelines (**Annexure 1**).

Course Structure for B.Tech

THIRD YEAR, SEMESTER-V

S. No.	Courses No.	Subject	Credits	Teaching schedule			Contact Hrs
1	CS-301N	Computer Network & Security	4	3	**1**	0	4
2	CS-303N	Software Engineering	4	3	**1**	0	4
3	CS-***	Departmental Elective-I	4	3	**1**	0	4
4	CS-305N	Theory of Computation	4	3	**1**	0	4
5	CS-307N	Operating Systems	4	3	**1**	0	4
6	EI-309T	Microprocessor & Their applications	4	3	**1**	0	4
Total			**24**	**18**	**6**	**0**	**24**
Laboratory Course							
7	CS-301 P	Linux Lab	2	0	0	3	3
8	CS-305 P	Advanced Programming Lab -I	2	0	0	3	3
9	EI- 309 P	Microprocessor Lab	2	0	0	3	3
Total			**6**	**0**	**0**	**9**	**9**
Semester Total			**30**	**18**	**6**	**9**	**33**

Course Structure for B.Tech

THIRD YEAR, **SEMESTER-VI**

S. No.	Courses No.	Subject	Credits	Teaching schedule			Contact Hrs
1	CS-304 N	Compiler Design	4	2	1	0	4
2	CS-306N	Interactive Computer Graphics	4	3	1	0	4
3	CS-308N	Advance Computer Network	4	3	1	0	4
4	CS-310N	Data Mining Techniques	4	3	1	0	4
5	CS-***	Departmental Elective-I I	4	2	1	0	4
6	EC-302T	Digital Signal Processing	4	3	1	0	4
Total			**24**	**16**	**6**	**0**	**24**
Laboratory Course							
7	CS-306 P	Computer Graphics Lab	2	0	0	3	3
8	CS-302P	Minor Project	2	0	0	3	3
9	EC-302 P	Digital Signal Processing Lab	2	0	0	3	3
Total			**6**	**0**	**0**	**9**	**9**
Semester Total			**30**	**16**	**6**	**9**	**33**

Note: 1. For Minor Project and Industrial Training see the guidelines **(Annexure 1)**

2. Subject CS-302N, Computer Network assigned for the EC and EI branches only

Course Structure for B.Tech

FOURTH

YEARSEMESTER-VII

S. No.	Courses No.	Subject	Credits	Teaching schedule			Contact Hrs
1	CS-401N	Soft computing	4	3	1	0	4
2	CS-403N	Dot NET framework with C#	4	3	1	0	4
3	CS-***	Departmental Elective-III	4	3	1	0	4
4	**-***	Pool Elective	4	3	1	0	4
5		Open Elective	4	3	1	0	4
6	TRN-401	Industrial Training	3	0	0	0	0
Total			**23**	**15**	**5**	**0**	**20**
Laboratory Course							
7	CS-401 P	DotNET Lab	2	0	0	3	3
8	CS-403 P	Major Project	6	0	0	9	9
Total			**8**	**0**	**0**	**12**	**12**
Semester Total			**31**	**15**	**5**	**12**	**32**

Course Structure for B.Tech

FOURTH

YEARSEMESTER-VIII

S. No.	Courses No.	Subject	Credits	Teaching schedule			Contact Hrs
1	CS-402N	Advanced Computer Architecture	4	3	1	0	4
2	CS-***	Departmental Electives-IV	4	3	1	0	4
3	CS-***	Departmental Elective-V	4	3	1	0	4
4	CS-404	Seminar	2	0	1	0	2
Total			**14**	**09**	**4**	**0**	**14**
Laboratory Course							
5	CS-402 P	Advanced Programming Lab -II	2	0	0	3	3
6	CS-404 P	Dissertation	12	0	0	15	15
Total			**14**	**0**	**0**	**18**	**18**
Semester Total			**28**	**09**	**4**	**18**	**32**

Course Structure for B.Tech

Annexure 1

Guidelines for Practical's /Industrial Training/Minor Project/Major Project/Dissertation

Semester I

CS-101P	**Computer Programming Lab.** The Lab shall be based on Theory subject CS101T and list of practicals will be provided by the Department before commencement of the session.

Semester III

CS201P	**Computer Programming Lab – II** The Lab is assigned only for EC and EI branches. The list of practical's will be provided by the Department before commencement of the session.
CS-203P	**Data Structure Lab in C/C++** The Lab shall be based on Theory subject CS203T and list of practical's will be provided by the Department before commencement of the session.
CS-205P	**Object Oriented Programming Lab** The Lab shall be based on Theory subject CS205T and list of practical's will be provided by the Department before commencement of the session.

Semester IV

CS-202P	**Analysis & Design of Algorithm Lab** The Lab shall be based on Theory subject CS202T and list of practical's will be provided by the Department before commencement of the session.
CS-208P	**DBMS Project Lab** The Lab shall be based on Theory subject CS208T and list of practical's will be provided by the Department before commencement of the session.
CS-210P	**Java Programming Lab** The Lab shall be based on Theory subject CS210T and list of practical's will be provided by the Department before commencement of the session.

[1]Note:

1. After IV sem, the students are required to learn Linux /Advance Java Programming during summer vacation as a training course. The student is required to collect the assignments from the department on Linux /Advance Java Programming before

Course Structure for B.Tech

start of summer vacation. These assignments will be completed by the students during vacation.

2. The summer training / assignments will be evaluated in V semester.

Semester V

CS-301 P	**Linux Lab** The Lab shall be based on summer training and Theory subject CS-307T. The list of practicals will be provided by the Department before commencement of the session.
CS-305 P	**Advance Java Programming Lab** The Lab shall be based on summer training and Theory subject CS-301T. The list of practical's will be provided by the Department before commencement of the session.

Semester VI

CS-306P	Computer Graphics Lab The Lab shall be based on Theory subject CS-306T and list of practical's will be provided by the Department before commencement of the session.
CS-302P	**Minor Project** Students are required to prepare a synopsis on Minor Project. The synopsis should be prepared in consultation with guide allotted by department. The format of synopsis includes: feasibility study on the Minor Project, system design, appropriateness and its application to society. The synopsis so formed should be submitted to the department for review and necessary approval. At the end of semester, the student will present the Minor Project to the department for evaluation and implement the project in Fourth year.

Note: After VI semester, students have to go for **Industrial Training** of at least 6 weeks and will prepare the project in any software platform. After joining the training, a weekly report on the training shall be submitted by the student duly signed by their supervisor or through email of the training company/training Institute to the Training coordinator. After successful completion of the training, the student will submit the project/Training report with Certificate (duly signed by supervisor during training) to the department for evaluation in VII semester.

Course Structure for B.Tech

Semester VII

TRN-401	**Industrial Training** Refer [3]Note provided in VI semester
CS-401 P	**DotNET Lab** The Lab shall be based on Theory subject CS-403T and list of practical's will be provided by the Department before commencement of the session.
CS-403P	**Major Project**

Semester VIII

CS-402 P	Advance Programming Lab -II The Lab shall be based on Elective Theory subject and list of practical's will be provided by the Department before commencement of the session.
CS-404 P	Dissertation

LIST OF ELECTIVES for III Year

CS331N	Distributed System
CS332N	Advanced Data Base Management System
CS333N	Advanced Java Programming
CS334N	Linux System Administration
CS335N	Graph theory
CS336N	Advance Data structure
CS337N	Web Technology
CS338N	Principles of Programming Languages
CS339N	Software Project management

LIST OF ELECTIVES for IV Year

CS441N	Neural network for Machine Learning
CS442N	Data Compression
CS443N	Network Security and Cryptography
CS444N	Artificial Intelligence
CS445N	Network Management Systems
CS446N	Object Oriented Analysis and Design
CS447N	Parallel Computing and Algorithms
CS448N	Digital Image Processing
CS449N	Business Environment
CS450N	Fault Tolerance Computing
CS451N	Wireless Network and Mobile computing
CS452N	Real Time System
CS453N	Environment Engineering
CS454N	Computational Geometry
CS456N	Natural Language Processing
CS457N	Pattern Recognition and Classification
CS458N	Embedded System
CS459N	Wireless Network Security
CS460N	Formal methods
CS461N	XML based Applications
CS462N	Information Retrieval
CS463N	Bio informatics
CS464N	Modeling and Simulation
CS465N	GIS and Remote Sensing
CS466N	Operation Research
CS467N	Cyber Security
CS468N	
CS469N	
CS470N	

Note: Due to rapid change in Industrial needs and Technological advancements, there is a need to revise the syllabus and introduction of new electives. So, the Departmental board is authorized to revise the syllabus as well as introduction of new electives time to time.

B.Tech First Year

CS-101T Computer Fundamental and Programming Credits 4(3-1-0)

Section A: Computer Fundamentals

1. Introduction: Basic definition, Classification of Computers, Block diagram of computer and brief idea of its part (I/O, Memory, control unit) with their working and example.

2.Number System: Introduction, Data representation-Decimal, Binary, octal,Hexadecimal and their inter convertibility.

3. Planning the computer program: Purpose of program planning, algorithms,flowcharts, Pseudo code.

4. Computer Software: Introduction to software, hardware, Firmware with example, Type of software, Translators and their types (compiler, interpreter, assembler etc.).

5. Basic operating system concepts: OS, Types of OS (MS-DOS, WINDOWS)
Role of OS with its characteristics in brief (Multi-programming, Multitasking, Multiprocessing, Multi-threading, Time-sharing, online-processing, Real-time processing).

Section B: Programming in C

6.Introduction : Introduction to C Programming Language,structure of C programs, compilation and execution of C programs, debuggingtechniques, data types and sizes, declaration of variables, modifiers, identifiersand keywords, symbolic constants, storage classes (automatic, external,register andstatic) and their use –when and where , macros, the C pre-processor.

7. Operators: unary operators,Arithmetic and logical operators, bit wise
operators, assignment operators ,relationaloperators, shift operators, comma operators, conditional operators , size of operators ,type conversion , type casting .

8. Control statements: IF-ELSE statement, nested if-else, Switch statement, break,exit (), return (), continue, go-to statement.

9. Iterative statements: While-loop, do-while loop, for loop, nested loops , difference between iteration and recursion,

10. Functions: Built in and User defined, function declaration, definition and
function calls, parameter passing, actual and formal argument, call by value and call by reference,recursive functions , command line argument, multifile program.

11.Arrays: Linear Arrays(declaration, accessing elements of an array, initialisation) multidimensional Arrays, array of strings, passing array to functions.

12.Structure and unions: Definition ,Declaration ,Accessing of element and use of structure ,union ,enumerated data typesand difference between structure and union, arrays of structures, passing structure in to function and passing its element in to function, .

13. Pointers: Introduction, Accessing the address of a variable , Declaring &initializing pointers, Accessing a variable though in pointer, pointers & Arrays,
Pointers& character strings, pointers & functions.

References:

1. –Computer Fundamentals‖ by V. Rajaraman
2. –Computer Fundamentals‖by . B. Ram
3. –Programming in C‖ by E. Balagurusamy, TMH.
4. –Let us C‖, by Yashwantkanetkar, Narosa publications.
5. –Schaums outline series‖, by Gottfried, TMH
6. Programming in C by Dennis and Ritche
7.―Magic with C‖ AB Publication

B.Tech Second Year

CS-201N **Discrete Mathematical Structures** **Credit 4(3-1-0)**

1. SET THEORY:-

Sets, Set Relations, Set operations, Infinite Collection of sets, Power sets, Venn Diagram, Algebras of sets, Cartesian Products, Inductively, defined sets, Proofs by Mathematical Induction.

2. FUNCTIONS:-

Functions, Injective and Surjective, Composition of functions, Inverse, Function, Recursively defined functions, Functions and Set operations, Permutation Function.

3. RELATIONS:-

Relations, Types of relation, Representation of relation, Compositions, of Relations, Equivalence Relations ,Equivalence Classes

4. COUNTING AND COUNTABILITY :-

Counting Principles, Functions and Counting, Permutations and Combinations, Principle of inclusion and exclusion, Pigeonhole principle, Extended Pigeonhole principle

5. LOGIC:-

Propositions, Algebra of propositions, Conditional and Biconditional, Tautology & Contradiction, Disjunctive normal Form and Simplification, Predicates and Quantifiers, Valid Arguments and proofs using tautology concept & without tautology concept. Proofs of Arguments using reduction method.

6. GRAPH THEORY :-

Basic Concepts, Paths and Connectivity, Planar Graphs, Regular graph, Complete graph, Bipartite graph, Distance & Diameter, Trees & its types, Rooted Trees, Shortest path algorithm.

7. INTRODUCTION TO ALGEBRA :-

Binary operations, Semigroups, Groups, Rings, Subgroups, Cosets and Lagrange‘s Theorem and its significance.

REFERENCES:-

1. Discrete Mathematics, Schaum‘s Outline, TMH
2. Olympia Nicodemi, ―Discrete Mathematics‖, CBS Publications, Delhi.
3. J.P. Trembley & R. Manohar, ―Discrete mathematical Structure‖, Mc Graw Hill Book Co., NY.
4. Discrete Maths, 5th Edition, Ross-Wright,Pearson
5. Discrete mathematical Structure ,G.Shankar Rao, New Age

CS203N **Data Structure** **Credits 4(3-1-0)**

UNIT 1: Basic Concepts & Notation: Data structure concepts and its types, Linear and Non-Linear data structures. Basics of Complexity and their types;
Array as an ADT: one dimensional array, two dimensional array and multidimensional array.

UNIT 2: Stacks: Definition and examples, primitive operations, Array representation of stacks, Example: Infix, Postfix, and Prefix: Basic definitions and Examples, Evaluating a postfix expression, Converting an expression from infix to postfix, Recursion - tower of Hanoi.

UNIT 3: Queues and Linked Lists: The Queue and its sequential Representation, Priority Queue; Linked Lists: Inserting and removing nodes from the list, Linked list as a data Structure, Other List structures: Circular Lists, Doubly Linked Lists.

UNIT 4: Trees: Binary Trees,Operation on Binary Trees, Traversal: In order, Preorder, Post order; Application Binary Tree. Expression Tree; Binary Tree Representation: Array representation, Link List representation; Example: Huffman Algorithm.
Binary search tree: inserting into Binary Search Tree (BST), Deleting from a BST, Balanced (AVL) Tree, Search Tree and B-Tree.

UNIT 5: **Search Methods:** Basic search Techniques: Sequential Searching, Indexed Sequential Search, B++ tree.
Sorting: Selection sort, bubble sort, insertion sort, quick sort and Merge sort, Heap sort and their time complexity.
Hashing: Hash function: Division Method, Mid-square Method, Folding Method, hash table, collision resolution: linear probing, chaining.

UNIT 6: Graphs and Their Applications: Introduction, Representation of graphs- Adjacency matrix and adjacency list, Wars hall's algorithm, Dijkstra's algorithm, Graph traversal: Depth first search, Breadth First search.

Text Books

1. Data Structures using C/C++: Tennenbaum, PHI
2. Introduction to Data Structures : Schaum Series. by Lipetu, Mac GrawHill
3. Data Structures by Augenstein &Tenenbaum.

CS-205N OBJECT ORIENTED PROGRAMMING CREDITS:- 4(3-1-0)

UNIT 1: Basics Of Object Oriented Programming

Object oriented programming concepts, Procedure oriented programming, problems with structured approach, OO terminology, Characteristics of Object oriented languages (Objects, Classes, Data Abstraction, Data Encapsulation, Inheritance, Polymorphism, Dynamic binding, Message passing) Structure of C++ Program , Benefits of OOPs.

UNIT 2: Tokens, Expressions and Control Structure In C++

Tokens. Basic data types,User defined data types, reference variables. Different Operators in C++ (::, new, delete, . ,.* , ->*, ::*) Loops (For, while and do), Decisions(if, if-else and switch), Control statements(break, continue and goto), default argument.

UNIT 3: Building Objects with Classes

Specifying classes, defining member function- inside and outside, arrays with in a class, Inline function, call by reference, function overloading, friend function, static data member and static member function, Arrays of objects, passing the object and returning the object, local class ,Const argument and Const member function, Constructor and Destructors, Characteristics of Constructor , types of constructor, Dynamic initialization of constructor , constructor overloading, Type Compatibility, Return by Reference, Memory allocation of objects, Friend class.

UNIT 4: Defining Operations on Objects

Operator & function overloading concepts, overloading unary and binary operator by using member function and friend function, Type Conversion, rules of operator overloading and limitation of overloading.

UNIT 5: Using Inheritance in C++

Derived class, Public, Private and Protected Derivation, single inheritance, multilevel Inheritance, multiple inheritance, Hierarchical inheritance, hybrid inheritance, virtual base class, abstract class, Constructor in Derived class, containership.

UNIT 6: Pointer's, Virtual Functions and Polymorphism

Basics of pointers, Manipulation and operations on pointers ,pointer to objects,, pointer to function, this pointer and pointer to derived class, Dynamic binding, static binding, virtual function, pure virtual function, dynamic binding through virtual function.

UNIT 7: Working with Files

Classes for file stream operation, opening and closing a file, detecting EOF, file modes, file pointers and their manipulations, error handling during file operation. Command line argument, sequential input– output operation, updating a file.

UNIT 8: Templates and Exception Handling

Templates, class templates, function templates, member function templates, Overloading of Template functions, Non–Type Template Arguments, exception handling and its terminology, mechanism of exception handling and catching, Re-throwing an exception, Specifying Exception, Catch –all exception, Uncaught exception .

References:

1) Programming in C++ by BjarneStroustroup,
2) Object Oriented Programming with C++ by Balagurusamy, TMH.

3) Turbo C++ by Robert Lafore,
4) Complete Reference C++ by Herbert Shield,

CS 202N ANALYSIS AND DESIGN OF ALGORITHMS Credit 4(3-1-0)

UNIT I: Overview: Introduction to basic techniques for designing and analyzing algorithms, including asymptotic analysis and recurrences; divide-and-conquer algorithms; lower bound for comparison based sorting methods, sorting in linear time, greedy algorithms; dynamic programming; backtracking and some graph algorithms for path problems.

Introduction: Algorithm, Psuedo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Growth of functions: Asymptotic Notation, Recurrences: substitution method, master method.

UNIT II: Divide and Conquer: General method, applications-Binary search, Finding the maximum and minimum, Quick sort, Heapsort.

Sorting in Linear Time: Lower bounds for sorting, Counting sort, Radix sort, Bucket sort, Medians and Order Statistics, Minimum and maximum.

UNIT III: Greedy method: General method, applications- Knapsack problem, Job sequencing with deadlines, optimal two way merge patterns, Huffman codes, Minimum cost spanning trees: Prims and Kruskal‘s algorithm, Single Source shortest path:Bellman Ford algorithm, Dijkstra‘s Algorithm.

UNIT IV: Dynamic Programming: General method, applications, capital budgeting problem, Multistage graphs, Matrix chain multiplication, 0/1 knapsack problem, All Pair shoertest path algorithm.Traveslling salesman Problem.

Backtracking: General method, applications, 8-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

UNIT V: Graph Algorithms: Introduction, representation of graphs, Breadth first search, depth first search, topological sort, strongly connected component, flow networks, ford-fulkerson method.

NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP Complete classes, satisfiability problem, reducibility.

TEXT BOOKS :

1. Introduction to Algorithms, second edition, T. H. Cormen, C. E. Leiserson, R.L. Rivest, and C. Stein, PHI Pvt. Ltd./ Pearson Education.
2. Fundamentals of Computer Algorithms, Ellis Horowitz,Satraj Sahni and Rajasekharam,Galgotia publications pvt. Ltd.
3. Algorithm Design: Foundations, Analysis and Internet examples, M.T.Goodrich and R.Tomassia, John wiley and sons.
4. Introduction to algorithm, Aho , Hopcraft, Ullman , Rajeev Motwani.

Code: CS-204N **Computer Organization** **Credits: 4(3-1-0)**
Branches: EE, EC, EI , CSIT

1. Introduction: - Review of digital logic gates, Design of adder and subtractor using gates & K-MAP.

2. Arithmetic for Computer:- Introduction to number system, negative numbers, Arithmetic Algorithms (addition, subtraction, Booth Multiplication), IEEE standard for Floating point numbers

3. Processor Design:- Von-Neumann Structure, Processor Organization: General register organization, Stack organization, Addressing modes, instruction types, RISC and CISC.

4. Control Design: - Control memory address sequencing, micro instruction interpretation, CPU control unit, Hardwired & Micro Programmed Control Unit, basic concepts of micro programmed control, micro program sequencer for a control memory, micro instruction formats.

5. Memory Organization:- Characteristics of memory systems, Memory Hierarchy, Virtual Memory, Dynamic Address Translation Scheme addressing scheme for main memory, TLB, characteristics and principles of cache memory, elements of cache design, Cache memory organization, Block replacement policies and mapping techniques.

6. System Organization: - Synchronous & asynchronous communication, standard communication interfaces, Bus arbitration (Serial and Parallel procedure), Modes of transfer, Programmed I/O (IO addressing, IO instruction), DMA (Cycle Stealing Concept, DMA Controller and DMA Transfer), interrupt driven I/O: Interrupt processing, interrupt hardware, types of interrupts and exceptions.

REFERENCES

1. Computer Architecture and Organization, By John P. Hayes, TMH.
2. Computer organization and design, by John L. Hennessy & David A. Petterson, Morgan Kaufman.
3. Computer System Architecture, by M. Morris Mano, PHI
4. Computer Organization, Stallings(PHI)
5. Structured Computer Organization, Tannenbaum(PHI)

CS-206N **Data Communication** **Credits 4(3-1-0)**

UNIT 1: Introduction and Signals

Data and Information, Data communication, Characteristics of DC, Components, Data Representation, data Flow, Simplex, Half Duplex, Full Duplex, Categories of Networks, Analog and Digital Signals, Periodic and Aperiodic signals, Time and Frequency Domain, Composite Signals.

UNIT II: Encoding, Decoding and Modulation techniques

Unipolar and Bipolar Schemes, Pulse Code Modulation, Pulse Amplitude Modulation, Amplitude Shift keying, Phase Shift Keying, Frequency Shift Keying, Quadrature Phase Shift Keying, Transmission Modes: Parallel and Serial.

UNIT III: Multiplexing Techniques

Many to one/ One to Many Multiplexing, Frequency Division Multiplexing, Time Division Multiplexing, Synchronous Time Division Multiplexing Wave Division Multiplexing, Space Division Multiplexing, Code Division Multiplexing, DTE-DCE, Telephone System, Modems.

UNIT IV: Introduction to Mobile Communication

Cellular System Architecture, Components, Transmission and receiving of Calls, Generation of cellular System, Frequency reuse principle, Mobility Management: Handoff mechanism, Soft and Hard Handoff, roaming, Overview of 2G and 3G communication system, Satellite networks: Orbits, Footprint, categories of satellite.

UNIT V: Global System for Mobile (GSM)

GSM System Overview, GSM architecture, Network and Switching Subsystem (NSS), VLR, HLR, EIR, AUC , Identifiers used in GSM system, Frame Structure for GSM, GSM call Procedures: Registration, Mobile-to-network call, Network-to-mobile call, GSM hand-off Procedures.

Text Books:

1. Behrouz Forouzan, –Data Communications and networking,‖ TMH.
2. W. Stalling, –Data and Computer Communication,‖ PHI.
3. Fred Halsann, –Data Communication, Computer Networks and Open Systems,‖ Pearson Education.
4. John Scheillor, –Mobile Communication,‖ Pearson.
5. Data Networks, D. Bertsekas and R Gallager, PHI.

SECOND YEAR (FOURTH SEMESTER)

CS-208N Data Base Management Systems Credits4(3-1-0)

UNIT 1: Introduction:
Data Base System Concepts, database system architecture, Data models and their types, Data base scheme and Instances, Data Independence, Data Base Languages and Interfaces, DBA role.

UNIT 2: Data Modeling Using the Entity-Relationship Model:
ER model concepts, Notations for ER diagram, Extended E-R diagram, Extended E-R model, E-R model design issues, constraints, keys: Weak entity set strong entity set, Relationships of higher degree.

UNIT 3: Relational Data Model and Languages:
Relational model concepts, E.F. Code rules for RDBMS, constraints, Relational Algebra operations, Extended relational algebra operations, Relational Calculus, Tuple and Domain relational calculus

SQL (DDL, DML, DTCL, DCL): Basic Structure and queries; set operators, Aggregate function, Derived Relations, Modification of the Database, Joined relations and up-dates in SQL, Advance SQL (SQL data types, Embedded-SQL, Dynamic SQL)

UNIT 4: Database Design:
Functional dependencies, Normal forms, First second, and third normal forms, BCNF, Multi-valued dependencies and Fourth Normal form, Join Dependencies and Fifth Normal form.

UNIT 5: Transaction Processing concepts:
Transaction and system concepts, transaction states, ACID properties of transactions, concurrent execution schedules and Recoverability, serializability of schedules.
Query Processing and Optimization: Measures of Query cost, Cost, Evaluation of expression; Optimization: Transformation of relational expression, Choice of evaluation plan.

UNIT 6: Concurrency Control Techniques:
Lock based protocols: Two phase and three phase Locking Techniques for Concurrency Control; Time-Based Protocols: Time stamping and concurrency control; Deadlock handling: Concepts and Necessary conditions, Deadlock prevention, Deadlock avoidance.

UNIT 7: Storage and Query Processing:
Overview of physical storage, Magnetic disks, RAID, File organization, Data dictionary, Indexing, B+ Tree Index, B Tree Index files, Static and Dynamic Hashing.

UNIT 8: Protecting the Database against Misuse:
Integrity constraints, Principle of security, security, Views, Encryption and Decryption Techniques, RSA Algorithm, Diffie Hellman Algorithm.

References:
1) Abraham Silberschatz. Henry F. Korth S.Sudarshan; database system concepts, McGraw hill Book co. 1997.
2) Date, C.J; An introduction to database system volume I & II, Addison-Wesley, 1981, 1983.
3) Ullman, Jeffrey D: Principles of database systems 2nd Edn Galgotial Publication Pvt. Ltd. 1982.
4) Whittigton, R.P. Database system engineering, Claventor Press.

CS 210N **Java Programming** **Credit 4 (3-1-0)**

(1) Introduction

Introduction – what is java, importance of java, java implementation application of java, sample program & compilation, using block of code, lexical issues (White space, identifiers, literals, comments, separators, keyword),java class library

(2) Data type, operators, control structures

variables, constants, declaration, literals, scope of variable, type casting, arithmetic operators, relational operators, logical operators, assignment operators, increment –decrement operators, conditional operators, bit wise operators, interface of operators, dot operators, if-else, statement, loops (while, do-while, for break, goto, continue return) switch statement, operator, array –declaration, creation, initialization, length, two-dimensional arrays, string-string arrays, string methods, stringbuffer class

(3) Introduction of classes, objects and methods

What is class, object & method, defining class, adding variables, adding methods, creating objects, constructors THIS key word, garbage collection, finalize() method, accessing class members, vactors and wrapper classes, inheritance, final variables and methods,final classes, finalizer methods, abstract methods and classes, visibility control – public access, friendly access, protected access,private protected access, String class, Command-Line arguments

(4) Inheritance

Inheritance, Member access, super class, creating multilevel Hierarchy, Method over loading & overriding, Abstract class, method,Using final to prevent overriding & overloading , the object class

(5) Packages and Interfaces

Defining packages, Access protection, importing packages, defining interfaces

(6) Exception handling

exception types, uncaught exceptions, multiple catch clauses, nested try statements, throw, throws, finally, java‘s built-in exceptions,creating your own exception subclasses

(7) Multithreaded programming

creating threads, run()method, new thread, thread class, stopping & blocking threads, life cycle of thread-newborn, runnable,running, blocked, dead, waiting sleeping, suspended, blocked, using thread methods, thread exceptions, thread priority, synchronization, implementing the Runnable interface

(8) Applet

what is an applet, applet lifecycle, applet class, applet context class, passing parameters to applet , use of java .awt graphics class and its various methods in an applet

(9) Event Handling

Event delegation model or event class hierarchy, all classes and interfaces of event delegation model, programs related to event handling covering all types of events

(10) I/O files in java

Concept of streams, difference between character streams and byte streams

(11) Graphical user interface

Layout managers (flowlayout, borderlayout, cardlayout gridbaglayout,gridlayout), AWT controls (labels, buttons,s canvases, checkboxes, checkboxgroup,choices, textfields, textareas, lists, scrollbars, panels, windows, frames, menus, menubars)

References:1. Programming with Java A Primer, E. Balaguruswamy Tata McGraw Hill Companies.
2. Java Programming John P. Flynt Thomson 2nd.
3. Java Programming Language Ken Arnold Pearson.
4. The complete reference JAVA2, Hervert schildt. TMH.
5. Big Java, Cay Horstmann 2nd edition, Wiley India Edition.
6. Core Java, Dietel and Dietel.
7. Java – Balaguruswamy.
8. Java server programming, Ivan Bayross SPD.

B.Tech Third Year

CS 301N **Computer Network & Security** **Credit 4 (3-1-0)**

Unit 1: Introduction, Protocols, Layered Model: Network components, Uses of networks and Topologies, Categories of Network (LAN, MAN & WAN), Transmission Media, Trace-route and socket API, Protocols and layering, Reference models (Internet, OSI), LAN switching (switch, hubs, Repeater, Bridge, Gateway, Router)

Unit 2: Data Link Layer, Retransmissions, Multiple access: Simple link models
PPP, HDLC, Framing and Data Link Control, Error detection schemes (VRC, LRC, checksum, CRC), Error correction schemes (Hamming), Retransmissions (Simplest, Stop & Wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ), IEEE standard (802.3, 802.4, 802.5, 802.11), Random access / Ethernet ALOHA, CSMA family, Contention-free access / Token Ring.

Unit 3: Network Layer and Internetworking: Datagram and virtual circuit models (IP, MPLS), IP addressing (classfull & Classless) and forwarding (prefixes, longest matching prefix), IP helpers: ARP, DHCP, Internetworking (fragmentation, path MTU discovery, ICMP), IPv4 and IPv6, Network Address Translation (NAT), VPN concepts

Unit 4: Routing: Routing concepts: Characteristics, Types, Store-and-Forward Packet Switching, Services Provided to the Transport Layer, Connectionless Service and Connection-Oriented Service, Design elements of routing strategies. Shortest cost routing model, Dijkstra's algorithm, Flooding, Distance Vector and Link-state, Equal-cost multi-path routing Hierarchical routing (prefixes, aggregation, subnets), Routing for Mobile Host

Unit 5: Transport Layer, Reliable Transport: Sockets, ports and service APIs, Reliable and unreliable delivery (TCP, UDP), Connection establishment and teardown, Flow control and sliding windows, Retransmission timeouts, General Principles of Congestion Control, Congestion Prevention Policies, Congestion control in datagram subnet, TCP congestion control (slow start, fast retransmission and recovery), Techniques for achieving good Quality of Service: Buffering, Traffic shaping, The leaky bucket algorithm, The Token bucket algorithm.

Unit 6: Application Layer Protocols: Naming (DNS), Telnet, ATM, SMTP, HTTP, ftp, pop3.

Unit 7: Network security: Issues in network security, Network security services : Message Confidentiality, Message Integrity, Message Authentication, Message Non-repudiation, Entity Authentication, Web security (SSL, DNSSEC),Firewalls

TEXT BOOKS :

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson, Education/PHI
2. Data Communications and Networking – Behrouz A. Forouzan.Third, Edition TMH.

REFERENCES :

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson
3. Data Networks, D. Bertsekas and R Gallager, PHI.
4. W. Stallings, Data and Computer Coomunication, Pearson education.

CS-303N **Software Engineering** **Credit4(3-1-0)**

UNIT I: Introduction: Introduction to software engineering, software crisis, software characteristics & application, software development life cycle model, waterfall model, iterative waterfall model , prototyping model, evolutionary model, spiral model, Agile development.

Project Management : project management concept, software process and project metrics, project size estimation metrics, project estimation technique, empirical estimation technique, COCOMO – A heuristic estimation technique ,Halstead's software science-an analytical technique ,staffing level estimation, scheduling.

UNIT II: Software Requirement Specification : requirement analysis , requirement elicitation techniques like FAST ,QFD & use case approach,DFD ,ER-diagram ,nature of SRS, characteristic & organization of SRS ,Alternative analysis techniques , data sturucture oriented methods ,the DSSD Approach , Jackson system development.

UNIT III: System Design: Design concept or principal, design fundamental abstraction, refinement, modularity,software architecture, control hierarchy, design techniques and its implementation:structure approach , functional approach ,object oriented approach.

UNIT IV: Testing And Maintenance: coding guidelines ,code review ,testing process,design of test case ,functional testing ,structural testing ,software testing techniques : unit testing ,integration testing (top down and bottom up), alpha and beta testing ,system testing and debugging ,maintenance process , maintenance model, reverse – engineering and re –engineering ,documentation ,verification vs validation.

UNIT V: Software Reliability And Quality Assurance : quality concepts & characteristics ,software quality assurance ,software quality activity, cost impact of software , formal technical review, the review meeting ,review reporting and record keeping ,review guide line , SQA,CMM & ISO 9001 Standard.

References:

1. Software engineering : A Practitioner's approach by Roger S. Pressman (MC-Graw Hill International Edition).

2. An Integrated Approach To Software Engineering: Pankaj Jalote , Narosa Publication

3. Software Engineering Concepts By Fairley (TMH)

4. Fundamental Of Software Engineering: Rajib Mall.PHI

CS-305N **Theory of Computation** **Credits 4(3-1-0)**

UNIT 1: Introduction

A general introduction to Strings, languages, graphs, trees and relations, Models of Computation: RAM and RASP Models of Computation, Finite State Machines, Regular expressions; Deterministic - Finite systems, Non deterministic Automata with and without e-moves, equivalence of DFA and NDFA without e-moves, Construction of DFA from NDFA with e-moves, FA with output: Moore and Mealy machine, Equivalence of Moore and Mealy Machine, Applications and Limitation of FA.

UNIT 2: Properties of regular sets

Regular expression (RE) , Definition, Operators of regular expression and there precedence, Algebraic laws for Regular expressions, Kleen's Theorem, Construction of Regular expression from FA, DFA to Regular expression, Arden Theorem, Non Regular Languages, Pumping Lemma for regular Languages. Application of Pumping Lemma, Closure properties of Regular Languages, Decision properties of Regular Languages.

UNIT 3: Context Free Grammars (CFG)

Chomsky Hierarchy of Grammars: Type0, 1, 2 and 3 Grammars. Context free grammar(CFG) and Context Free Languages (CFL): Definition, Examples, Derivation , Derivation trees, Ambiguity in Grammar, Ambiguous to Unambiguous CFG, Simplification of CFGs, Normal forms for CFGs: CNF(Chomsky normal form) and GNF (Griebach normal form), Conversion of a given grammar into Chomsky normal form, Griebach normal form (examples only). Closure properties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Membership, Pumping lemma for CFLs.

UNIT 4. Push Down Automata

Definition of instantaneous descriptions, definition of Deterministic PDA, Construction of PDA for a given language, Two Stack PDA and its construction, construction of CFL's given the transition function of PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG.

UNIT 5: Turing machine (TM)

Definition, Types of TM, Different representations of TM, Construction of Turing machines for simple languages, Definition of Computable languages and functions, Definition of total recursive, partial recursive functions, Church Thesis, Post correspondence Problem, Halting problem.

Text Books:

1. John E Hopcroft, Rajeev Motwani, Jeffrey D Ullman, –Introduction to Automata Theory, Languages and Computation‖, Pearson Education
2. Peter Linz, –An Introduction to formal language and automata‖, Third edition, Narosa Publication.

References:

1. Kamala Krithivasan, Rama R, –Introduction to Formal Languages, Automata Theory and Computation‖, Pearson Education.
2. Martin J. C., –Introduction to Languages and Theory of Computations‖, TMH.
3. Papadimitrou, C. and Lewis, C.L., –Elements of the Theory of Computation‖, PHI.
4. K.L.P. Mishra and N.Chandrasekaran, –Theory of Computer Science : Automata, Languages and Computation‖, PHI
5. Cohen D. I. A., –Introduction to Computer theory‖, JohnWiley & Sons.
6. John E Hopcroft, Jeffrey D Ullman, –Introduction to Automata Theory, Languages and Computation‖, Narosa Publication.

CS-307N **Operating System** **credit 4(3-1-0)**

Unit – I

Introduction : Operating system and functions, Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multiprocess Systems, Multithreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Reentrant Kernels, Monolithic and Microkernel Systems.

Unit – II

Concurrent Processes: Process Concept, Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem; Inter Process Communication models and Schemes, Process generation.

Unit – III

CPU Scheduling: Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.

Unit – IV

Memory Management: Basic bare machine, Resident monitor, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference.

Unit – V

I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID. File System: File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File system protection and security.

References:

1. Silberschatz, Galvin and Gagne, –Operating Systems Concepts|, Wiley
2. Sibsankar Halder and Alex A Aravind, –Operating Systems|, Pearson Education
3. Harvey M Dietel, ― An Introduction to Operating System‖, Pearson Education
4. D M Dhamdhere, –Operating Systems : A Concept based Approach|, 2nd Edition, TMH
5. William Stallings, –Operating Systems: Internals and Design Principles |, 6th Edition, Pearson Education

CS-304N **COMPILER DESIGN** **Credit:4(3-1-0)**

UNIT 1: Introduction to Compiling: Compiler, Translator and itsNeed, The phases of a compiler, phases of _C' compiler, Cousins of the Compiler, grouping of Phases, Bootstrapping.
UNIT 2: Lexical Analysis: Role of lexical analyzer, Input buffering, specification & Recognition of tokens, Finite automata, Regular sets and expression, Conversion of Regular expression to FNA, Obtaining Regular expression from Finite Automata, Optimization of DFA states.
UNIT 3: Basic Parsing Techniques: Context Free Grammar, Derivation and Parse Tree, Parsers: Top-down Parsing (Predictive Parser , Back tracking Parser or Recursive-descent parsing , LL parsing) ,Bottom Up Parsing (Shift –reduce parser, LR, Parser , SLR Parser , LALR Parser).
UNIT 4: Syntax Directed Translation: Syntax directed definition, L- attribute and S- attribute definition, 3-address code, Inter mediate Code, Postfix notation, Quadruples, Triples, implementation of syntax directed translator, parse tree and syntax tree.
UNIT 5: Symbol Tables : The contents of symbol table, Entering information in to symbol Table , Information about run time storage location, Data structure for symbol tables, representing scope information in Symbol Table , Storage allocation , Activation Record , Static Allocation, (call and return sequence, access to nonlocal names, setting up the access link.)
UNIT 6: Error detection and recovery: Errors, Error recovery, Errors and Recovery in Lexical phase , Syntactic-phase , Semantic phase, LR Parsing , Predictive Parsing .
UNIT 7: Code optimization: Principles sources of optimization, loop optimization, DAG representation of basic blocks, values numbers and algebraic laws, Global data-flow analysis.
UNIT 8: Code Generation: Issues in the design of code generator, a simple code generator, register allocation and assignment, code generation from DAG.

References:
1) Aho, Sethi& Ullman, –Compilers Principles & Techniques & Tools|, Addision Wesley.
2) Aho&Ulman, –Compiler Design, –Narosa Publishers, New Delhi.

CS306N **Interactive computer graphics** **Credits-4(3-1-0)**

UNIT-1: Introduction:

Origin of computer graphics, display devices, General purpose Graphics software display of solid objects.

UNIT-2: Display Techniques and Devices:

Point plotting techniques, coordinate, system and intcremental methods, line drawing algorithms, circle generators, display devices, CRT, inherited memory devices, the storage tube display, refresh line-drawing display.

UNIT-3: Graphics Package and Display Files:

A simple graphics, segment functions for segmenting the display files, posting and unposting, segment naming schemes. Appending to segment refresh concurrent with reconstruction free storage allocation, display file structure, geometric models, defining symbols procedures, display procedure, structured display files.

UNIT-4: Two Dimensional Transformations:

Principle concatenation matrix representation, a line dipping algorithm, midpoint division, dipping other graphics entities, polygon dipping viewing transformation, tiny windowing transformation.

UNIT-5: Input Devices:

Pointing and positioning devices, three dimensional input devices. Graph input techniques.

UNIT 6: Event Handling & Input Fractions:

Introduction, polling, interrupts, the event queue, functions for handling eveifits, polling task design, light pen interrupts, dragging and fix, htt detection, on-line character recognizers.

UNIT 7: Raster Graphics:

Introduction, generating a raster image, interactive faster graphics raster display hardware.

UNIT 8: 3-D Graphics :

Realism of 3D Graphics, 3D Transformation, Projections and its types. Curves & surfaces, hidden line and surface elimination (Z-Buffer Algorithm).

UNIT 9: Introduction To Virtual Reality

References:

1) Principles of interactive coinsurer graphics by W. M. Newman & R. F. Sproull, Me Graw Hill.
2) Computer Graphics by R~y A. Plastick & Gorden Kalley, Schaum's Outline Series.
3)Computer Graphics by Donald Heam & Baker, PHI.
4) Computetr Graphics, harinqton, TMH
5) Mathematical Approach To Computer Graphics, Rodger,
6) Computer graphics, Folay Addison Wessley

CS 308N **Advance Computer Network** **Credits 4(3-1-0)**

UNIT 1: Introduction

TCP/IP Internet, User Datagram Protocol (UDP): Format of UDP message, UDP Pseudo Header, UDP Encapsulation, UDP Port Numbers, Transmission Control protocol (TCP): Need for Stream Delivery, properties of Reliable delivery Services, Idea behind Sliding window, TCP port connection and endpoints, passive and active open, Segments, Streams and Sequence Numbers, TCP Segment Format, TCP options, Limitations of TCP, Internet Protocol (IP): Purpose of IP, IPv4 Datagram, Datagram format, encapsulation, datagram size, network MTU and fragmentation, Reassembly of fragments, TTL, Datagram options. Classful and Classless Addressing.

UNIT II: Routing architecture and IP switching

Cores, peers and algorithms, Routing Architecture, Routing between peers (BGP), Routing with an autonomous system: RIP and OSPF, IP switching and MPLS, Switching technology, using switching with IP, MPLS encapsulation, MPLS and fragmentation.

UNIT III: Mobile IP

Introduction, Mobile IP characteristics, Mobile IP operations, Foreign agent Discovery, Agent registration, Message Format, Communication with home network, VPN addressing and routing, Interaction between NAT and ICMP, Voice and Video over IP (RTP, RSVP and QoS) IPv6: why IPv6, Header Format IPv6, fragmentation and reassembly, hexadecimal notation, Address types, unspecified and loopback addresses, IPv4 Vs IPV6, Mobile TCP.

UNIT IV: Emerging Wireless Technologies

WLAN: Advantage and disadvantage, WLAN architecture, WLAN applications, HiperLAN technology, WPAN technology, WMAN Technology, Wi-Max, Wi-Max and 3Gpp, Wi-Fi, Bluetooth, Security in Wireless Networks (WLAN, WPAN and WMAN), interoperatibility of Wireless Networks.

UNIT V: Adhoc Networks

Infrastructure based and infrastructure less Networks, Types of Adhoc protocols, Applications of adhoc networks, Limitations of Adhoc networks, Routing in Wireless Adhoc Networks, types, case study: Dynamic Source routing protocol, Cluster based Routing protocol, Routing in vehicular Adhoc networks, Wirelss Adhoc (MANET) Vs vehicular Adhoc Networks (VANETs), Introduction to Sensor and mesh networks.

Text Books:

1. Douglas E. comer, ‐Internetworking with TCP/IP,| PHI.
2. T. L. Singhal, ‐Wirelesss Communication,| TMH.

References

1. Murthy and Manoj, Ad Hoc Wireless Networks, Pearson Education publication.
2. Jochen Schiller,—Mobile Communications‖,Addison-Wesley.
3. Stojmenovic and Cacute, ‐Handbook of Wireless Networks and Mobile Computing|, Wiley, 2002, ISBN 0471419028.
4. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden , Schwiebert, Loren, ‐Fundamentals of Mobile and Pervasive Computing|, ISBN: 0071412379, McGraw-Hill Professional,.
5. Hansmann, Merk, Nicklous, Stober, ‐Principles of Mobile Computing|, Springer,
6. Martyn Mallick, ‐Mobile and Wireless Design Essentials|, Wiley DreamTech,
7. Mobile computing, A. K. talukder and R R Yavagal

CS-310N **Data Mining Techniques** **Credits 4(3-1-0)**

UNIT 1: What is learning: Introduction, What is learning, Self learning computer systems, Machine learning & Methodology of science, Ex:- A kangaroo in mist. Data Mining: Definitions, Challenges, The knowledge discovery process in detail (Data selection, Cleaning, Enrichment, Coding process) KDD (Knowledge Discovery in Database) v/s Data Mining, DBMS v/s Data Mining, Golden rules to setup KDD environment

UNIT 2: DSS: Characteristics, Definitions for DSS, Why Decision DSS, Benefits, DSS Architecture. Dss-Uses, definition, Operational Database.Introduction to DATA Warehousing.why do we need it & Integration with Data Mining, Data-Mart, Concept of Data-Warehousing, Multi-Dimensional Database Structures. Client/Server Computing Model & Data Warehousing.

UNIT 3: DATA Warehousing: DATA Warehousing. Data Warehousing Components.Building a Data Warehouse.Warehouse Database.Technical considerations & Implementation considerations of data warehouses, 3-level architecture of data warehousing.

UNIT 4: Data Mining Techniques: Preliminary Analysis of data set using traditional Query rules, Visualization techniques, Likelihood & distance, OLAP Tools, K-nearest neighbor, Decision Trees. Association rules, Neural Networks, Genetic algorithm.

UNIT 5 :Association Rules: What is an Association rule, Methods to discover Association Rules, A Priori algorithm, Partition algorithms, Pincer search algorithms, Discussion on different algorithms, Incremental algorithms, Border algorithm, Generalized association rule.

UNIT 6:Classification and Clustering technique:Decision Trees : What is a decision tree, Tree construction principle, Web-split, Splitting Indices, Splitting Criteria, Decision tree construction algorithm.**Clustering technique:**Introduction, clustering paradigms, partitioning algorithm, k-medoidalgorithm,CLARA, CLARANS, Hierarchical clustering, DBSCAN, CURE, BIRCH,CURE, Categorical clustering algorithm, STIRR, ROCK, CACTUS.

UNIT 7: Web Mining: Web mining, Web content mining, Web structure mining, Web users mining, Text mining, Unstructured text, Episode Rule Discovery for Text, Hierarchy of Categories, Text-Clustering.

References: G.Proakis&Dimitris G. Manolakis, PHI

1) Data Mining techniques by ArunPujari, Universities Press.
2. Digital signal processing by Alan V. Oppenheim and Ronald Schafer
2) Data Mining by Pieter Adriaans, DolfZantinge, Addison-**3.**Introduction to digital system Processing by Roman Kuc. Mcgraw hill Wesley. international editions.
3) Datawarehousing, Data mining, OLAP, by Alex Berson& Stephen J. Smith, TMH Edition
4) Berson, –Data Warehousing, Data-Mining & OLAP|, TMH
5) Mallach, –Decision Support and Data Warehousing System|, TMH
6) BhavaniThura-is-ingham, –Data-Mining Technologies, Techniques Tools & Trends|, CRC Press
7)Navathe, –Fundamental of Database System|, Pearson Education
8) Margaret H. Dunham, –Data-Mining. Introductory & Advanced Topics|, Pearson Education

Credits:4(3-1-0)

B.Tech Fourth Year

CS-401N Soft Computing

UNIT I: FUZZY SET THEORY

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems.

UNIT II: ARTIFICIAL NEURAL NETWORK

Neural Network : Structure and Function of a single neuron: Biological neuron, artificialneuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain,characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebb;s learning rule/Delta rule, ADALINE, MADALINE, Introduction of MLP, different activation functions, Error back propagation algorithm, derivation ofBBPA, momentum, limitation, characteristics and application of EBPA.

UNIT III: GENETIC ALGORITHM

Genetic algorithm : Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion,mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications &advances in GA, Differences & similarities between GA & other traditional method.

UNIT IV: HYBRID SYSYETMS

Integration of neural networks, fuzzy logic and genetic algorithms, applications of computational intelligence:

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

Text Books:

1. J.S.R.Jang, C.T.Sun and E.Mizutani, –Neuro-Fuzzy and Soft Computing|, PHI, 2004, Pearson Education 2004.
2. S. Rajasekaran and G.A.VijaylakshmiPai.. Neural Networks Fuzzy Logic, and Genetic Algorithms, Prentice Hall of India.

REFERENCES

1. Timothy J.Ross, –Fuzzy Logic with Engineering Applications|, McGraw-Hill, 1997.
2. Davis E.Goldberg, –Genetic Algorithms: Search, Optimization and Machine Learning|, Addison Wesley, N.Y., 1989.
3. S. Rajasekaran and G.A.V.Pai, –Neural Networks, Fuzzy Logic and Genetic Algorithms|, PHI, 2003.
4. R.Eberhart, P.Simpson and R.Dobbins, –Computational Intelligence - PC Tools|, AP Professional, Boston, 1996.

CS-403N **DOT NET FRAMEWORK WITH C#** **Credit:-4(3-1-0)**

UNIT I –
INTRODUCTION TO C#
Introducing C#, Overview of C#, Literals, Variables & Constant, Data Types, Operators, Expressions, Branching, Looping, Methods, C# statements Arrays, Strings, Structures, Enumerations.

UNIT II-
INTRODUCTION TO .NET
Introduction, Common Language Runtime, Common Type System, Common Language Specification, The base class library, The .Net Class Library Intermediate Language, Just In Time Compiler, Garbage Collection, Assemblies

UNIT III-
OBJECT ORIENTED ASPECTS OF C#
Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, System Collections, Delegates, Events, Errors and Exceptions.

UNIT IV –
WEB BASED APPLICATION DEVELOPMENT ON .NET
Namespace System, Window Forms, C# in Web Application, Programming Web Applications with Web Form , Programming Web Services, Validation and Rich Controls, Master Pages and Themes, Building Windows Applications, Accessing Data with ADO.NET.

UNIT V –
WORKING WITH ADO.NET
ADO.NET Fundamentals, Reflection, State Management, Website Navigation, Forms Connectivity with Database.

UNIT VI-
THE CLR AND THE .NET FRAMEWORK
Versioning, Attributes, Viewing Metadata, Type Discovery, Reflecting on a Type, Marshaling, Remoting, Understanding Server Object Types, Specifying a Server with an Interface, Building a Server, Building the Client, Using Single Call, Threads.

Note: Each unit shall be discussed with suitable examples through C# programming.

TEXT BOOKS
1. E. Balagurusamy, –Programming in C#‖, Tata McGraw-Hill, 2004.
2) 'Beginning ASP.NET 2.0 in C# 2005' by Apress
3) 'C# with .NET Framework ' by Shibi Pannikar & Kumar Sanjeev
4. J. Liberty, –Programming C#‖, 2nd ed., O'Reilly, 2002.

CS-402N **Advance Computer Architecture** **Credit:4(3-1-0)**

UNIT -1 COMPUTATIONAL MODEL
Computational Models: concepts and types, Granularity, Program Partitioning and Scheduling, Program Flow Mechanisms, System Interconnect Architecture.

UNIT -2 PRINCIPLES OF SCALABLE PERFORMANCE
Performance Metrics and measures, Speedup Performance Laws, Scalability Analysis and Approaches.

UNIT-3 INTRODUCTION TO PARALLEL PROCESSING
Parallel processing Concepts, Architectural classification schemes, Applications, Types and levels of parallelism, ILP, Dependencies, Instruction scheduling.

UNIT-4 PIPELINED PROCESSORS AND SUPER SCALER TECHNIQUES
Linear pipeline processors, Non-linear pipeline,Instruction level pipeline designs, Arithmetic pipeline design,Early Vector processors,scientific Attached Processors, Recent Vector Processors.

UNIT-5 ARRAY PROCESSORS
SIMD Array processors, SIMD Inter connection Networks, Parallel Algorithms for Array Processors, Illiac-IV and BSP System, Massively parallel processors,Performance Enhancement Methods.

UNIT-6 MULTI PROCESSOR ARCHITECTURE, CONTROL AND ALGORITHMS
Functional Structures,Interconnection Networks, Multi processing Operating Systems, Exploiting Concurrency for multi processing,multiprocessor scheduling strategies,Parallel algorithms for multiprocessors,Example-Multiprocessor systems.

REFERENCE BOOKS:-

1. Advance Computer Architecture, Kai Hwang and Naresh Jotwani, McGraw Hill
2. Computer Architecture and Parallel Processing, Kai Hwang and Faye A Briggs, McGraw Hill
3. Advance Computer Architectures – A Design Space Approach , DezsoSima,Terence Fountain and Peter Karsuk,Pearson

ELECTIVES

CS-331N **Distributed System** **Credits 4(3-1-0)**

UNIT 1: Introduction to distributed system : What is distributed system, Advantages of distributed systems over centralized systems and PCs, Disadvantages of distributed system. Hardware concepts: Bus based multiprocessors, switched Multiprocessors, Bus based multi computer, Switched multi computers. Software Concepts: Network OS, true distributed systems, Multiprocessor time sharing system.

UNIT 2: Architecture of Distributed System: Motivation of distributed operating system, System Architecture types, Various issues in distributed operating system: Global Knowlege, Naming,Scalability, Compatibility, Process Synchronization, Resource Management, Security, Client-Server computing model. Communication Network (WAN and LAN), Communication Primitives, The Massage Passing Model, Remote procedural calls.

UNIT 3: Theoretical Foundations of Distributed Operating system: Inherent limitation of distributed system, absence of global clock, Absence of shared memory, Lamport's Logical clock, Global State Chandy-Lamport's global state recording algorithm, termination detection.

UNIT 4: Distributed deadlock, Distributed Mutual Exclusion and Agreement Protocol:

Mutual Exclusion: Centralized Algorithm, Distributed algorithm, Token ring algorithm.Deadlock in distributed system. Distributed deadlock detection, Distributed deadlock prevention., Introduction to Agreement protocols, System models: Asynchronous Vs Synchronous Computation, Model od processor failure, Authenticated Vs Non-Authenticated Massages, Perfor-mance Aspects.

UNIT 5: Distributed data storage and distributed Query Processing :

Data Replication, Data Fragmentation (horizontal, vertical and mixed), Data replication and fragmentation, Query Transformation, Simple join Processing. Semijoin strategy. Join strategy that exploits parallelism, Distributed transaction model.

UNIT 6: Commit protocol, Concurrency control and deadlock handling : Commit protocols-two phase commit and three phase commit, Concurrency control-locking protocol and time stamping, Deadlock handling - centralized and distributed approaches.

References:

1) Advanced Concepts in operating system by MukeshSinghal and Niranjan G. Shivaratri.

2) Distributed operating system by Andrew S.Tanenbaum.

CS-332 N **Advance DBMS** **Credit 4(3-1-0)**

Unit 1 Introduction to distributed data base systems, transaction processing Concurrency control techniques, security, Distributed Data Base architecture.

Unit 2 Introduction to object oriented database system, Definition of Objects, Review of Key Object-oriented programming concepts, Object Orientation for Database Systems, Relational Extensions to Object-oriented Database Systems, Object Orientation in Relational Databases, Uses for Object-oriented Database.

Unit 3 Introduction to data mining, Self-learning, What is data warehouse and why do we need, Designing decision support systems, Integration with data mining.

Unit 4 Introduction to knowledge discovery process, Data selection, cleaning. Enrichment coding data mining, Preliminary analysis of the data set using traditional query tools, Decompose trees, Association rules, Neural networks, Genetic algorithms Introduction to setting up a KDD environment.

Unit 5 Advanced Transaction processing: Remote Backup systems, Transaction Processing Monitors, TP-Monitor Architectures, High-Performance Transaction systems. Long Duration Transactions, Transactional Workflows, Query Optimization security and production, Encryption, Statistical Database. Data base triggers, functions, procedures, packages and forms with respect to existing database.

S. No	Title	Author	Publisher
1	Distributed Data base system,.	Stegano Ceri and qiuseppe Pelagati	Mc-Graw Hill
2	Distributed Object Oriented Data-Systems Design	Prabhat K. Andleigh, Michacl R. Gretzinger	PTR Prentic Hall Inc
3	Data Mining, Addison, Wesley	Pieter Adriaans Dolf Zantinge	Longman Ltd

CS-333N Advance JAVA Programming Credit:4(3-1-0)

1. Collections: Basic,Collection Interfaces, Concrete Collections, The Collections Framework

2. Multithreading : Creating thread and running it, Multiple Thread acting on single object, Synchronization, Thread communication, Thread group, Thread priorities, Daemon Thread, Life Cycle of Thread

3. Networking: Internet Addressing, InetAddress, Factory Methods, Instance Methods, TCP/IP Client Sockets, URL, URL Connection, TCP/IP Server Sockets, Datagrams

4. Enterprise Java Bean: Preparing a Class to be a JavaBean, Creating a JavaBean, JavaBean Properties, Types of beans, Stateful Session bean, Stateless Session bean, Entity bean

5. Java Database Connectivity (JDBC): Merging Data from Multiple Tables: Joining, Manipulating Databases with JDBC, Prepared Statements, Transaction Processing, Stored Procedures C

6. Servlets: Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle, Handling HTTP get Requests, Handling HTTP post Requests, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with HttpSession

7. Java Swing
Working with JFrame, JApplet, Jpanel, JTextfield, JPasswordField, Jbutton,Jcheckbox, Jradiobutton, Jlist, Jscrollpane, Jcombobox,Jmenu, Jmenubar,JMenultem, JpopupMenu, JTree, JTable

8. Java Server Pages (JSP): Introduction, Java Server Pages Overview, A First Java Server Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries

9. Remote Method Invocation: Defining the Remote Interface, Implementing the Remote Interface, Compiling and Executing the Server and the Client

10. Common Object Request Broker Architecture (CORBA): Technical/Architectural Overview, CORBA Basics, CORBA services

11. Introduction Smart Phone Application Development: Introduction to android platform, Creating application template, adding activity, intent, services to application, using Google map API

Reference Book:

1. ―Advanced Java 2 Platform HOW TO PROGRAM‖ by H. M.Deitel, P. J. Deitel, S. E. Santry – Prentice Hall
2.
3. ―Beginning Java™ EE 6 Platform with GlassFish 3 From Novice to Professional‖ by Antonio Goncalves -Apress publication

References:

1. Programming with Java A Primer, E. Balaguruswamy Tata McGraw Hill Companies.
2. Java Programming John P. Flynt Thomson 2nd.

3. Java Programming Language Ken Arnold Pearson.
4. The complete reference JAVA2, Hervert schildt. TMH.
5. Big Java, Cay Horstmann 2nd edition, Wiley India Edition.
6. Core Java, Dietel and Dietel.
7. Java – Balaguruswamy.

8. Java server programming, Ivan Bayross SPD.

CS-334 N Linux System Administration Credit 4(3-1-0)

Unit 1 **Introduction:** Duties of the Administrator, Administration tools, Overview of permissions. Processes: Process status, Killing processes, process priority. Starting up and Shut down: Peripherals, Kernel loading, Console, The scheduler, init and the inittab file, Run-levels, Run level scripts.

Managing User Accounts: Principles, password file, Password security, Shadow file, Groups and the group file, Shells, restricted shells, user management commands, homes and permissions, default files, profiles, locking accounts, setting passwords, Switching user, Switching group, Removing users.

Unit 2 **Managing Unix File Systems:** Partitions, Swap space, Device files, Raw and Block files, Formatting disks, Making file systems, Superblock, I-nodes, File system checker, Mounting file systems, Logical Volumes, Network File systems, Boot disks.

Configuring the TCP/IP Networking : Kernel Configuration; Mounting the /proc File system, Installing the Binaries, Setting the Hostname, Assigning IP Addresses, Creating Subnets, Writing hosts and networks Files, Interface Configuration for IP, ifconfig, netstat command, Checking the ARP Tables; Name service and resolver configuration.

Unit 3 **TCP/IP Firewall:** Methods of Attack, What Is a Firewall? What Is IP Filtering? Setting Up Linux for Firewalling Testing a Firewall Configuration; A Sample Firewall Configuration: IPAccounting, Configuring the Kernel for IP Accounting, Configuring IP Accounting, Using IPAccounting Results

IP Masquerade and Network Address Translation : Side Effects and Fringe Benefits, Configuring the Kernel for IP Masquerade, Configuring IP Masquerade.

Unit 4 **The Network Information System:** Getting Acquainted with NIS, NIS Versus NIS+ , The Client Side of NIS, Running an NIS Server, NIS Server Security.

Network file system: Preparing NFS, Mounting an NFS Volume, The NFS Daemons, The exports File.

System Backup & Recovery: Log files for system and applications; Backup schedules and methods (manual and automated).

Unit 5 Active Directory, LDAP

S. No	Title	Authors	Publisher
1	System Software	L.L. Beck	Pearson Education
2	PC System Programming	Michel Ticher	Abacus
3	Linux network Administrator	Kirch	O'Rielly
4	Unix system administration	Maxwell	TMH
5	The Practice of System & Network Administration	Limoncelli	Pearson

CS-335 N **Graph theory** **Credit 4(3-1-0)**

Unit 1 Graphs Introduction Isomorphism Sub graphs Walks, Paths, Circuits Connectedness Components - Euler Graphs Hamiltonian Paths and Circuits Trees Properties of trees Distance and Centers in Tree Rooted and Binary Trees.

Unit 2 Spanning trees - Fundamental Circuits -Spanning Trees in a Weighted Graph Cut Sets Properties of Cut Set - All Cut Sets - Fundamental Circuits and Cut Sets Connectivity and Separability Network flows 1-Isomorphism 2-Isomorphism Combinational and Geometric Graphs Planer Graphs Different Representation of a Planer Graph.

Unit 3 Incidence matrix - Submatrices Circuit Matrix - Path Matrix - Adjacency Matrix - Chromatic Number - Chromatic partitioning - Chromatic polynomial - Matching - Covering - Four Color Problem - Directed Graphs - Types of Directed Graphs - Digraphs and Binary Relations - Directed Paths and Connectedness - Euler Graphs - Adjacency Matrix of a Digraph.

Unit 4 Algorithms: Connectedness and Components - Spanning tree - Finding all Spanning Trees of a Graph -Set of Fundamental Circuits - Cut Vertices and Separability - Directed Circuits.

Unit 5 Algorithms: Shortest Path Algorithm - DFS - Planarity Testing - Isomorphism

S. No	Title	Author	Publisher
1	Graph Theory: With Application to Engineering and Computer Science	Narsingh Deo	PHI
2	Introduction to Graph Theory	R.J. Wilson	Pearson Education
3	A text book of Graph Theory	R. Balakrishan, K. Rangnathan	Springer

CS-336N **Advanced Data Structures** **Credit:4(3-1-0)**

Unit 1: Introduction- Basic concepts, Computational Models, Fixed Universe successor problem and other data structure problems.

Unit 2: Binary Search trees- Introduction, Height of Binary search tree, Basic Operations in Binary Search Tree: Search, Successor, predecessor, insert, deletion, minimum, maximum, Balancing trees, random binary search tree- treaps, optimal binary search tree, Cartesian tree and its applications.

Unit 3: Balanced Search Trees- Introduction, rotations, AVL Trees- insertion, deletion, Red Black Trees- height of Rb tree, insertion, deletion, Splay Trees- properties, splaying modes, splay tree operations, insertion, deletion, searching.

Unit 4: Multiway Search Trees- m-way search tree, B-tree-insertion, deletion, B^+ tree- Searching, insertion, deletion, analysis, Finger Search Tree and level Linking, finger searching, finger search tree, search in finger tree, Randomized Finger Search Trees- Finger searching in Treaps, Finger searching in Skip Lists, Applications, (2,3) trees- height, insertion, deletion, application in range query, x-fast tree, y-fast tree.

Unit 5: String Data Structures- Introduction, Digital Search trees- searching, insertion, deletion, Binary tries, patricia trie, Suffix Trees, Suffix Array, Correspondence between suffix array and suffix tree.

Unit 6: Data Structure for Disjoint Sets- Introduction, Disjoint set operations, Determining connected components of an undirected graph, Disjoint set representation- Linked representation, Disjoint set forests, Shallow threaded trees, Applications- Maze generation, Kruskal‘s Minimum spanning tree.

Unit 7: Hashing Techniques- Introduction, Static Hashing, Hash functions, Cuckoo hashing, Bloom filters- design and applications.

CS-337N **Web Technology** **Credit:4(3-1-0)**

UNIT 1: INTRODUCTION

History of Web, Protocols governing Web, Creating Websites for individual andCorporate World, Cyber Laws, Web Applications, Writing Web Projects, Identification of Objects, Target Users, Web Team, Planning and Process Development Introduction toInternet Services.

UNIT 2: HTML:

Concept of Hypertext, Versions of HTML, Elements of HTML,Formatting Tags, Links, Hyperlinks, Image & Image map, List, Tables, Frames,Forms, Style Sheets, Background and Color Controls. DHTML: Introduction toDHTML. Advanced Netscape DHTML, Advanced Microsoft DHTML & Crossbrowser DHTML JavaScript: Introduction, Statements, Functions, objects inJavaScript, Events and Event Handling, Arrays, FORMS, Buttons, Checkboxes,Text fields and Text areas.

UNIT 3: CSS

Introduction, List, Tables, Images, Forms, Frames; Introduction to scripting languages: Problems with HTML & SGML, Types of XML Markup, Displaying an XML Document, Document Type Definitions (DTD), Linking,Using Style Sheets with XML. Data Interchange with an XML document,Client-side usage, Server Side usage;

UNIT 4: XML

CSS Document type definition, XML schemes, Object Models,Presenting XML, Using XML Processors: DOM and SAX, Introduction to Java Script, Object in Java Script, Dynamic HTML with Java Script Web project, Web Team, Communication Issues, the Client, Multidepartmental& Large scale Websites, Quality Assurance and Testing, Technological advances and Impact on Web Teams, Overview of Static or Dynamic Web page, Portal, Search Engine.

UNIT 5: PHP& MYSQL

PHP Introduction, Creating PHP Script, Running PHP Script, Variables & Constants, data types, Operators.PHP Conditional Statements, Control Statements, Arrays, Functions, Working with forms and database using MySQL.

UNIT 6: JSP

Introduction to JSP, JSP processing, JSP Application Design, Tomcat Server, Implicit JSP objects,Conditional Processing, Declaring variables and methods, Error Handling and Debugging, Sharingdata between JSP pages, Sharing Session and Application Data.

UNIT 7 - AJAX & CGI-PERL

AJAX Introduction, AJAX with XML, AJAX with PHP, Common Gateway Interface and Perl Programming.

Text books:

1) Burdman, –collaborative web development| addision Wesley
2) ASP.NET 21 days, TMH
3) –magic with HTML, DHTML, Javascript|, laxmi publication.
4) –web technology|, laxmi publication

CS-338N Principles of Programming Languages Credit:4(3-1-0)

UNIT 1: Introduction:
Why study programming language?, Charactristics of programming Languages, Factors influencing evolution of programming language, attributes of a good language, Role of programming language, Evolution of software architecture, Language Paradigms Language Standardization,.

UNIT 2: Virtural computer and actual computer:
Structure and operations of a compiler, Translator and software related components, syntax and semantics, Software simulation, Virtural computer and actual computer, Binding and Binding time.

UNIT 3: Data objects, variables and constant:
Data types, specification of elementary data types, types checking (Static and dynamics).

UNIT 4: Vectors and arrays:
Implementation of one and multi dimension arrays, records and structures, their implementation, Record and arrays with structured component, pointer.

UNIT 5: Parallel programming:
Principle of Parallel programming language co routines, synchronization of tasks using interrupts, semaphores and messages, mutual exclusion, critical section.

UNIT 6: Abstract data types:
Data Abstraction, information, hiding, encapsulation by subprograms-subprograms as Abstract operation, subprogram definition & invocation, generic subprogram.

UNIT 7: Subprogram control:
Simple subprogram call-return with its implementation Recursive program
with its implementation Referencing environment .

References:
1) Programming Languages (2nd ed.) by Ravi Sethi
2) Programming Languages (2nd ed.) by Ravi Sethi & Terrence W. Pratt.

CS-339 N Software Project Management Credit 4(3-1-0)

Unit 1 Introduction and Software Project Planning Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.

Unit 2 Project Organization and Scheduling Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.

Unit 3 Project Monitoring and Control Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Deskchecks, Walkthroughs, Code Reviews, Pair Programming.

Unit 4 Software Quality Assurance and Testing Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Cleanroom process.

Unit 5 Project Management and Project Management Tools Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version
Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.

S. No	Title	Author	Publisher
1	Software Project Management	M. Cotterell , Bob Hughes	McGrew Hill
2	Software Project Managemnet	S. A. Kelkar	PHI

CS-441N Neural Network for Machine learning Credit: 4(3-1-0)

UNIT 1: Introduction, well posed learning problems, Machine learning approach, perspective and issues in machine learning, elements of Machine learning, types of machine learning: supervised learning, unsupervised learning, reinforcement learning, recommender system, linear regression with one variable (cost function, example), regression with multi variable and applications, gradient descent, overview of soft computing and applications.

UNIT 2: Introduction to Artificial Neural Systems, Neural Computation: Some Examples and Applications, biological Neurons, dendrite, synapses and their weights, pre- and post-synaptic signals, activation potential and activation function. Excitatory and inhibitory synapses. The biasing input. Types of activating functions, Models of Artificial Neural Networks, Neural Processing,

Unit 3: Learning and adaptation, Learning as Approximation or Equilibria Encoding, Supervised and Unsupervised Learning, Neural Network Learning Rules: Hebbian Learning Rule, Perceptron Learning Rule, Delta Learning Rule, Least-Mean-Square (Widrow-Hoff) Learning Rule, Correlation Learning Rule, Winner-Take-All Learning Rule, Outstar Learning Rule

Unit 4: Perceptron, Single-Layer Perceptron Classifiers, Classification Model, Features, and Decision Regions, Discriminate Function, perceptron for classification.

Unit 5: Multilayer Feed Forward Neural Network, Supervised Learning, Linearly Nonseparable Pattern Classification, Error Back-Propagation algorithm, Fast training algorithms.

Unit 6: Self-Organising Maps**,** Kohonen networks Recurrent Networks, Hopfield networks.

Text Books:

1. Tom M. Mitchell. "Machine Learning" McGraw-Hill, 1997.
2. P. Langley. "Elements of Machine Learning" Morgan Kaufmann Publishers, Inc. 1996.
3. Artificial neural Networks, Zurada, Jacek M.
4. Neural Networks for Pattern Recognition,. Bishop, C. M. (1995), Oxford University Press.
5. Neural Networks: A Comprehensive Foundation, Simon Haykin.
6. Artificial neural Networks, B. Yegnanarayana, PHI
7. Neural networks, Fuzzy logic and Genetic Algorithms, S. Raj sekaran , Vijayalakshmi Pari, PHI.

CS-442N DATA COMPRESSION Credit:4(3-1-0)

Unit - I: Introduction

Compression Techniques: Loss less compression, Lossy Compression, Measures of prefonnance, Modeling and coding, Mathematical *Preliminaries* for Lossless compression: A brief introduction to information theory, Models: Physical models, Probability models, Markov models, composite source model, Coding: uniquely decodable codes, Prefix codes.

Unit – II: Huffman coding

The Huffman coding algorithm: Minimum variance Huffman codes, Adaptive Huffman coding: Update procedure, Encoding procedure, Decoding procedure. Golomb codes, Rice codes, Tunstall codes, Applications of Huffman coding: Loss less image compression, Text compression.

Unit-III: Arithmetic Coding

Coding a sequence, Generating a binary code, Comparison of Binary and Huffman coding, Applications: Bi-level image compression. Dictionary Techniques: Introduction, Static Dictionary: Diagram Coding, Adaptive Dictionary. The LZ77 Approach, The LZ78 Approach, Applications: File Compression-UNIX compress, Image Compression: The Graphics Interchange Format (GIF), Compression over Modems: V.42 bits, Predictive Coding: Prediction with Partial match (ppm): The basic algorithm, The ESCAPE SYMBOL, length of context, The Exclusion Principle, The Burrows-Wheeler Transform: Move-to-front coding, Multi-resolution Approaches, Facsimile Encoding, Dynamic Markoy Compression.

Unit – IV: Mathematical Preliminaries for Lossy Coding

Distortion criteria, Models, Scalar Ouantization: The Quantization problem, Uniform Quantizer, Adaptive Quantization, Non uniform Quantization.

Unit-V: Vector Quantization

Advantages of Vector Quantization *over* Scalar Quantization, The Linde-Buzo- Gray Algorithm, Tree structured Vector Quantizers. Structured *Vector* Quantizers.

Books:

1. Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Publishers

CS-443 N Network security and Cryptography Credit 4(3-1-0)

Unit 1 **Introduction:** Terminology, Substitution ciphers and Transposition ciphers, Simple XOR, One-Time Pads, Computer Algorithms. Cryptographic Protocols

Unit 2 **Protocol Building Blocks:** Introduction, Communication using Symmetric Cryptography, One-Way Hash Functions, One-Way Hash Functions, Communication using Public-Key Cryptography, Digital Signatures, Digital Signatures with Encryption.

Unit 3 **Protocols:** Authentication and Key exchange, Key Exchange, Authentication, Multiple key public key cryptography, Secret splitting, Secret Sharing, Cryptographic protection. Zero-Knowledge Proofs, Zero-Knowledge Proofs of Indentity, Blind Signatures, Obilivious Transfer, oblivious signature, Simultaneous contract singing Cryptographic Techniques

Unit 4 **Key Management :** Generating Keys, Nonlinear Keyspaces, Transferring Keys, Verifying Keys, Using Keys.

Unit 5 **Using Algorithms:** Choosing an Algorithm, Public-Key cryptography versus Symmetric cryptography, Encrypting Communication Channels, Encrypting data for Storage.
Cryptographic Algorithms: RSA, DES

S. No	Title	Author	Publisher
1	Applied Cryptography	Bruce Schneier, John Viley & Sons.	
2	Network Security and Cryptography	Willam Stalling	
3	Concept of Network Security and Cryptography	Frozen	

CS-444N **Artificial Intelligence** **Credit:4(3-1-0)**

Unit-I

Introduction: Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence,can machine think?, AI techniques, components of AI, Applications of Artificial Intelligence,Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.

Unit-II

Introduction to Search : Searching for solutions, Uniformed search strategies(BFS,DFS), Informed search strategies(hill climbing search,best-first search,A* search,IDA*,AO*), Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.

Unit-III

Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic,Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.

Unit-IV

Machine Learning : Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data – EM algorithm, Reinforcement learning,

Unit-V

Pattern Recognition : Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering.

References:

1. Stuart Russell, Peter Norvig, ―Artificial Intelligence – A Modern Approach‖, Pearson Education
2. Elaine Rich and Kevin Knight, ―Artificial Intelligence‖, McGraw-Hill
3. E Charniak and D McDermott, ―Introduction to Artificial Intelligence‖, Pearson Education
4. Dan W. Patterson, ―Artificial Intelligence and Expert Systems‖, Prentice Hall of India,

CS-445 N Network Management System Credit 4(3-1-0)

Unit 1 Data communications and Network Management Overview : Analogy of Telephone Network Management, Communications protocols and Standards, Case Histories of Networking and Management, Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions, Network and System Management, Network Management System Platform, Current Status and future of Network Management.

Unit 2 SNMPV1 Network Management: Organization and Information and Information Models. Managed network: Case Histories and Examples, The History of SNMP Management, The SNMP Model, The Organization Model, System Overview, The Information Model. SNMPv1 Network Management: Communication and Functional Models. The SNMP Communication Model, Functional model. SNMP Management: SNMPv2: Major Changes in SNMPv2, SNMPv2 System Architecture, SNMPv2 Structure of Management Information, the SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility with SNMPv1.

Unit 3 **SNMP Management: RMON:** What is Remote Monitoring? , RMON SMI and MIB,RMON1, RMON2, ATM Remote Monitoring, A Case Study of Internet Traffic Using RMON
Telecommunications Management Network: Why TMN? , Operations Systems, TMN Conceptual Model, TMN Standards, TMN Architecture, TMN Management Service Architecture, An Integrated View of TMN, Implementation Issues.

Unit 4 Network Management Tools and Systems: Network Management Tools, Network Statistics Measurement Systems, History of Enterprise Management, Network Management systems, Commercial Network management Systems, System Management, Enterprise Management Solutions

Unit 5 Web-Based Management: NMS with Web Interface and Web-Based Management, Web Interface to SNMP Management, Embedded Web-Based Management, Desktop management Interface, Web-Based Enterprise Management, WBEM: Windows Management Instrumentation, Java management Extensions, Management of a Storage Area Network, Future Directions.

S. No	Title	Author	Publisher
1	Network Management, Principles and Practice	Mani Subrahmanian	Pearson Education
2	Network management	Morris	Pearson Education
3	Principles of Network System Administration	Mark Burges, Wiley Dreamtech	
4	Distributed Network Management	Paul, John Wiley	

CS-446 N **Object Oriented Analysis and Design** **Credit 4 (3-1-0)**

Unit-I Introduction to OOAD What is OOAD? What is UML? What are the United process(UP) phases Case study the NextGen POS system, Inception Use case Modeling Relating Use cases include, extend and generalization.

Unit-II Elaboration Domain Models Finding conceptual classes and description classes Associations Attributes Domain model refinement Finding conceptual class hierarchies Aggregation and Composition UML activity diagrams and modeling

Unit-III System sequence diagrams - Relationship between sequence diagrams and use cases Logical architecture and UML package diagram Logical architecture refinement UML class diagrams - UML interaction diagrams

Unit-IV GRASP: Designing objects with responsibilities Creator – Information expert Low Coupling Controller High Cohesion Designing for visibility Applying GoF design patterns – adapter, singleton, factory and observer patterns.

Unit-V UML state diagrams and modeling Operation contracts Mapping design to code UML deployment and component diagrams

S. No	Title	Author	Publisher
1	Applying UML and Patterns: An Introduction to object-oriented Analysis and Design and iterativedevelopment	Craig Larman	Third Edition, Pearson Education
2	Object-Oriented Analysis & Design: Understanding System Development with UML 2.0	Mike O'Docherty	John Wiley & Sons
3	Java Design Patterns – A Tutorial	James W- Cooper	Wesley

CS-447N Parallel Computing and Algorithms Credits 4(3-1-0)

UNIT 1: Introduction: Sequential model, need of alternative model, Parallel processing terminology, c ontrasting pipelining and data parallelism, control parallelism, scalability, sieve of Eratosthenes.

UNIT 2: PRAM algorithms: model of serial computation, PRAM model of parallel computation, PRAM algorithms: Parallel reduction, prefix sums, List ranking, preorder tree traversal, merging two sorted lists.

UNIT 3: Processor Arrays and Multiprocessors: Processor organizations: Mesh networks, Binary tree network, Hypertree network, Pyramid network, Buttefily network, hypercube network, Cube Connected Cycle, Shuffle Exchange network, de Bruijn network, Mapping data to processors on processor arrays and multicomputers. Multiprocessors: UMA and NUMA.

UNIT 4: Matrix Multiplication: sequential multiplication, Matrix Multiplication on 2D mesh, Hypercube and shuffle exchange SIMD model, Algorithm for Multiprocessors.

UNIT 5: Parallel Sorting Algorithm: Enumeration sort, lower bound on parallel sorting, odd-even transposition sort, Bitonic merge.

UNIT 6: Graph Algorithms – searching a graph, Connected components.

References:

1) M.J. Quinn, –Designing Efficient Algorithms for Parallel Computer‖ by Mc Graw Hill.

2) S.G. Akl, –Design and Analysis of Parallel Algorithms‖

3) S.G. Akl, ‖Parallel Sorting Algorithm‖ by Academic Press.

CS-448 N Digital Image Processing Credit 4 (3-1-0)

Unit 1: **Introduction and Fundamentals** Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization. **Image Enhancement in Spatial** Domain Introduction; Basic Gray Level Functions – Piecewise- Linear Transformation Functions: Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations – Image Subtraction, Image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter; Sharpening – The Laplacian.

Unit 2: **Image Enhancement in Frequency Domain** Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters – Low-pass, High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters – Gaussian Lowpass Filters; Sharpening Frequency Domain Filters – Gaussian Highpass Filters; Homomorphic Filtering.
Image Restoration A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering – Mean Filters: Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters – Median Filter, Max and Min filters; Periodic Noise Reduction by Frequency Domain Filtering – Bandpass Filters; Minimum Mean-square Error Restoration.

Unit 3: **Color Image Processing** Color Fundamentals, Color Models, Converting Colors to different models, Color Transformation, Smoothing and Sharpening, Color Segmentation.
Morphological Image Processing Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening

Unit 4: **Registration** Introduction, Geometric Transformation – Plane to Plane transformation, Mapping, Stereo Imaging – Algorithms to Establish Correspondence, Algorithms to Recover Depth
Segmentation Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding, Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following, Edge Elements Extraction by Thresholding, Edge Detector Performance, Line Detection, Corner Detection.

Unit 5: **Feature Extraction** Representation, Topological Attributes, Geometric Attributes **Description** Boundary-based Description, Region-based Description, Relationship.
Object Recognition Deterministic Methods, Clustering, Statistical Classification, Syntactic Recognition, Tree Search, Graph Matching

Referenced Text Books

S.no	Title of Book	Author Name	Publisher of Book
1	Digital Image Processing	Rafael C. Gonzalvez and Richard E. Woods	Pearson Education
2	Digital Image Processing and Computer Vision	R.J. Schalkoff.	John Wiley and Sons
3	Fundamentals of Digital Image Processing	A.K. Jain	Prentice Hall, Upper Saddle River, NJ

CS-449 N **Business Environment** **Credit 4 (3-1-0)**

Unit-I Business Environment - Meaning, Importance, Environmental Factors, Recent Political Environment, Recent Economic and Financial Environment, Planning In India – Planning Commision - Liberalisation and Planning,
Industrial Policy: New trade policy – 1991 onwards, Industrial Licensing in India

Unit-II Indian Financial System : Monetary And Fiscal Policy,Economic Trends , Price Policy,Stock Exchange Of
India , Role of regulatory instituions in Indian financial system – RBI and SEBI , National Income,Role of
Industry in Economic Development, Foreign Trade and Balance of Payment,Poverty in India, Unemployment in India,
Inflation, Human Development, Rural Development, Problems of Growth

Unit-III Direct & Indirect Taxes (MODVAT),(CENVAT),Competition Act 2002 & FEMA Acts ,Business Ethics,
Corporate Governance, Philosophy and strategy of planning in India.

Unit-IV Liberalisation, Privatization and Disinvestmen
ts, Special Economic Zone (SEZ)and their role and impact in International Business Environment,World Trade Organisation (WTO), Redefining Value Preposition to MSMEs

Unit-V Social Responsibility of business enterprises, New Economic Policy, Globalization, EXIM policy
and role of EXIM bank, FDI policy, Multinational Corporation (MNCs) and Transnational Corporations (TNCs), Global
Competitiveness, technology and competitive advantage, technology transfer - importance and types,
Appropriate technology and technology adaptation.

S. No	Title	Author	Publisher
1	Business Environment	Shaikh & Saleem	Pearson,
2	Business Environment, Text and Cases	Francis Cherunilam	Himalaya Publishing House
3	Business Environment	Mittal	Excel Books
4	usiness Environment	Fernando	Prentice hall

CS-450 N **Fault Tolerance computing** **Credit 4(3-1-0)**

Unit 1 INTRODUCTION: Fundamental terminology, Objective of Fault Tolerance, Applications of Fault-Tolerant computing, Reliability, Safety, Availability and Maintainability Modeling using Markov chain, Dependability Evaluation technologies, Failure rate, reliability function. Mean time to Failure (MTTF), Mean Time between, failures (MTBF) Mean time to Repair (MTTR)

Unit 2 Architecture of Fault Tolerant Computer: Taxonomy, Fault Avoid ance Techniques, Fault Detection at IBM, Dynamic redundancy in multiple computer system & Recovery on Time and Space, Fault, Detection Techniques, Detection of errors in Data Management, Component Fault Detection, Detection Tests at System level.

Unit 3 Reliable Design and Fault Diagnosis: Hazard, Fault Detection in Combinational circuits, fault location Experiments, Boolean Differences, Fault Detection by Path Sensitizing.

Unit 4 Coding Theory For Fault-Tolerant System: Error models, Basic structural properties of parity check codes, Matrix description of parity check codes, vectorspace properties of parity check codes Error checking the syndrome, Group properties of Parity check codes, Distance properties of parity check codes Polynomial algebra and cyclic codes, Hamming single error correcting codes, Unidirectional error correcting and Detecting codes, Asymnetric Errorcorrecting codes, single-Asymmetric error correcting code.

Unit 5 Software Design Faults: Approaches for uniprocess software: Exception Handling Framework, Recovery Block Approach, N-version Programming. Backward Recovery in Concurrent systems: Domino Effect, Conversations, and FT-Actions, Conversation using monitors, Using Distributed-Action. Forward recovery in concurrent Systems: Exception Resolution Exception Handling with FT-Action.

S. No	Title	Author	Publisher
1	Fault Tolerance Computing: Fundamental Concepts	V. Nelson	IEEE Computer
2	Design and analysis of reliable and fault tolerance Computed Systems	Mustafa Abd-El-Barr	Imperial College Press
3	Fault tolerance Computing	Dhiraj K. Pradhan, Jacob A. Abraham	Prentic Hall

CS-451N Wireless Network and Mobile Computing Credits 4(3-1-0)

UNIT-1 Overview of wireless communication: History, Different Generations, General characteristics of mobile devices, Electromagnetic spectrum, Radio propagation mechanisms, characteristics of wireless medium, wireless topology, cellular system (cell concepts, cell hierarchy, cell fundamentals) Issues in mobile computing: Introduction, functions, 3-Tier architecture, applications and services. GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling Handover, Security.

UNIT-2 WLAN: Technical issue (uses, design goal, types, components and services offered by a typical IEEE 802.11 network), IEEE 802.11 standard (physical layer, MAC layer mechanism & functionalities, CSMA/CA mechanism). HIPERLAN: HIPERLAN standard, HyperLAN/1 (physical layer, DLC & RLC layer, MAC sub-layer), HyperLAN/2 (Physical layer, MAC sub-layer, power conservation issues) BLUETOOTH: Specifications, transport protocol group, middleware protocol group, profile.

UNIT 3: Medium access control (wireless): Motivation for a specialized MAC (hidden and exposed terminals, near and far terminals), SDMA, FDMA, TDMA and CDMA.

UNIT 4: Mobile Network layer: Mobile IP: Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations, and dynamic host configuration protocols (DHCP). Mobile Transport layer: Traditional TCP, Indirect TCP, Snooping TCP,, Mobile TCP, Fast retransmission/ fast recovery, transmission/time-out freezing, selective retransmission, transaction oriented TCP. Wireless Application Protocol WAP: Introduction, protocol architecture and treatment of protocols of all layers.

UNIT-5 Introduction & issues in Ad Hoc wireless networks: introduction (cellular vs ad hoc wireless networks and applications), Medium Access Scheme, Routing, Multicasting, transport layer protocols, Pricing Scheme, QoS provisioning, Self organization, security, addressing and service discovery, energy management, Scalability, deployment considerations, Issues in designing a routing protocol for ad hoc wireless Networks (Mobility, Bandwidth constraint, Error prone shared broadcast radio channel, Hidden & exposed Terminal Problems, Resource Constraints, characteristics of idle routing protocol), Classification of routing protocols: Table-driven routing protocols (DSDV,WRP), On-demand routing protocols (DSR, AODV, LAR).

Text Books:

1. Murthy and Manoj, Ad Hoc Wireless Networks, Pearson Education publication.
2. Jochen Schiller,―Mobile Communications‖,Addison-Wesley.
3. Stojmenovic and Cacute, ―Handbook of Wireless Networks and Mobile Computing‖, Wiley, 2002, ISBN 0471419028.

REFERENCES :

1. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden , Schwiebert, Loren, ―Fundamentals of Mobile and Pervasive Computing‖, ISBN: 0071412379, McGraw-Hill Professional,.
3. Hansmann, Merk, Nicklous, Stober, ―Principles of Mobile Computing‖, Springer,
4. Martyn Mallick, ―Mobile and Wireless Design Essentials‖, Wiley DreamTech,
5. Mobile computing, A. K. talukder and R R Yavagal

CS-452 N **Real Time System** **Credit 4(3-1-0)**

Unit 1 **Introduction to real-time computing**-Structure of a real-time system - Characterization of real-time systems and tasks - Performance measures.

Unit 2 **Task Assignment and Scheduling**- Uniprocessor scheduling algorithms - Task assignment - Mode changes - Fault tolerant scheduling.

Unit 3 **Real-time Communication**- Network topologies and architecture issues - Protocols - Contention-based, token-based, polled bus - Fault tolerant routing.

Unit 4 **Real-time Databases**- Transaction priorities and aborts - Concurrency control issues - Scheduling algorithms - Two-phase approach to improve predictability.

Unit 5 **Programming Languages and Tools**- Hierarchical decomposition - Run-time error handling - Overloading - Timing specification - Recent trends and developments.

S. No	Title	Author	Publisher
1	Real-Time Systems	C. M. Krishna and Kang G. Shin	McGraw Hill
2	Real-Time Systems	Jane W.S. Liu	Prentice Hall.
3	Real-Time Systems ‖Theory and Practice ‖	Ragib Mall	Preason

CS-454 N Computational Geometry Credit 4(3-1-0)

Unit 1 INTRODUCTION: Application Domains–Line Segment Intersection–Intersection of Convex Polygons Polygon Triangulation

Unit 2 GEOMETRIC SEARCHING: Geometric Searching –Range Searching –Kd-Trees –Range trees –Point-Location Problems

Unit 3 CONVEX HULL PROBLEM: Convex hull Problem –Preliminaries –Convex hull Algorithms in the Plane –Graham's scan -Jarvis's March –Quick Hull –Divide-and-conquer – Dynamic Convex Hull Maintenance –Delaunay Triangulation

Unit 4 PROXIMITY PROBLEMS: Proximity Problems –Fundamental Algorithms (Closest Pair – All Nearest Neighbors – Euclidean Minimum Spanning Tree –Nearest Neighbor Search) – Lower bounds – Closest Pair Problem : A Divide – and -Conquer Approach

Unit 5 VORONOI DIAGRAM: Voronoi Diagram – Proximity Problems Solved by the Voronoi Diagram –Planar Applications

S. No	Title	Author	Publisher
1	Computational Geometry: An Introduction	Franco P. Preparata, Michael I. Shamos,	Springer, 1985
2	Computational Geometry: Algorithms and Applications	Mark de Berg, Otfried Cheong, Marc van Kreveld, Mark Overmars	Springer, 3rd edition, 2008
3	Computational Geometry,	Satyan L. Devadoss and Joseph O'Rourke, Discrete and	Princeton University Press, 2011.
4	Algorithms in Combinatorial Geometry, EATCS Monographs in Computer Science	Herbert Edelsbrunner	Springer Verlag, 1987

CS-456 N Natural Language Processing Credit 4(3-1-0)

Unit 1 Introduction to Natural Language Understanding: The study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Background: An outline of English syntax.

Unit 2 Introduction to semantics and knowledge representation, Some applications like machine translation, database interface.

Unit 3 Grammars and Parsing: Grammars and sentence Structure, Top-Down and Bottom-Up Parsers, Transition Network Grammars, Top-Down Chart Parsing. Feature Systems and Augmented Grammars: Basic Feature system for English, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks.

Unit 4 Grammars for Natural Language: Auxiliary Verbs and Verb Phrases, Movement Phenomenon in Language, Handling questions in Context-Free Grammars. Human preferences in Parsing, Encoding uncertainty, Deterministic Parser.

Unit 5 Ambiguity Resolution: Statistical Methods, Probabilistic Language Processing, Estimating Probabilities, Part-of-Speech tagging, Obtaining Lexical Probabilities, Probabilistic Context-Free Grammars, Best First Parsing. Semantics and Logical Form, Word senses and Ambiguity, Encoding Ambiguity in Logical Form.

S. No	Title	Author	Publisher
1	NLP: A Paninian Perspective	Akshar Bharti, Vineet Chaitanya and Rajeev Sangal	Prentice Hall, New Delhi
2	Natural Language Understanding	James Allen	Pearson Education
3	Speech and Language Processing	D. Jurafsky, J. H. Martin	Pearson Education
4	Language as a Cognitive Process	T. Winograd	Wesley

CS-457 N Pattern Recognition and Classification Credit 4(3-1-0)

Unit 1 **Introduction:** Basics of pattern recognition, Design principles of pattern recognition system, Learning and adaptation, Pattern recognition approaches, Mathematical foundations Linear algebra, Probability Theory, Expectation, mean and covariance, Normal distribution, multivariate normal densities, Chi squared test.

Unit 2 Statistical Patten Recognition: Bayesian Decision Theory, Classifiers, Normal density and discriminate functions,

Unit 3 Parameter estimation methods: Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods - Principal Component Analysis (PCA), Fisher Linear discriminate analysis, Expectation-maximization (EM), Hidden Markov Models (HMM), Gaussian mixture models.

Unit 4 Nonparametric Techniques: Density Estimation, Parzen Windows, K-Nearest Neighbor Estimation, Nearest Neighbor Rule, Fuzzy classification.

Unit 5 Unsupervised Learning & Clustering: Criterion functions for clustering, Clustering Techniques: Iterative square - error partitional clustering – K-means, agglomerative hierarchical clustering, Cluster validation.

S. No	Title	Author	Publisher
1	**Pattern Recognition**	Richard O. Duda, Peter E. Hart and David G. Stork	John Wiley
2	Pattern Recognition and Machine Learning	C. M. Bishop	Springer
3	Pattern Recognition	S. Theodoridis and K. Koutroumbas	Academic Press

CS-458 N **Embedded System** **Credit 4(3-1-0)**

Unit 1 Introduction to embedded systems: Classification, Characteristics and requirements

Unit 2 Timing and clocks in Embedded systems, Task Modeling and management, Real time operating system issues.

Unit 3 Signals, frequency spectrum and sampling, digitization (ADC, DAC), Signal Conditioning and Processing. Modeling and Characterization of Embedded Computation System.

Unit 4 Embedded Control and Control Hierarchy, Communication strategies for embedded systems: Encoding and Flow control.

Unit 5 Fault-Tolerance Formal Verification.

S. No	Title	Author	Publisher
1	Embedded System	Raj Kamal	TMH
2	Embedded System	A.P Godse, A.O Mulani	Technical Publication
3	Intro To Embedded System	Shibu	TMH

CS-460 N **Formal Methods** **Credit 4(3-1-0)**

Unit 1 INTRODUCTION: Need for Formal methods Problems in Natural Language Specifications, Formal Versus Informal Programming Advantages of Formal Methods Requirements of Formal System Types Prepositional Logic Predicate Logic Relationships and Functions.

Unit 2 FORMAL SPECIFICATION STYLE: Model Oriented Specifications Concurrency Based Specifications Example Specification Languages.

Unit 3 VDM: Introduction to VDM Basic Types Quote Types Compound Types Optional Types Functions Operations Additional Constructs Modules.

Unit 4 THE Z NOTATION The Interchange Language User-Defined Identifiers Data Types Basic Types Compound Types Schemas Additional Constructs.

Unit 5 FORMAL SEMANTICS AND TOOLS: Operational Semantics Denotational Semantics Axiomatic Semantics Proof Editors Proof Analyser Symbolic Simulators Translators Test Generation Tools.

S. No	Title	Author	Publisher
1	Formal Methods: Fact File VDM and Z	Andrew Harry	John Wiley and Sons
2	Using Z Specification, Refinement and Proof	Jim Woodcock, Jim Davies	Prentice Hall International

CS-462 N **Information retrieval System** **Credit 4(3-1-0)**

Unit 1 Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.
Information Retrieval System Capabilities: Search, Browse, Miscellaneous Cataloging and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction.

Unit 2 Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

Unit 3 Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.

Unit 4 User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, Weighted searches of Boolean systems, Searching the Internet and hypertext. Information Visualization: Introduction, Cognition and perception, Information visualization technologies.

Unit 5 Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems.
Information System Evaluation: Introduction, Measures used in system evaluation, Measurement example TREC results.

S. No	Title	Author	Publisher
1	Information Retrieval Systems: Theory and Implementation	Kowalski, Gerald, Mark T Maybury	Kluwer Academic Press,
2	Information Retrieval Data Structures and Algorithms,	Frakes, W.B., Ricardo Baeza-Yates	Prentice Hall,
3	Modern Information Retrival	Yates	Pearson Education.
4	Information Storage & Retieval	Robert Korfhage – John	Wiley & Sons.

CS-463 N **Bioinformatics** **Credit 4(3-1-0)**

Unit 1 Introduction Bioinformatics objectives and overviews, Interd isciplinary nature of Bioinformatics, Data integration, Data analysis, Major Bioinformatics databases and tools. Metadata: Summary & reference systems, finding new type of data online. Molecular Biology and Bioinformatics: Systems approach in biology, Central dogma of molecular biology, problems in molecular approach and the bioinformatics approach, Overview of the bioinformatics applications.

Unit 2 The Information Molecules and Information Flow Basic chemistry of nucleic acids, Structure of DNA, Structure of RNA, DNA Replication, -Transcription, -Translation, Genes- the functional elements in DNA, Analyzing DNA,DNA sequencing. Proteins: Amino acids, Protein structure, Secondary, Tertiary and Quaternary structure, Protein folding and function, Nucleic acid-Protein interaction.

Unit 3 Perl Basics, Perl applications for bioinformatics- Bioperl, Linux Operating System, Understanding and Using Biological Databases, Java clients, CORBA, Introduction to biostatics.

Unit 4 Nucleotide sequence data Genome, Genomic sequencing, expressed sequence tags, gene expression, transcription factor binding sites and single nucleotide polymorphism. Computational representations of molecular biological data storage techniques: databases (flat, relational and object oriented), and controlled vocabularies, general data retrieval techniques: indices, Boolean search, fuzzy search and neighboring, application to biological data warehouses.

Unit 5 Biological data types and their special requirements: sequences, macromolecular structures, chemical compounds, generic variability and its connection to clinical data. Representation of patterns and relationships: alignments, regular expressions, hierarchies and graphical models.

S. No	Title	Author	Publisher
1	Developing Bio informatics computer skills	O'Reilly	Indian Edition's publication
2	Bioinformatics concepts, skills &Applications	Rastogi, Mendiratta, Rastogi,	CBS Publishers
3	Bioinformatics Basic Applications	Rashidi, Hooman and Lukas K. Buehler	CRC Press
4	Bioinformatics	Addison Wesley	

CS-464 N **Modeling and Simulation** **Credit 4(3-1-0)**

Unit 1 System definition and components, stochastic activities, continuous and discrete systems, System modeling, Types of models, static and dynamic physical models, static and dynamic mathematical models, full corporate model, types of system study.

Unit 2 System simulation, Need of simulation, Basic nature of simulation, techniques of simulation, comparison of simulation and analytical methods, types of system single-server queuing system and an inventory problem, Monte-Carlo simulation, Distributed Lag model, Cobweb model.

Unit 3 Simulation of continuous Systems, analog vs digital simulation, simulation of water reservoir system, simulation of a servo system, simulation of an auto-pilot. Discrete system simulation, fixed time-step vs event to event model, generation of random numbers, test of randomness, Monte-Carlo computation vs stochastic simulation.

Unit 4 System dynamics, exponential growth models, exponential decay models, logistic curves, system dynamics diagrams, world model.

Unit 5 Simulation of PERT networks, critical path computation, uncertaintities in activityduration, resource allocation and consideration, Simulation languages, object oriented simulation.

S. No	Title	Author	Publisher
1	System Simulation	Geoftrey Gordon	PHI
2	System Simulation with digital computer	Narsingh Deo	PHI
3	Simulation Modelling and Analysis	Averill M. Law, W. David Kelton	TMH

CS-465 N # GIS and Remote Sensing **Credit 4 (3-1-0)**

Unit 1 **GEOGRAPHIC INFORMATION SYSTEM:** Geographic Information System: Introduction, GIS categories, Components of GIS, Fundamental operations of GIS, A theoretical framework for GIS. Types of data representation- Data collection data input and output. Mannual Digitizing and Scanning.GIS Data File Management; Layer based GIS, Feature based GIS mapping. Data storage – Raster, Vector and Attribute data storage, Overview of the Data Manipulation and Analysis. Integrated Analysis of the Spatial and Attribute Data. Integration of RS, GIS & GPS.

Unit 2 **PHOTOGRAMMETRY & REMOTE SENSING :**Introduction – Principle and Types of Aerial Photographs, Stereoscopy, Scale of a Vertical Aerial Photograph, Map Vs Aerial Photographs, Mosaic, Ground Control, Parallax Measurements for height. Basic concepts and foundation of Remote Sensing – Elements involved in Remote Sensing , Electromagnetic Spectrum, Physics of Remote Sensing, Energy Interactions with Earth Surface Features of Vegetation, Water and Soil, Energy Interactions with Atmosphere.

Unit 3 **SATELLITES & SENSORS:** Satellite and Sensor characteristics of LANDSAT series, SPOT, IRS, IKONOS & QUICKBIRD. Visual Interpretation Keys – Converging Evidence.

Unit 4 **ENVIRONMENTAL AND TRANSPORTATION ENGINEERING APPLICATIONS:** Air pollution – Detection & Identification of pollution sources of Water Water quality Mapping& Monitoring, Environmental Impact Assessment Highway alignment-urban Planning and Infrastructure Development.

Unit 5 **WATER RESOURCES APPLICATIONS:** Land use/Land cover, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring. Watershed management for sustainable development and Watershed characteristics Reservoir sedimentation, Identification of suitable sites for Ground water & identification of sites for artificial recharge structures, Drainage morphometry, water depth estimation and bathymetry.

S. No	Title	Author	Publisher
1	Remote Sensing and Image Interpretation	Lillesand and Kiefer	John Wiley and Sons
2	Remote Sensing and Geographical Information systems	M.Anji Reddy	B.S.Publications
3	Remote Sensing and Geographical Information System	A.M. Chandra, S.K. Ghosh	Narosa Publishing house
4	Fundamental of GIS	Micheal N Demers	JohnWiley & Sons

CS-466 N **Operational Research** **Credit 4(3-1-0)**

Unit 1 Introduction: Definition and scope of operations research (OR) , OR model, solving the OR model, art of modeling, phases of OR study.
Linear Programming: Two variable Linear Programming model and Graphical method of solution, Simplex method, Dual Simplex method, special cases of Linear Programming, duality, sensitivity analysis.

Unit 2 Transportation Problems: Types of transportation problems, mathematical models , transportation algorithms.
Assignment: Allocation and assignment problems and models, processing of job through machines.

Unit 3 Network Techniques: Shortest path model, minimum spanning Tree Problem, Max-Flow problem and Min-cost problem.
Project Management: Phases of project management, guidelines for network construction, CPM and PERT.

Unit 4 Theory of Games : Rectangular games, Minimax theorem, graphical solution of 2 x n or m x 2 games, game with mixed strategies, reduction to linear programming model.
Quality Systems: Elements of Queuing model, generalized poi sson queing model, single server models.

Unit 5 Inventory Control: Models of inventory, operation of inventory system, quantity discount. Replacement: Replacement models: Equipments that deteriorate with time, equipment that fail with time.

S. No	Title	Authors	Publisher
1	Operations Research	Wayne L. Winston	Thomson Learning
2	Operations Research -An Introduction	Hamdy H. Taha	Pearson Education,
3	Operations Research	R. Panneer Seevam	PHI Learning
4	Total Quality Management	V.K.Khanna	New Age International

CS-467N **Cyber Security/Information Security** **Credit 4(3-1-0)**

Unit 1: Introduction to Information System, Type of information system, Development of information system, CIA model of Information Characteristics, Introduction to Information Security, Need of Information Security, Cyber Security, Business need, Ethical and Professional issues of security.

Unit 2: Information Security Model, Component of an Information security, Aspect of information security, Security attacks (Active and Passive Attacks), Security mechanism and Security Services (X.800).

Unit 3: Information Security Techniques, Introduction to Cryptography: Terminology, cryptanalysis, Security of algorithms, Substitution Cipher and Transposition Cipher, Single XOR , One-way Pad**,** Cryptographic Protocols: Arbitrated and Adjudicated Protocol, One- Way Hash function, Public key cryptography, Digital Signature, Digital Watermarking Technique: Characteristics and Types.

Unit 4: Security Policies, Why Policies should be developed, WWW policies, Email Security policies, Policy Review Process-Corporate policies- Sample Security Policies.

Unit 5: Information Security Standards-ISO, IT Act 2000 Provisions: Introduction to digital law(cyber law, Intellectual Property, Copyright Law, Patent Law, Software License).

S. No	Title	Authors	Publisher
1	Applied Cryptography	Bruce Schneier, john biley & Sons	
2	Hand book of information security management	Micki Krause, Harold F tipton	CRC Press LLC
3	Network Security and Cryptography	William Stalling	