EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
II-YEAR (III-SEMESTER)
(Effective from session: 2022-23)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME					
						SESSIONAL EXAM			ESE	Subject Total	Credits
			L	T	P	CT	TA	Total			
THEORY											
1.	TCS-231	DATA STRUCTURE	3	1	0	30	20	50	100	150	3
2.	TCS-232	DISCRETE STRUCTURE	3	1	0	30	20	50	100	150	3
3.	TCS-233	DATABASE MANAGEMENT SYSTEM	3	1	0	30	20	50	100	150	3
4.	TEC-232	DIGITAL ELECTRONICS	3	1	0	30	20	50	100	150	3
5.	TCS-234	PYTHON PROGRAMMING	3	1	0	30	20	50	100	150	3
6.	TAH-234	CONSTITUTION OF INDIA	2	0	0	30	20	50	100	150	0
PRACTICAL											
7.	PCS-231	DATA STRUCTURE LAB	0	0	2	10	15	25	25	50	1
8.	PCS-233	DATABASE MANAGEMENT SYSTEM LAB	0	0	2	10	15	25	25	50	1
9.	PES-232	DIGITAL ELECTRONICS LAB	0	0	2	10	15	25	25	50	1
10.	PCS-232	INDUSTRIAL TRAINING	0	0	2	0	50	50	0	50	1
11.	PCS-234	PYTHON PROGRAMMING LAB	0	0	2	0	50	50	0	50	1
12.	GPP 231	GENERAL PROFICIENCY	0	0	0	0	50	50	0	50	0
SEMESTER TOTAL			**17**	**5**	**10**	**210**	**315**	**525**	**675**	**1200**	**20**

EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
II-YEAR (IV-SEMESTER)
(Effective from session: 2022-23)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME					
						SESSIONAL EXAM			ESE	Subject Total	Credits
			L	T	P	CT	TA	Total			
THEORY											
1.	TCS-241	COMPUTER ORGANIZATION & ARCHITECTURE	3	1	0	30	20	50	100	150	3
2.	TCS-242	OPERATING SYSTEMS	3	1	0	30	20	50	100	150	3
3.	TCS-243	OBJECT ORIENTED PROGRAMMING	3	1	0	30	20	50	100	150	3
4.	TCS-244	THEORY OF COMPUTATION	3	1	0	30	20	50	100	150	3
5.	TAH-243	STATISTICAL METHODS	3	1	0	30	20	50	100	150	3
6.	TAH-246	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	2	0	0	30	20	50	100	150	0
PRACTICAL											
7.	PCS-241	COMPUTER ORGANIZATION & ARCHITECTURE LAB	0	0	2	10	15	25	25	50	1
8.	PCS-242	OPERATING SYSTEMS LAB	0	0	2	10	15	25	25	50	1
9.	PCS-243	OBJECT ORIENTED PROGRAMMING LAB	0	0	2	10	15	25	25	50	1
10.	PCS-244	UNIX/LINUX PROGRAMMING LAB	1	0	2	10	15	25	25	50	2
11.	GPP 241	GENERAL PROFICIENCY	0	0	0	0	50	50	0	50	0
SEMESTER TOTAL			**18**	**5**	**8**	**220**	**240**	**450**	**700**	**1150**	**20**

EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
III-YEAR (V-SEMESTER)
(Effective from session: 2023-24)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME					
						SESSIONAL EXAM			ESE	Subject Total	Credits
			L	T	P	CT	TA	Total			
THEORY											
1.	TCS-351	DESIGN & ANALYSIS OF ALGORITHMS	3	1	0	30	20	50	100	150	3
2.	TCS-352	JAVA PROGRAMMING	3	1	0	30	20	50	100	150	3
3.	TCS-353	COMPILER DESIGN	3	1	0	30	20	50	100	150	3
4.	TCS-354	COMPUTER NETWORKS	3	1	0	30	20	50	100	150	3
5.	ECS-31X	ELECTIVE-I	3	1	0	30	20	50	100	150	3
PRACTICAL											
6.	PCS-351	DESIGN & ANALYSIS OF ALGORITHMS LAB	0	0	2	10	15	25	25	50	1
7.	PCS-352	JAVA PROGRAMMING LAB	0	0	2	10	15	25	25	50	1
8.	PCS-353	INDUSTRIAL TRAINING	0	0	2	0	50	50	0	50	1
9.	PCS-354	COMPUTER NETWORKS LAB	0	0	2	10	15	25	25	50	1
10.	GPP 351	GENERAL PROFICIENCY	0	0	0	0	50	50	0	50	0
SEMESTER TOTAL			**15**	**5**	**8**	**180**	**245**	**425**	**575**	**1000**	**19**

ELECTIVE-I

ECS-311 GRAPH THOERY

ECS-312 QUEUING THEORY AND MODELING

ECS-313 FAULT TOLERANT COMPUTING

ECS-314 COMPUTER GRAPHICS

EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
III-YEAR (VI-SEMESTER)
(Effective from session: 2023-24)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME					
						SESSIONAL EXAM			ESE	Subject Total	Credits
			L	T	P	CT	TA	Total			
THEORY											
1.	TCS-361	ARTIFICIAL INTELLIGENCE	3	1	0	30	20	50	100	150	3
2.	TCS-362	WEB TECHNOLOGY	3	1	0	30	20	50	100	150	3
3.	TCS-363	SOFTWARE ENGINEERING	3	1	0	30	20	50	100	150	3
4.	TAH-362	ORGANIZATIONAL BEHAVIOUR	2	3	0	30	20	50	100	150	2
5.	ECS-32X	ELECTIVE-II	3	1	0	30	20	50	100	150	3
6.	ECS-33X	ELECTIVE-III	3	1	0	30	20	50	100	150	3
PRACTICAL											
7.	PCS-361	ARTIFICIAL INTELLIGENCE LAB	0	0	2	10	15	25	25	50	1
8.	PCS-362	WEB TECHNOLOGY LAB	0	0	2	10	15	25	25	50	1
9.	PCS-363	SOFTWARE ENGINEERING LAB	0	0	2	10	15	25	25	50	1
10.	PCS-364	MINI PROJECT	0	0	4	-	-	50	50	100	2
11.	GPP 361	GENERAL PROFICIENCY	0	0	0	0	50	50	0	50	0
SEMESTER TOTAL			**17**	**8**	**08**	**210**	**275**	**475**	**725**	**1200**	**22**

ELECTIVE-II
ECS-321 CRYPTOGRAPHY & NETWORK SECURITY
ECS-322 DISTRIBUTED SYSTEMS
ECS-323 REAL TIME SYSTEM
ECS-324 DATA SCIENCE
ECS-325 MICROPROCESSORS

ELECTIVE-III
ECS-331 INTERNET OF THINGS
ECS-332 AD-HOC AND SENSOR NETWORKS
ECS-333 QUANTUM COMPUTING
ECS-334 AUGEMENTED REALITY (AR)/VIRTUAL REALITY (VR)
ECS-335 FUZZY LOGIC

EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
IV-YEAR (VII-SEMESTER)
(Effective from session: 2024-25)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME					
						SESSIONAL EXAM			ESE	Subject Total	Credits
			L	T	P	CT	TA	Total			
THEORY											
1.	TCS-471	MACHINE LEARNING	3	1	0	30	20	50	100	150	3
2.	ECS-44X	ELECTIVE-IV	3	1	0	30	20	50	100	150	3
3.	ECS-45X	ELECTIVE-V	3	1	0	30	20	50	100	150	3
4.	TOE-XY	OPEN ELECTIVE-I	3	0	0	30	20	50	100	150	2
5.	TAH-473	ENGINEERING ECONOMICS	2	3	0	30	20	50	100	150	2
PRACTICAL											
6.	PCS-471	MACHINE LEARNING LAB	0	0	2	10	15	25	25	50	1
7.	PCS-472	PROJECT-I	0	0	8	-	-	100	100	200	4
8.	PCS-473	INDUSTRIAL TRAINING	0	0	2	0	0	50	0	50	1
9.	GPP 471	GENERAL PROFICIENCY	0	0	0	0	50	50	0	50	0
SEMESTER TOTAL			**14**	**6**	**12**	**160**	**165**	**475**	**625**	**1100**	**19**

ELECTIVE-IV
ECS-441 BLOCKCHAIN
ECS-442 MOBILE COMPUTING
ECS-443MULTI-AGENT INTELLIGENT SYSTEMS
ECS-444 DATA MINING

ELECTIVE-V

ECS-451 SOFT COMPUTING
ECS-452 CLOUD COMPUTING
ECS-453RELIABLE COMPUTING
ECS-454SOFTWARE PROJECT MANAGEMENT

EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
IV-YEAR (VIII-SEMESTER)
(Effective from session: 2024-25)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME					
						SESSIONAL EXAM			ESE	Subject Total	Credits
			L	T	P	CT	TA	Total			
THEORY											
1.	TCS-481	DIGITAL IMAGE PROCESSING	3	1	0	30	20	50	100	150	3
2.	ECS-46X	ELECTIVE-VI	3	1	0	30	20	50	100	150	3
3.	TOE-XY	OPEN ELECTIVE-II	3	0	0	30	20	50	100	150	2
PRACTICAL											
4.	PCS-481	DIGITAL IMAGE PROCESSING LAB	0	0	2	10	15	25	25	50	1
5.	PCS-482	PROJECT-II	0	0	16	-	-	200	200	400	8
6.	PCS-483	SEMINAR	0	0	2	-	-	50	0	50	1
7.	GPP 481	GENERAL PROFICIENCY	0	0	0	0	50	50	0	50	0
SEMESTER TOTAL			**9**	**2**	**18**	**100**	**125**	**475**	**525**	**1000**	**18**

ELECTIVE-VI

ECS-461 EMBEDDED SYSTEM
ECS-462 CYBER SECURITY
ECS-463INFORMATION THEORY AND CODING
ECS-464 DATA ANALYTICS

OPEN ELECTIVE COURSES OFFERED BY CSED

S.NO.	COURSE CODE	COURSE TITLE
1.	TOE-40	DATABASE MANAGEMENT SYSTEM
2.	TOE-41	DATA STRUCTURES
3.	TOE-42	OPERATING SYSTEM
4.	TOE-43	OBJECT ORIENTED PROGRAMMING
5.	TOE-44	COMPUTER NETWORKS
6.	TOE-45	JAVA PROGRAMMING
7.	TOE-46	MACHINE LEARNING
8.	TOE-47	MOBILE COMPUTING
9.	TOE-48	WEB TECHNOLOGY
10.	TOE-49	ADHOC AND SENSOR NETWORK
11.	TOE-50	ARTIFICIAL INTELLIGENCE

EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
I-YEAR (I/II-SEMESTER)
(COMMON FOR ALL BRANCHES)
(Effective from session: 2021-22)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME					
						SESSIONAL EXAM			ESE	Subject Total	Credits
			L	T	P	CT	TA	Total			
THEORY											
1.	TCS-111/121	PROGRAMMING FOR PROBLEM SOLVING	3	1	0	30	20	50	100	150	3
PRACTICAL											
2.	PCS-111/121	PROGRAMMING FOR PROBLEM SOLVING LAB	0	0	2	10	15	25	25	50	1

TCS-111/ 121 Programming For Problem Solving

B.Tech. Semester –I/II (Common to all Branches)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon completion of this course, the students will be able to

- Illustrate the flowchart and design analgorithm for a given problem and to develop C programs using operators
- Develop conditional and iterativestatements to write C programs
- Exercise user defined functions to solvereal time problems
- Use Pointers toaccess arrays, strings and functions.
- Exercise user defined data typesincluding structures and unions and input and output files to solve problems

Unit 1-Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code..

Unit 2-Mathematical Expressions: Arithmetic expressions and precedence ,Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching, Iteration and loops.

Unit 3-Function and Arrays: Function, Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference, Recursion, Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series etc.
Arrays (1-D, 2-D), Character arrays and Strings.

Unit 4-Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection,Quick sort or Merge sort), Step by step working methodology process of (Bubble, Insertion and Selection,Quick sort or Merge sort), Finding roots of equations.

Unit 5-Structure: Structures, Defining structures and Array of Structures,Union, Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation).File handling (only if time is available, otherwise should be done as part of the lab)

Text Books

1. Byron Gottfried, Schaum's Outline of Programming with C,McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, TataMcGraw-Hill

Reference Books

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall ofIndia

PCS-111/121 Programming For Problem Solving Lab

B.Tech. Semester –I/II (Common to all Branches)

L	T	P		
-	-	2	**Class Work**	**:25 Marks**
			Exam.	**:25 Marks**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon completion of this course, the students will be able to

- Develop conditional and iterativestatementsprograms
- Exercise user defined functions to solvereal time problems
- Develop programs using pointers, strings and arrays.
- Develop C programs using pointers andto allocate memory using dynamic memorymanagement functions.
- Exercise files concept to show input andoutput of files in C

Tutorial 1: Problem solving using computers:

Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:

Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:

Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:

Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays: searching, sorting:

Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings

Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:

Lab 7: Simple functions

Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration):
Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls

Lab 10: Recursive functions

Tutorial 11: Pointers, structures and dynamic memory allocation

Lab 11: Pointers and structures

Tutorial 12: File handling:

Lab 12: Fileoperations

TCS-231/TOE-41 Data Structure
B.Tech. Semester –III (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course outcomes:

Upon completion of this course, the students will be able to

- Understand the concept of the algoritm to determine time and computational complexity, dynamic memory management.
- Solve the search probem in real scenario's.
- Understand the data like arrays, linked lists, stack and queues.
- Solve the problems in trees and graphs.
- Understand and implement the algorithms for sorting searching, delection and insertion.

Unit 1-Introduction: Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. **Searching:** Linear Search and Binary Search Techniques and their complexityanalysis.

Unit 2-Stacks and Queues: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and theiranalysis.

Unit 3-Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexityanalysis.

Unit 4-Trees and Graphs: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms andanalysis.**Graph:** Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

Unit 5-Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods,Hashing.

Books

1. An Introduction To Data Structures and Application by Jean Paul Tremblay & Pal G. Sorenson (McGraw Hill)
2. R.L. Kruse, B.P. Leary, C.L. Tondo, Data structure and program design in C , PHI
3. R. B. Patel, Expert Data Structures With C, Khanna Publications, Delhi, India, 3rd Edition 2008.
4. Data Structures using C by A. M. Tenenbaum, Langsam, Moshe J. Augentem, PHI Pub.
5. Data Structures and Algorithms by A. V. Aho, J. E. Hopcroft and T. D. Ullman, Original edition, AddisonWesley, 1999, Low Price Edition.

TCS 232Discrete Structure
B.Tech. Semester –III (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon completion of this course, the students will be able to

- Express it in terms of predicates, quantifiers and logical connectives
- Derive the solution using deductive logic and prove the solution based on logicalinference
- Classify mathematical problem and its algebraicstructure
- Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra
- Develop the given problem as graph networks and solve with techniques of graphtheory

Unit 1- Set Theory: Introduction to set theory, Set operations, Algebra of Sets, Combination of sets, Duality, Finite and infinite sets, Classes of sets, Power sets, Multi sets, Cartesian Product, Representation of relations, Types of relation, Binary relation, Equivalence relations and partitions, Mathematics Induction.

Function and its types: Composition of function and relations, Cardinality and inverse relations, Functions, logic and proofs injective, surjective and bijective functions.

Unit 2- Propositional Calculus: Basic operations; AND(^), OR(v), NOT(~), True value of a compound statement, propositions, tautologies and contradictions.Partial ordering relations and lattices.
Lattice theory: Partial ordering , posets, lattices as posets, propertices of lattices as algebraic systems, sublattices, and some special lattices.

Unit 3-Combinations: The Basic of Counting**,** Pigeonhole Principles,Permutations and Combinations ,Principle of Inclusion and Exclusion.
Recursion and Recurrence Relation:,linear recurrence relation with constant coefficients, Homogeneous solutions, Particular solutions, Total solution of a recurrence relation using generating functions.

Unit 4- Algebraic Structures: Definition, elementary properties of Algebraic structures, examples of a Monoid, sunmonoid, semi group, groups and rings, Homomorphism, Isomorphism and automorphism, Subgroups and Normal subgroups, Cyclic groups, Integral domain and fields, Rings, Division Ring.

Unit 5- Graphs and Trees: Introduction to graphs, Directed and undirected graphs, Homomorphic and Isomorphic graphs, Subgraphs, Cut points and bridges, Multigraph and Weighted graphs, Paths and circuits, Shortest path in weighted graph, Eulerian path and circuits, Hamilton paths and circuits, Planar graphs, Eular's formula, Trees, Rooted trees, Spanning trees and cut-sets, Binary trees and its traversals.

Books

1. Elements of Discrete Mathematics C. L. Liu, 1985, McGraw-Hill.
2. Concrete Mathematics: A Foundation for Computer Science, Ronald Graham, Donald Knuth and Oren Patashik, 1989, Addison-Wesley.
3. Mathematical structures for Computer Science, Judith L. Gersting, 1993, Computer Science Press.
4. Applied discrete structures for Computer Science, Doerr and Levasseur, (Chicago: 1985, SRA)
5. Discrete Mathematics by A. Chtewynd and P. Diggle (Modular Mathematics series), 1995, Edward Arnold, London.
6. Schaums Outline series: Theory and Problems of Probability by S. Lipshutz, 1982, McGraw-Hill Singapore.
7. Discrete Mathematical Structures, B. Kolman and R. C. Busby, 1996, PHI.
8. Discrete Mathematical Structures with Applications to Computers by Trembley&Manohar, 1995, McGraw-Hill.
9. Discrete Mathematics & Structures, SatyenderBal Gupta, 2nd Ed. Luxmi Pub.

TCS-233/TOE-40 Database Management Systems
B.Tech. Semester –III (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon completion of this course, the students will be able to

- Understand the concepts of Database Management System, DDL, DML and requirement design the databases using E R method for real life applications.
- Knowledge and understanding of Relational algebra, Structured Query Language and ability to generate queries for real life applications.
- Knowledge of relational Database design and Improve the database design by normalization and Familiar with the concepts of indexing methods including B tree, and hashing.
- Understanding the concepts of transaction-processing system, ACID (atomicity, consistency, isolation, and durability) properties and concurrency control mechanism.
- Knowledge of advanced topic in DBMS: object oriented, object relational database and various applications

Unit 1-Introductio: Data Abstraction, DataIndependence,Data Definition Language(DDL),Data Manipulation Language(DML), 3 level Database System Architecture.
Database models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulationoperations.

Unit 2-Relational Model: Structure of relational database, Relational Algebra: Fundamental operations, Additional Operations, Extended Relational-Algebra operations, Tuple Relational Calculus – Domain Relational Calculus. SQL: Basic structure, Set operations, Aggregate functions, Null Values, Nested subqueries, Views, Data Definition Language, Embedded SQL, Dynamic SQL, Domain Constraints, Referential Integrity and Triggers.

Unit 3-Relational database design: Functional Dependencies, First, Second, Third Normal Forms, Closure, Armstrong's Axioms, Canonical cover, Decomposition, Properties of Decomposition, Dependency Preservation, Boyce-Codd Normal Form, Fourth Normal Form, Fifth Normal Form.

Unit 4-Transaction processing: Transaction Concepts, ACID Properties, Two Phase Commit, Save Points, Concurrency Control techniques: Locking Protocols, Two Phase Locking, timestamp based protocol, Multi-version and optimistic Concurrency Control schemes, Databaserecovery.

Unit 5-Storage Structure, Query Processing and Advanced database: Storage structures: RAID. File Organization: Organization of Records, Indexing, Ordered Indices, B+ tree Index Files, B tree Index Files.
Query Processing: Overview, Measures of Query Cost, Query optimization.
Advanced Databse: Object-oriented and object relational databases, logical databases, web databases, distributed databases, data warehousing and data mining**.**

Books

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts , 6thEdition,McGraw-Hill.
2. J. D. Ullman, Principles of Database and Knowledge – Base Systems, Vol 1, Computer SciencePress.
3. R. Elmasri and S. Navathe , Fundamentals of Database Systems , 5th Edition, PearsonEducation.
4. Serge Abiteboul ,Foundations of Databases, Reprint, Richard Hull, Victor Vianu,Addison-Wesley

TEC-232 Digital Electronics
B.Tech. Semester –III (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon completion of this course, the students will be able to

- Understand the working of logicgates.
- Understand the working of synchronous and asynchronous counters
- Design and implement Combinational and Sequentiallogiccircuits.
- Understand the process of Analog to Digital conversion and Digital to Analog conversion.
- Use PLDs to implement the given logicalproblem.

Unit 1- Fundamentals of Digital Systems: Digital Systems, Binary number systems and it conversions, logic Gates: AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, canonical and standard form, binary arithmetic, one's and two's complements arithmetic, error detecting and correcting code, BCD, Gray code, Excess 3 code, Standard representation for logic functions, K-map representation, simplification oflogicfunctions using K-map, minimization of logical functions. Don't care conditions,Q-M method (Tabular Method) for boolean function minimization.

Unit 2- Combinational Circuits:, Adders, Subtractors, Multiplexer/De-Multiplexer Encoder/Decoders,BCD arithmetic, Serial Adder, carry look ahead adder,elementary, Magnitude comparator,basic ALU design, Encoder for BCD to seven segment display.

Unit 3- Sequential Logic And Its Applications: Storage elements: latches & flip flops, Characteristic Equations of Flip Flops, Flip Flop Conversion, Shift Registers, Ripple Counters, Synchronous Counters, Other Counters: Johnson & Ring Counter.

Unit 4- Synchronous & Asynchronous Sequential Circuits: Analysis of clocked sequential circuits with state machine designing, State reduction and assignments, Design procedure. Analysis procedure of Asynchronous sequential circuits, circuit with latches, design procedure, Reduction of state and flow table, Race-free state assignment, Hazards.

Unit 5-Memory and Programmable logic: ROM, RAM, PAL, PLA, Implementation of digital functions using PLDs. Introduction to Hardware Description Language, Behavioral, Dataflow and gate level modelling, Simple HDL codes for combinational circuits and sequential circuits

Text/References

1. R. P. Jain, Modern Digital Electronics, McGraw Hill Education,2009.
2. M. M. Mano, Digital logic and Computer design, Pearson Education India,2016.
3. Kumar, Fundamentals of Digital Circuits, Prentice Hall India, 2016.

TCS-234 Python Programming

B.Tech. Semester –III (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes:

- Developessentialprogrammingskillsincomputerprogrammingconceptslikedatatypes
- Applythe basicsofprogramminginthePython language
- Solvecodingtasksrelatedconditionalexecution,loops
- Develop user defined function and standard modules in python programming.
- Solvecodingtasksrelatedtothefundamentalnotionsandtechniquesusedinobject-orientedprogramming.

Unit 1- Introduction andSyntax ofPythonProgram: FeaturesofPython-Interactive,Object oriented,Interpreted,platformindependent, Pythonbuildingblocks -Identifiers,Keywords, Indention, Variables,Comments, Pythonenvironmentsetup -InstallationandworkingofIDE, RunningSimplePythonscriptstodisplay'welcome'message, Python variables, PythonData Types: Numbers,String,Tuples,Lists,Dictionary.Declaration anduseofdatatypes, Built in Functions.

Unit2-PythonOperatorsandControlFlowstatements:Basic Operators:Arithmetic,Comparison/Relational,Assignment,Logical,Bitwise,Membership,Identityoperators,Python OperatorPrecedence, Control Flow: ConditionalStatements(if,if...else,nestedif), Loopinginpython(whileloop,forloop,nestedloops), loopmanipulation usingcontinue,pass,break,else.

Unit 3-DataStructuresinPython: String: Concept,escapecharacters, Stringspecialoperations, Stringformattingoperator, Singlequotes,Doublequotes, Triplequotes, RawString,Unicodestrings, Built-inStringmethods.Lists: Defining lists, accessing values in list, deletingvaluesinlist,updatinglists, BasicListOperations, Built-inListfunctions.Tuples: Accessing values in Tuples, deletingvaluesinTuples,andupdatingTuples, BasicTupleoperations, Built-inTuplefunctions.Sets: AccessingvaluesinSet,deletingvaluesinSetandupdatingSets, BasicSetoperations, Built-inSet functions.Dictionaries: Accessing values in Dictionary, deletingvaluesinDictionaryandupdatingDictionary, BasicDictionaryoperations, Built- inDictionariesfunctions.

Unit 4-
PythonFunctions,modules,andPackages:UseofPythonbuiltinfunctions(e.g.type/dataconversionfunctions,mathfunctionsetc.),zserdefinedfunctions:Functiondefinition,Functioncalling,functionargumentsandparameterpassing,Returnstatement, Scope of Variables: Globalvariable andLocalVariable.Modules:Writingmodules,importingmodules,importingobjectsfrommodules,Pythonbuilt-inmodules(e.g.Numeric and mathematicalmodule,FunctionalProgramming Module), Packages.

Unit 5-Object- Oriented Programming, File I/OHandlingandExceptionHandlingin Python: CreatingClassesandObjects, MethodOverloadingandOverriding, DataHiding, Dataabstraction, Inheritanceandcompositionclasses, Customization via inheritancespecializinginheritedmethods.I/O Operations: Reading keyboard input,Printingtoscreen.File Handling: Opening file in differentmodes,accessingfilecontentsusingstandardlibraryfunctions,Reading,andwritingfiles,closingafile,Renaminganddeleting files, File relatedstandardfunctions.ExceptionHandling:Introduction,Exception handling - 'try: except:'statement,'raise'statement, Userdefinedexceptions.

Text Books:

- Charles R. Severance, “Python for Everybody: Exploring Data Using Python 3”, 1st Edition, CreateSpace Independent Publishing Platform, 2016.
- Allen B. Downey, "Think Python: How to Think Like a Computer Scientist”, 2ndEdition, Green Tea Press, 2015.
- Ch Satyanarayana, “Python Programming”, 1st Edition, universities press (india) private limited 2018.

Reference Books:

- Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley India Pvt Ltd. ISBN-13: 978-8126556014
- Mark Lutz, “Programming Python”, 4th Edition, O’Reilly Media, 2011.ISBN-13: 978-9350232873
- Wesley J Chun, “Core Python Applications Programming”, 3rdEdition,Pearson Education India, 2015. ISBN-13: 978-9332555365
- Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich, “Data Structures and Algorithms in Python”,1stEdition, Wiley India Pvt Ltd, 2016. ISBN-13: 978- 8126562176
- ReemaThareja, “Python Programming using problem solving approach”, Oxford university press, 2017

TAH-234 Constitution of India
B.Tech. Semester –III (Computer Science &Engg.)

L	T	P		
2	-	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

COURSE OBJECTIVE:- The Course aims to develop the critical understanding of Constitutional arrangements in the Country.

UNIT I: INTRODUCTION AND HISTORY OF INDIAN CONSTITUTION: (8 hours)

Constitution: Meaning, Indian Constitution: Sources and constitutional history, Formation of Drafting Committee (Composition and Working)

UNIT II: PHILOSOPHY OF INDIAN CONSTITUTION: (8 hours)

Preamble, Salient features

UNIT III: CONSTITUTIONAL RIGHTS AND DUTIES: (8hours)

Constitution: Meaning and Features, Fundamental Rights and Duties, Right to Equality, Right to Freedom Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy. Fundamental Duties.

UNIT IV: COMPONENTS OF GOVERNANCE (7 hours)

Parliament: Composition, Qualifications and Disqualifications, Powers and Functions, Council of Ministers, Executive: President, Governor, Judiciary, Appointment and Transfer of Judges, Qualifications Powers and Functions

UNIT V: LOCAL ADMINISTRATION AND ELECTION COMMISSION: (8 hours)

District Administration, Municipalities: Role of CEO and elective representatives, Tri-Level Panchayat system: Zila Panchayat, Block and Village and role of appointed and elected officials. Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and functioning.

TEXT BOOKS:

1. 'Indian Polity' by Laxmikanth
2. 'Indian Administration' by Subhash Kashyap
3. 'Indian Constitution' by D.D. Basu
4. 'Indian Administration' by Avasti and Avasti

COURSE OUTCOME:-
CO-1 Ability to understand the concept of Constitution
CO-2 Ability to understand the Role of Indian constitution.
CO-3 Overview of various Constitutional Rights and Duties
CO-4 Ability to understand the Tri-Level Democratic arrangement.
CO-5 Ability to gather the knowledge regarding Administration and Election Commission.

PCS-231 Data Structure Lab
B.Tech. Semester –III (Computer Science &Engg.)

L	T	P		
-	-	2	**Class Work**	**:25 Marks**
			Exam.	**:25 Marks**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs.**

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

- Develop programs using dynamic memory allocation and linked list ADT.
- Apply Stack and Queue to solve problems.
- Implement the concept of hashing in real time dictionaries.
- Identify and implement the suitable data structures for the given problem.
- Solve real world problems by finding minimum spanning tree and Shortest path algorithm.

LIST OF EXPERIMENTS

1. Write programs to implement the following using an array.
    a) Stack ADT
    b) Queue ADT
2. Write programs to implement the following using a singly linked list.
    a) Stack ADT
    b) Queue ADT
3. Write program to implement the deque (double ended queue) ADT using a doubly linked list.
4. Write a program to perform the following operations:
    a) Insert an element into a binary search tree.
    b) Delete an element from a binary search tree.
    c) Search for a key element in a binary search tree.
5. Write a program to implement circular queue ADT using an array.
6. Write a program to implement all the functions of a dictionary (ADT) using hashing.
7. Write a program to perform the following operations on B-Trees and AVL-trees:
    a) Insertion.
    b) Deletion.
8. Write programs for the implementation of BFS and DFS for a given graph.
9. Write programs to implement the following to generate a minimum cost spanning tree:
    a) Prim's algorithm.
    b) Kruskal's algorithm.
10. Write a program to solve the single source shortest path problem.
(Note: Use Dijkstra's algorithm).
11. Write program that uses non-recursive functions to traverse a binary tree in:
    a) Pre-order.
    b) In-order.
    c) Post-order.
12. Write programs for sorting a given list of elements in ascending order using the following sorting methods:
    a) Quick sort.
    b) Merge sort.

PCS-233 Database Management System Lab
B.Tech. Semester –III (Computer Science &Engg.)

L	T	P		
-	-	2	**Class Work**	**:25 Marks**
			Exam.	**:25 Marks**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs.**

COURSE OUTCOMES

Upon successful completion of the course, the students will be able to

- Understand, appreciate and effectively explain the concepts of database Technologies.
- Declare and enforce integrity constraints on a database using RDBMS.
- Devise a complex query using SQL DML/DDL commands.
- Create views and use in-built functions to query a database.
- Write PL/SQL programs including stored procedures, stored functions and triggers.

LIST OF EXPERIMENTS

1. Build the following database schemas and perform the manipulation operations on these schemas using SQL DDL,DML,TCL and DCL commands.

   (I) Database Schema for a customer-sale scenario

   Customer(Custid : integer, cust_name: string)
   Item(item_id: integer, item_name: string, price: integer)
   Sale(bill_no: integer, bill_data: date, cust_id: integer, item_id: integer, qty_sold: integer)

   For the above schema, perform the following:-

   a) Create the tables with the appropriate integrity constraint
   b) Insert around 10 records in each of the tables
   c) List all the bills for the current date with the customer namesand item numbers
   d) List the total Bill details with the quantity sold, price of theitem and the final amount
   e) List the details of the customer who have bought a productwhich has a price>200
   f) Give a count of how many products have been bought byeach customer
   g) Give a list of products bought by a customer having cust_idas 5
   h) List the item details which are sold as of today
   i) Create a view which lists out the bill_no, bill_date, cust_id, item_id, price, qty_sold, amount
   j) Create a view which lists the date wise daily sales for the last one week
   k) Identify the normalization of this schema. Justify your answer.
   l) If the schema is not normalized then normalize the schema.

   (II) Database Schema for a Employee-pay scenario

   Employee(emp_id : integer, emp_name: string)
   Department (dept_id: integer, dept_name:string)
   Paydetails(emp_id : integer, dept_id: integer, basic: integer,deductions: integer, additions: integer, DOJ: date)
   payroll(emp_id : integer, pay_date: date)

   For the above schema, perform the following:—

   a) Create the tables with the appropriate integrity constraints
   b) Insert around 10 records in each of the tables
   c) List the employee details department wise
   d) List all the employee names who joined after particular date

e) List the details of employees whose basic salary is between 10,000 and 20,000
f) Give a count of how many employees are working in each department
g) Give a names of the employees whose netsalary>10,000
h) List the details for an employee_id=5
i) Create a view which lists out the emp_name, department, basic, deductions,netsalary
j) Create a view which lists the emp_name and his netsalary
k) Identify the normalization of this schema. Justify your answer
l) If the schema is not normalized then normalize the schema.

2. Construct a PL/SQL program to find largest number from the given three numbers.
3. Build a PL/SQL program to generate all prime numbers below 100.
4. Construct a PL/SQL program to demonstrate %type and %row type attributes.
5. Develop a PL/SQL procedure to find reverse of a given number.
6. Create a PL/SQL procedure to update the salaries of all employees by 10% in their basic pay.
7. Execute a PL/SQL procedure to demonstrate IN, OUT and INOUT parameters.
8. Design a PL/SQL trigger before/after update on employee table for each row/statement.
9. Create a PL/SQL trigger before/after delete on employee table for each row/statement.
10. Build a PL/SQL trigger before/after insert on employee table for each row/statement.
11. Design and build the following applications using SQL and front end tool and generate report
    - Student information system for your college.
    - Hospital Management System.
    - A video library management system.
    - Inventory management system for a hardware / sanitary item shop.
    - Banking System.
    - Railway Reservation System
    - Car Insurance Company

PEC-232Digital Electronics Lab
B.Tech. Semester –III (Computer Science &Engg.)

L	T	P		
-	-	2	**Class Work**	**:25 Marks**
			Exam.	**:25 Marks**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs.**

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

- Describe the basic concept of Number System and number Conversion.
- Implement different methods used for simplification of Boolean functions.
- Implement the concept of multiplexer
- Implement and analyse the combinational circuits and Sequential circuits.
- Implement synchronous sequential circuits.

LIST OF EXPERIMENTS

1. To verify the De-Morgan's theorems using NAND/NOR gates.
2. To design the full adder and half adder using AND, OR and X- OR gates.
3. To implement the logic circuits using decoder.
4. To implement the logic circuits using multiplexer.
5. To design parity generator and checker circuits.
6. To design and implement RS FLIP FLOP using basic latches.
7. Realization and testing of basic logic gates using discrete components.
8. Realization and testing of CMOS IC characteristics.
9. Realization and testing of TTL IC characteristics.
10. Realization and testing of RAM circuit using IC 7489.
11. Realization and testing of Interfacing of CMOS- TTL and TTL- CMOS ICS.

PCS-232 Industrial Training
B.Tech. Semester –III (Computer Science &Engg.)

L	T	P		
-	-	2	**Class Work**	**:50 Marks**
			Exam.	**:--**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs**

About Industrial Training

It is an organized method or activity of enhancing and improving skill set and knowledge of engineering students which boost their performance and consequently helping them to meet their career objectives.Industrial Training is an essential component in the development of the practical and professional skills required for an Engineer and an aid to prospective employment

Objectives of Industrial Training

- • The main objective of Industrial Training is to expose the students to actual working environment and enhance their knowledge and skill from what they have learned in the college.
- • Another purpose of this program is to enhance the good qualities of integrity, responsibility and self-confidence. All ethical values and good working practices must be followed by student.
- • It is also to help the students about the safety practices and regulations inside the industry and to instill the spirit of teamwork and good relationship between students and employees.

Course Outcomes

At the end of Industrial Training, the students will be able to

- Understand organizational issues and its impact on organization and employees.
- Identify industrial problems and suggest possible solutions.
- Relate, apply and adapt relevant knowledge, concepts and theories within an industrial organization, practice and ethics.
- Apply technical knowledge in an industry to solve real world problems.
- Demonstrate effective group communication, presentation, self-management and report writing skills**.**

PCS-234 PythonProgramming Lab
B.Tech. Semester –III (Computer Science &Engg.)

L	T	P		
-	-	2	**Class Work**	**:25 Marks**
			Exam.	**:25 Marks**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

On completion of the course, the students will be able to

- Run Python Programs at interactive and script mode.
- Implement Python programs with conditionals and loops.
- Develop Python programs stepwise by defining functions and calling them.
- Use Python lists, tuples and dictionaries for representing compound data.
- Read and write data from/to files in Python

List of experiments:

Exercise 1 - Basics

a) Running instructions in Interactive interpreter and a Python Script

b) Write a program to purposefully raise Indentation Error and Correct it

Exercise 2 - Operations

a) Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)

b) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

Exercise - 3 Control Flow

a) Write a Program for checking whether the given number is a even number or not.

b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . , 1/10

c) Write a program using a for loop that loops over a sequence. What is sequence ?

d) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

Exercise 4 - Control Flow - Continued

a) Find the sum of all the primes below two million.

Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:

1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

c) Linear search and Binary search

d) Selection sort, Insertion sort

Exercise - 5 - DS

a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure

b) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

Exercise - 6 DS - Continued

a) Write a program combine_lists that combines these lists into a dictionary.

b) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

Exercise - 7 Files

a) Write a program to print each line of a file in reverse order.

b) Write a program to compute the number of characters, words and lines in a file.

Exercise - 8 Functions

a) Write a function ball_collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.

Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius

If (distance between two balls centers) <= (sum of their radii) then (they are colliding)

b) Find mean, median, mode for the given set of numbers in a list.

Exercise - 9 Functions - Continued

a) Write a function nearly_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.

b) Write a function dups to find all duplicates in the list.

c) Write a function unique to find all the unique elements of a list.

Exercise - 10 - Functions - Problem Solving

a) Write a function cumulative_product to compute cumulative product of a list of numbers.

b) Write a function reverse to reverse a list. Without using the reverse function.

c) Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

Exercise - 11–Python Packages

a) Install packages requests, flask and explore them. using (pip)

b) Plot graphs using python and Matplotlib.

c) Data Analysis using numpy and Pandas Libraries

TCS-241 Computer Organization & Architecture

B.Tech. Semester –IV (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course outcomes

Upon completion of this course, the students will be able to

- Draw the functional block diagram of a single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions.
- Given a CPU organization and instruction, design a memory module and analyze its operation by interfacing with theCPU.
- Design the connection between I/O address from the CPU and the I/O interface.
- Understand the concept of Pipelining and multiprocessor.
- Draw a flowchart for concurrent access to memory and cache coherency in parallel processors.

Unit 1- Functional Blocks of a Computer: CPU, Memory, Input-Output Subsystems, Control Unit. Instruction Set Architecture of a CPU – Registers, Instruction ExecutionCycle, RTL Representation and Interpretation of Instructions, Addressing Modes, Instruction Set. Case Study – Instruction Sets of Some CommonCPUs, RISC and CISC Architecture.

Unit 2- Basic Processing Unit: Signed NumberRepresentation, Fixed Point Arithmetic, Addition and Subtraction of Signed Numbers, Multiplication of Positive Numbers, Signed Operand Multiplication Algorithm,Booth Multiplication Algorithm, division algorithm, floating point numbers and its arithmetic operation. Fundamental Concepts: Execution of a Complete Instruction, Multiple Bus Organization, Hardwired Control, Micro Programmed Control.

Unit 3- Peripheral Devices and their Characteristics: Input-Output Subsystems, I/O Device Interface, I/O Transfers– Program Controlled, Interrupt Driven and DMA, Software Interrupts and Exceptions,Programs and Processes – Role of Interrupts in Process State Transitions, I/O Device Interfaces – SCII, USB.

Unit 4- Pipelining& Multiprocessor: Basic Concepts of Pipelining, Throughput and Speedup, Instruction Pipeline, Pipeline Hazards, Introduction to Parallel Processors, Symmetric Shared Memory and Distributed Shared Memory Multiprocessors, Performance Issues of Symmetric and Distributed Shared Memory, Synchronization.

Unit 5- Memory Organization: Basic Concepts, Concept of Hierarchical Memory Organization, Main Memory: RAM, ROM, Speed, Size and cost, Cache Memory and its Mapping, Replacement Algorithms, Write Policies, Virtual Memory, Memory Management Requirements, Associative Memory, Secondary storage devices.

Books

1. David A. Patterson and John L. Hennessy “Computer Organization and Design: The Hardware/Software Interface” , 5th Edition, Elsevier.
2. M. Morris Mano, “Computer System Architecture”, Third Edition, Pearson Prentice Hall.
3. CarlHamacher“ Computer Organization and EmbeddedSystems” , 6th Edition, McGraw Hill HigherEducation.
4. Miles Murdoccaa and Vincent Heuring“Computer Architecture and Organization: An integrated Approach” 2nd edition,Wiley Publication.

TCS-242/TOE-042 Operating Systems
B.Tech. Semester –IV (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon completion of this course, the students will be able to

- Create processes andthreads.
- Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, ResponseTime.
- Develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the accesstime.
- Design and implement file managementsystem.
- Develop the I/O management functions in OS

Unit 1- Introduction: Concept of Operating Systems, Generationsof Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS -Layered, Microkernel Operating Systems, Concept of Virtual Machine.

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching

Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads,

Unit 2- Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.**Inter-process Communication:** Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer-Consumer Problem, Semaphores, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problemetc.

Unit 3- Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection andRecovery.

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memoryallocation–Fixed and variable partition– Internal and External fragmentation and Compaction; Paging: Principleofoperation – Page allocation –Hardware support for paging, Protection and sharing, Disadvantages ofpaging.

Unit 4- Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used(LRU).

Unit 5- File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed).

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability.

Suggested Books

1. AviSilberschatz, Peter Galvin, Greg Gagne , Operating System Concepts Essentials, 9th Edition by, Wiley Asia StudentEdition.
2. William Stallings , Operating Systems: Internals and Design Principles, 5th Edition, Prentice Hall ofIndia.

TCS-243/TOE-43 Object Oriented Programming
B.Tech. Semester –IV (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon completion of this course, the students will be able to

- Recognise features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on objectidentity.
- Name and apply some common object-oriented design patterns and give examples of theiruse.
- Specify simple abstract data types and design implementations, using abstraction functions to documentthem.
- Design the convenient way for handling of problem using templates and use simple try-catch blocks for Exception Handling.
- Manage I/O streams and File I/O oriented interactions.

Unit 1- Object Oriented Programming Concepts: Classes and Objects, Methods and Messages, Abstraction and Encapsulation, Inheritance, Abstract Classes, Polymorphism. Introduction to C++: Classes and Objects,Structures and Classes, Unions and Classes, Friend Functions, Friend Classes, Inline Functions, Static Class Members, Scope Resolution Operator, Nested Classes, Local Classes, Passing Objects to Functions, Returning objects, object assignment. Arrays, Pointers, References and the Dynamic Allocation Operators: Arrays of Objects, Pointers to Objects, Type Checking, this Pointer, Pointers to Derived Types, Pointers to Class Members, References, Dynamic Allocation Operators.

Unit 2- Function Overloading And Constructors: Function Overloading, Constructors,parameterized constructors,Copy Constructors,Overloading Constructors, Finding the Address of an Overloaded Function, Default Function Arguments, Function Overloading and Ambiguity. Operator overloading: Creating member Operator Function, Operator Overloading Using Friend Function, Overloading New and Delete, Overloading Special Operators, Overloading Comma Operator.

Unit 3- Inheritance And Polymorphism: Inheritance: Base-Class Access Control, Inheritance and Protected Members, Inheriting Muitiple Base Classes, Constructors, Destructors and Inheritance, Granting Access, Virtual Base Classes. Polymorphism: Virtual Functions, Virtual Attribute and Inheritance, Virtual Functions and Hierarchy, Pure Virtual Functions, Early vs. Late Binding, Run-Time Type ID and Casting Operators: RTTI, Casting Operators, Dynamic Cast.

Unit 4- Templates And Exception Handling: Templates: Generic Functions, Applying Generic Functions, Generic Classes, The typename and export Keywords, Power of Templates, Exception Handling: Fundamentals, Handling Derived Class Exceptions, Exception Handling Options, Understanding terminate() and unexpected(), uncaught_exception () Function, exception and bad_exception Classes, Applying Exception Handling.

Unit 5- I/O System Basics: Streams and Formatted 1/O. File I/O: File Classes, File Operations. Namespaces: Namespaces, std Namespace. Standard Template Library: Overview, Container Classes, General Theory of Operation, Lists, string Class, Final Thoughts on STL.

Text Books

1. Herbert Schildt, “C++: The Complete Reference”, 4th Edition, Tata McGraw-Hill, 2003.
2. Paul Deitel, Harvey Deitel, “C++ How to Program”, 8th Edition, Prentice Hall, 2011.

TCS-244 Theory of Computation
B.Tech. Semester –IV (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon completion of this course, the students will be able to

- Write a formal notation for strings, languages andmachines.
- Design finite automata to accept a set of strings of alanguage.
- Design context free grammars to generate strings of context free language
- Determine equivalence of languages accepted by Push Down Automata and languages generated by context freegrammars
- Distinguish between computability and non-computability and Decidability andundecidability.

Unit 1- Introduction: Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages.

Unit 2- Regular languages and finite automata: Regular expressions and languages, deterministic finite automata (DFA) and equivalence with regular expressions, nondeterministic finite automata (NFA) and equivalence with DFA, regular grammars and equivalence with finite automata, properties of regular languages, pumping lemma for regular languages, minimization of finite automata.

Unit 3- Context-free languages and pushdown automata: Context-free grammars (CFG) and languages (CFL), Chomsky and Greibach normal forms, nondeterministic pushdown automata (PDA) and equivalence with CFG, parse trees, ambiguity in CFG, pumping lemma for context-free languages, deterministic pushdown automata, closure properties of CFLs.

Unit 4- Context-sensitive languages: Context-sensitive grammars (CSG) and languages, linear bounded automata and equivalence with CSG. Turing machines: The basic model for Turing machines (TM), Turing-recognizable (recursively enumerable) and Turing-decidable (recursive) languages and their closure properties, variants of Turing machines, nondeterministic TMs and equivalence with deterministic TMs, unrestricted grammars and equivalence with Turing machines, TMs as enumerators.

Unit 4- Undecidability: Church-Turing thesis, universal Turing machine, the universal and diagonalization languages, reduction between languages and Rice s theorem, undecidable problems aboutlanguages.

Books

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.
2. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science,Springer.
3. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing.

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TAH-243 Statistical Methods
B.Tech. Semester –IV (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Unit I: Basic Probability (10 lectures)
Addition and multiplication laws of probability, Conditional probability, independent and dependent events, mutually exclusive events, use of Binomial expansion, Baye's theorem, expectation of random variables.

Unit II: Discrete Random variable and Continuous Random variable (6 lectures) Random variable, types of random variable, mathematical expectation of the sum of two discrete random variable, Continuous random variables, probability density function, expected value of a continuous random variable, constant of continuous probability distribution.

Unit III: Basic Statistics (9 lectures)
Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal, Correlation and regression - Rank correlation, Karl Pearson's coefficient of correlation.

Unit IV: Applied Statistics (8 lectures)
Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas, fitting of the curve $y = ae^{bx}$, fitting of the curve $y = ax+bx^2$, fitting of the curve $y=ax+b/x$. Statistical quality control method, control charts, means chart & R-chart.

Unit V: Sampling Theory (7 lectures)
Sampling: types of sampling, sampling distribution of the variance, testing a hypothesis, Null hypothesis, errors, level of significance, test of significance, confidence limits, test of significance of large samples(N>30), sampling distribution of the proportion, comparison of large samples, the t-distribution for small sample, chi-square test of goodness of fit.

Suggested Text Books/Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal BookStall, 2003 (Reprint).
3. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

TAH-246 Essence of Indian Traditional Knowledge
B.Tech. Semester –IV (Computer Science &Engg.)

L	T	P		
2	-	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

COURSE OBJECTIVE:- The Course aims to develop the critical understanding to get a knowledge of Indian Culture

UNIT I: INTRODUCTIONTON INDIAN CULTURE: (8 hours)

Introduction to Culture: Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India

UNIT II: INDIAN LANGUAGES, CULTURE AND LITERATURE: (8 hours)

Indian Languages and Literature-I: the role of Sanskrit, significance of scriptures to current society, Indian philosophies, other Sanskrit literature, literature of Indian Languages and Literature

UNIT III: RELIGION AND PHILOSOPHY: (8hours)

Religion and Philosophy in ancient India, Religion and Philosophy in Medieval India, Religious Reform Movements in Modern India (selected movements only)

UNIT IV: FINE ARTS IN INDIA (ART, TECHNOLOGY& ENGINEERING): (7 hours)

Indian Painting, Indian handicrafts, Music, Indian Painting, Indian handicrafts, Music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (ancient, medieval and modern), Science and Technology in India

UNIT V: EDUCATION SYSTEM IN INDIA: (8 hours)

Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India

TEXT BOOKS:

1. Kapil Kapoor, “Text and Interpretation: The India Tradition”,ISBN: 81246033375, 2005
2. “Science in Samskrit”, Samskrita Bharti Publisher, ISBN 13: 978-8187276333, 2007
3. NCERT, “Position paper on Arts, Music, Dance and Theatre”, ISBN 81-7450 494-X, 200 4.
4. S. Narain, “Examinations in ancient India”, Arya Book Depot, 1993
5. Satya Prakash, “Founders of Sciences in Ancient India”, Vijay Kumar Publisher, 1989

COURSE OUTCOME:-

CO-1 Understand philosophy of Indian culture.

CO-2 Distinguish the Indian languages

CO-3 Learn the philosophy of ancient, medieval and modern India.

CO-4 Acquire the information about the fine arts in India. Know the contribution of scientists of different eras.

CO-5 To gather the knowledge regarding Administration and Election Commission.

PCS-241 Computer Organization &ArchitectureLab
B.Tech. Semester –IV (Computer Science &Engg.)

L	T	P		
-	-	2	**Class Work**	**:25 Marks**
			Exam.	**:25 Marks**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcome:
Upon successful completion of this course, students should be able to:

- Recognize basic logic gates with IC chips.
- Design combinational circuits using IC Chips.
- Connect the theory of computer organization with hardware.
- Implement the concept of adders
- Apply fundamentals of digital design and extend the learning to design sequential circuits.

LIST OF EXPERIMENTS

1. Implementing HALF ADDER, FULL ADDER using basic logic gates
2. Implementing Binary -to -Gray, Gray -to -Binary code conversions.
3. Implementing 3-8 line DECODER and Implementing 4x1 and 8x1 MULTIPLEXERS.
4. Verify the excitation tables of various FLIP-FLOPS.
5. Design of an 8-bit Input/ Output system with four 8-bit Internal Registers.
6. Design of an 8-bit ARITHMETIC LOGIC UNIT.
7. Design the data path of a computer from its register transfer language description.
8. Design the control unit of a computer using either hardwiring or microprogramming based on its register transfer language description.
9. Write an algorithm and program to perform matrix multiplication of two n * n matrices on the 2-D mesh SIMD model, Hypercube SIMD Model or multiprocessor system.
10. Study of Scalability for Single board Multi-board, multi-core, multiprocessor using Simulator.

PCS-242 Operating SystemsLab
B.Tech. Semester –IV (Computer Science &Engg.)

L	T	P		
-	-	2	**Class Work**	**:25 Marks**
			Exam.	**:25 Marks**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs.**

COURSE OUTCOMES

Upon successful completion of the course, the students will be able to

- Understand the system calls and I/O system calls in UNIX
- Evaluate the process scheduling algorithms FCFS,SJF, Priority and Round robin
- Simulate the process communication through various techniques
- Simulate memory management schemes
- Simulate File allocation Techniques

(Implement the following on LINUX or other UNIX like platform. Use C for high level language implementation)

LIST OF EXPERIMENTS

1. Write programs using the following system calls of UNIX operating system: fork, exec,getpid, exit, wait, stat, opendir, readdir
2. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc)
3. Write C programs to simulate UNIX commands like ls, grep, etc.
4. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time (2 sessions)
5. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time (2 Sessions).
6. Developing Application using Inter Process communication (using shared memory and pipes)
7. Simulate the Producer – Consumer problem using semaphores (using UNIX system calls).
8. Simulate First fit, best fit and Worst fit memory management algorithms.
9. Simulate Page Replacement Algorithms(FIFO, LRU and Optimal)
10. Simulate Paging memory management scheme

PCS 243: Object Oriented Programming (Pr)
B.TECH Semester-IV (Computer Science & Engineering)

L	T	P
-	-	2

Class Work	**:25 Marks**
Exam.	**:25 Marks**
Total	**:50 Marks**
Duration of Exam	**: 3 Hrs**

COURSE OUTCOMES

Upon successful completion of this course, students will be able to

- Design object oriented programs with static members and friend functions using C++
- Implement C++ programs with operator overloading and type conversions
- Develop class templates for various data structures like stack, queue and linked list.
- Create classes with necessary exception handling
- Construct simple test applications using polymorphism.

LIST OF EXPERIMENTS

1. Design C++ classes with static members, methods with default arguments, friend functions. (For example, design matrix and vector classes with static allocation, and a friend function to do matrix-vector multiplication).
2. Implement Matrix class with dynamic memory allocation and necessary methods. Give proper constructor, destructor, copy constructor, and overloading of assignment operator.
3. Implement complex number class with necessary operator overloading and type conversions such as integer to complex, double to complex, complex to double etc.
4. Overload the new and delete operators to provide custom dynamic allocation of memory.
5. Develop C++ class hierarchy for various types of inheritances.
6. Design a simple test application to demonstrate dynamic polymorphism and RTTI.
7. Develop a template of linked-list class and its methods.
8. Develop templates of standard sorting algorithms such as bubble sort, insertion sort and quick sort.
9. Design stack and queue classes with necessary exception handling.
10. Write a C++ program that randomly generates complex numbers (use previously designed Complex class) and write them two per line in a file along with an operator (+, -, *, or /). The numbers are written to file in the format (a + ib). Write another program to read one line at a time from this file, perform the corresponding operation on the two complex numbers read, and write the result to another file (one per line).

PCS-244 Unix/Linux Programming Lab
B.Tech. Semester –IV (Computer Science &Engg.)

L	T	P		
1	-	2	**Class Work**	**:25 Marks**
			Exam.	**:25 Marks**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs.**

COURSE OUTCOMES:

Upon successful completion of the course, the students will be able to

- To demonstrate the basic knowledge of Linux commands and file handling utilities by using Linux shell environment.
- To evaluate the concept of shell scripting programs by using an AWK and SED commands.
- Use tracing mechanisms for debugging.
- Compile source code into object and executable modules.
- Use advanced network tools.

LIST OF EXPERIMENTS

1. Study of Unix/Linux general purpose utility command list (man, who, cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown etc.), vi editor, .bashrc, /etc/bashrc and environment variables.
2. Write a shell script program to: a)display list of user currently logged in; b) to copy contents of one file to another.
3. Write a program using sed command to print duplicated lines of Input.
4. Write a grep/egrep script to find the number of words character, words and lines in a file.
5. Write an awk script to: a). develop a Fibonacci series; b) display the pattern of given string or number.
6. Write a shell script program to a) display the process attributes; b) change priority of processes; c) change the ownership of processes; d)to send back a process from foreground ; e) to retrieve a process from background ; f) create a Zombie process
7. Write a program to create a child process and allow the parent to display “parent” and the child to display “child” on the screen
8. Write a makefile to compile a C program.
9. Study to execute programs using gdb to utilize its various features like breakpoints, conditional breakpoints. Also write a shell script program to include verbose and xtrace debug option for debugging.
10. Study to use ssh, telnet, putty, ftp, ncftp and other network tools.

TCS-351 Design & Analysis of Algorithms
B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon completion of this course, the students will be able to

- Analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedyalgorithms.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.
- Analyze randomized algorithms and approximation algorithms.

Unit 1- Introduction: Characteristics of algorithm,**Analysis of algorithm:** Asymptotic analysis of complexity bounds – best, average and worst-case behavior,Sorting techniques and their performance analysis, Time and space trade-offs, **Analysis of recursive algorithms through recurrence relations:** Substitution method, Recursion tree method andMasters theorem.

Unit 2- Fundamental Algorithmic Strategies: Brute-Force, Greedy,Dynamic Programming, Branch- and-Bound and Backtracking methodologies for the designof algorithms, Illustrations of these techniques for Problem-Solving, Knapsack, Matrix Chain Multiplication, Activity selection and LCS Problem.

Unit 3- Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS), Shortest path algorithms, Minimum Spanning Tree, Topological sorting, Network FlowAlgorithm, Binomial Heap and Fibonacci Heap.

Unit 4- Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard, Standard NP-complete problems and Reductiontechniques.

Unit 5- Advanced Topics: Approximation algorithms and Randomized algorithms, Distributed Hash Table

Books

1. Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, Introduction to Algorithms, 4TH Edition, MITPress/McGraw-Hill.
2. E. Horowitz etal ,Fundamentals of Algorithms .

Reference books

1. Jon Kleinberg and ÉvaTardos,Algorithm Design, 1ST Edition, Pearson.
2. Michael T Goodrich and Roberto Tamassia,Algorithm Design: Foundations, Analysis, and Internet Examples, Second EditionWiley.

TCS-352/TOE-45 JAVA Programming
B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

COURSE OUTCOMES

Upon successful completion of the course, the students will be able to
• Write Java programs with properly designed constants, variables, objects, methods and reusability functionality
• Learn how and where to implement interface and exception handling concepts
•Write multi-threaded programming concepts for concurrency control based applications
• Construct GUI basedJAVA enterprise applications
• Develop web applications using JDBC, RMI and Servlet methodologies.

Unit 1- Java Basics and Inheritance: The Genesis of Java, Overview of Java, Data Types, Variables, and Arrays, Operators, Control Statements, Introducing Classes, Methods and Classes,Type Casting, String Handling, Abstract Class, Method overriding**Inheritance:** Basics, Using Super, Creating a Multilevel Hierarchy, Problem with Multiple Inheritance.

Unit 2- Packages, Interfaces and Exception Handling: Packages- Packages, Access Protection, Importing Packages, **Interfaces-** Definition and Implementations, **Exception Handling-** Types, Try and Catch, Throw and Finally statements.

Unit 3- Multi Threading and File Handling: Multithreaded Programming, Thread Life Cycle Creating Threads, Creating Multiple Threads, Thread Priorities, Synchronization, Inter Thread Communication, Suspending, Resuming and Stopping Threads.**File Handling:** I/O Basics, Reading Console Input, Writing Console output, I/ O Classes and Interfaces.

Unit 4- Applets, Event Handling and AWT: Applet Basics, Applet Architecture, Applet Display Methods, Passing parameters to Applets, **Event Handling**: Delegation Event Model, Event Classes, Event Listener Interfaces, **AWT:**Working with Windows, Graphics, Colors and Fonts, Using AWT Controls, Layout Managers and Menus.

Unit 5- JDBC, RMI And Servlets: JDBC-JDBC Architecture, The Structured Query Language, JDBC Configuration, Executing SQL, **RMI,** Architecture , A simple client/server application using RMI, **Servlets-** Life cycle of a Servlet, Servlet packages , Handling HTTP Requests and Responses.

TEXT BOOK(S)

1. D.Norton, Herbert Schildt, ―Java 2 - The Complete Reference‖ 5th Edition, Tata McGraw Hill, 2011.
2. Hortsmann& Cornell, ―CORE JAVA 2 Advanced Features – VOL-II‖, Pearson Education, 2002.

REFERENCES

1. Deitel&Deitel, ―Java How to Program‖, Prentice Hall of India, 2010.
2. Herbert Schildt, ―Java: A Beginner's Guide‖, Tata McGraw Hill, 2007.
3. Keyur Shah, ―Gateway to java programmer sun certification‖, Tata McGraw Hill, 2002.

TCS-353 Complier Design
B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon completion of this course, the students will be able to

- Develop the lexicalanalyser
- Design top-down and bottom-up parsers
- Develop syntax directed translationschemes
- Draw DAG representation for problem statement
- Develop algorithms to generate code for a targetmachine

Unit 1- Introduction: Phases of compilation and overview.
LexicalAnalysis(scanner): Regular languages, finite automata, regular expressions, from regular expressions to finite automata, scanner generator (lex, flex).

Unit 2- Syntax Analysis (Parser): Role of Parser, Context-free languages and grammars, push-down automata, LL(1) grammars and top-down parsing, operator grammars, LR(0), SLR(1), LR(1), LALR(1) grammars and bottom- up parsing, ambiguity and LR parsing, LALR(1) parser generator (yacc, bison) Semantic Analysis: Attribute grammars, syntax directed definition, evaluation and flow of attribute in a syntax tree.

Unit 3- Syntax directed translation & Symbol table: Syntax directed definitions, Evaluation order of SDD, Syntax directed Translation scheme,symbol table structure, attributes and management, Run-time environment:Stack allocation and space, Heap management, garbage collection.

Unit 4- Intermediate Code Generation: Variants of syntax tree, three address code, type checking, control-flow, backpatching.

Unit 5- Code Generation and Optimization: Issues in the design of a code generator, The target language, Basic blocks and flow graphs, Next-use information, The Directed Acyclic Graph (DAG) representation of basic blocks, Generating code from DAGs, A simple code generator, peep-hole optimization, Register allocation and assignment, Data-flow analysis.

Books

1. Aho A.V. and Ullaman J.D. Principles of Compiler Design, Addison Wesley
2. Donovan, J, System Programming , TMH
3. D.M. Dhamdhere: Compiler construction- Principles and Practice Mc Milan India
4. David Grics: Compiler Construction for digital computer

TCS-354 /TOE-44 Computer Networks
B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon completion of this course, the students will be able to

- Explain the functions of the different layer of the OSIProtocol.
- Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
- Address the issues related to IPv4 and IPv6
- Configure DNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP
- Configure Bluetooth, Firewalls using open source available software andtools.

Unit 1- Data communication Components: Representation of data and its flow Networks , Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spreadspectrum.

Unit 2- Data Link Layer and Medium Access Sub Layer: Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols-Pure ALOHA, Slotted ALOHA,CSMA/CD,CDMA/CA, high level data link control(HDLC), Point To Point protocol (PPP).

Unit 3- Network Layer: Repeater, Hub, Switches, Bridges, Gateways, Switching, Logical addressing – IPV4, IPV6, Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

Unit 4- Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

Unit 5- Application Layer: Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography , Digital Signature.

Books

1. Data Communication and Networking, 4th Edition, BehrouzA. Forouzan, McGraw- Hill.
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice HallIndia.
3. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.
4. Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall ofIndia.

ECS-311 Graph Theory
B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon successful completion of this module students will be able to

- Understand the basic concept of a walk, path and circuit in a graph.
- To perform the basic operation of Euler graph and digraph
- Discuss the various spanning trees algorithms.
- Understand the concept of edge connectivity, vertex connectivity and separable graphs.
- Derive the relations between the reduced incidence matrix, the fundamental cycle matrix, and the fundamental cut-set matrix of a graph G.

UNIT I INTRODUCTION: Introduction to Graphs : Introduction- Basic definition – Application of graphs – finite, infinite and bipartite graphs – Incidence and Degree – Isolated vertex, pendant vertex and Null graph. Paths and circuits – Isomorphism, sub graphs, walks, paths and circuits, connected graphs, disconnected graphs and components.

UNIT II EULERIAN AND HAMILTONIAN GRAPHS : Euler graphs, Operations on graphs, Hamiltonian paths and circuits, Travelling salesman problem. Directed graphs – types of digraphs, Digraphs and binary relation, Directed paths and connectedness – Euler graphs.

UNIT III TREES AND GRAPH ALGORITHMS : Trees – properties, pendant vertex, Distance and centres in a tree - Rooted and binary trees, counting trees, spanning trees, Prim's algorithm and Kruskal's algorithm, Dijkstra's shortest path algorithm, Floyd-Warshall shortest path algorithm.

UNIT IV CONNECTIVITY AND PLANAR GRAPHS : Vertex Connectivity, Edge Connectivity, Cut set and Cut Vertices, Fundamental circuits, Planar graphs, Kuratowski's theorem (proof not required), Different representations of planar graphs, Euler's theorem, Geometric dual.

UNIT V: GRAPH REPRESENTATIONS AND VERTEX COLOURING : Matrix representation of graphs Adjacency matrix, Incidence Matrix, Circuit Matrix, Path Matrix. Coloring- Chromatic number, Chromatic polynomial, Matchings, Coverings, Four color problem and Five color problem.

Text Books

1. Narsingh Deo, Graph Theory: With Application to Engineering and Computer Science, Prentice Hall of India, 2003.

References

1. R.J. Wilson, Introduction to Graph Theory, Fourth Edition, Pearson Education, 2003.

ECS-312 Queuing Theory and Modeling
B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Objectives

On successful completion of this course, the students shall be able to

- Have a fundamental knowledge of the basic concepts of probability
- Have a well-founded knowledge of various probability distributions which can describe real life phenomena
- Acquire skills in estimating expected values of variables and handling situations involving more than one random variable and functions of random variables
- Understand the stochastic processes and phenomena which evolve with respect to time in a probabilistic manner
- Expose the basic characteristic features of Markov chains, queuing systems and queuing models

Unit 1- Probability Models : Sample Space, Events and their algebra, graphical methods of representing events, Probability Axioms and their applications, Condition probability, Independence of Events, Bayes' Rule and Bernoulli Trials.

Unit 2- Random variables, and their event spaces: Probability mass function, Distribution functions, some discrete distributions (Bernoulli, Binomial, Geometric, Poisson, uniform, Probability Generating Function, Discrete random vectors, Continuous random variables: pdf some continuous distributions (Gamma, Normal), Exponential functions of random variables, joint1y distributed random variables.

Unit 3- Expectation: Expectation of functions of more than one random variable, Moments and transforms of some distributions (Uniform, Bernoulli, Binomial, Geometric, Poisson. Exponential, Gamma, Normal), Computation of mean time to failure.

Unit 4- Stochastic Processes: Classification of stochastic processes, the Bernoulli process, renewal process, renewal model of program behavior.

Unit 5- Markov Chains: Computation of n-step transition probabilities, State classification and limiting distributions, Irreducible finite chains with aperiodic states, M/G/l queuing system, Discrete parameter BirthDeath processes, Analysis of program execution time. Continuous parameter Markov Chains, Birth-Death process with special cases, Non-Birth-Death Processes.

Books

1. K.S. Trivedi, Probability, Statistics with Reliability, Queuing and Computer Science Applications, PHI, 2001.
2. J.F. Hayes, Modeling of Computer Communication Networks, Khanna Publishing, Delhi.
3. W. Feller, An Introduction to Probability Theory and its applications. 2vo1s. Wiley Eastern, 1975.
4. L. Kleinroek, Queuing Systems, vol.2, John Wiley, 1976.

ECS-313 Fault Tolerant Computing
B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon completion of this course, the students will be able to

- Understand research problems and challenges in fault tolerance computing
- Identify the state-of-the-art techniques and tools to address research problems and challenges;
- Develop strong technical reviewing, writing, and presentation skills.
- Design a more reliable systems that can tolerate S/W faults
- Design a more reliable systems that can tolerate H/W faults

Unit 1- Basics of Fault Tolerance: Fault Classification, Types of Redundancy, Basic Measures of Fault Tolerance,Reliability concepts, Failures & faults, Reliability and Failure rate, Relation between reliability and mean time between failure, maintainability and availability, Fault Tolerant Design: Basic concepts-static, dynamic, hybrid, triple modular redundant system (TMR), Data redundancy, Time redundancy and software Redundancy concepts.

Unit 2- Hardware Fault Tolerance: canonical and Resilient Structures- Series and Parallel Systems, Non-Series/Parallel Systems, *M*-of-*N* Systems, Voters, Variations on *N*-Modular Redundancy, Duplex Systems, Other Reliability Evaluation Techniques-Poisson Processes, Markov Models, Fault-Tolerance Processor-Level Techniques, Watchdog Processor, Simultaneous Multithreading for Fault Tolerance, Byzantine Failures, Byzantine Agreement with Message Authentication.

Unit 3- Testability for Hardware: testability for combinational circuits: Basic concepts of Testability, Controllability and observability, The Reed Muller's expansion technique, use of control and syndrome testable designs. Design for testability by means of scan: Making circuits Testable, Testability Insertion, Full scan DFT technique- Full scan insertion, flip-flop Structures, Full scan design and Test, Scan Architectures full scan design, Shadow register DFT, Partial scan methods, multiple scan design, other scan designs.

Unit 4- Software Fault Tolerance: Acceptance Tests Single-Version Fault Tolerance- Wrappers, Software Rejuvenation, Data Diversity, Software Implemented Hardware Fault Tolerance (SIHFT), *N*-Version Programming- Consistent Comparison Problem, Version Independence, Recovery Block Approach- Basic Principles, Success Probability Calculation, Distributed Recovery Blocks, Preconditions, Postconditions, and Assertions, Exception-Handling- Requirements from Exception-Handlers, Basics of Exceptions and Exception-Handling, Language Support, Software Reliability Models- Jelinski–Moranda Model, Littlewood–Verrall Model, Musa–Okumoto Model, Model Selection and Parameter Estimation, Fault-Tolerant Remote Procedure Calls-Primary-Backup Approach, The Circus Approach.

Unit 5- Checkpointing: Basics of checkpoint, Checkpoint Level, Optimal Checkpointing- An Analytical Model, Time Between Checkpoints-A First-Order Approximation, Optimal Checkpoint Placement, Reducing Overhead, Reducing Latency, Checkpointing in Distributed Systems-The Domino Effect and Livelock, A Coordinated Checkpointing Algorithm, Time-Based Synchronization, Diskless Checkpointing, Message Logging, Checkpointing in Shared-Memory Systems- Bus-Based Coherence Protocol, Directory-Based Protocol, Checkpointing in Real-Time Systems.

TEXTBOOKS:

- Israel Koren And C. Mani Krishna, "Fault-Tolerant Systems, Morgan Kaufmann publisher
- Parag K. Lala, "Fault Tolerant & Fault Testable Hardware Design", 1984, PHI
- ZainalabedinNavabi, "Digital System Test and Testable Design using HDL models and Architectures", Springer International Edition.
- MironAbramovici, Melvin A. Breuer and Arthur D. Friedman, "Digital Systems Testing and Testable Design", Jaico Books

ECS-314 Computer Graphics

B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcome

Upon completion of this course, the students will be able to

- Develop the understanding of fundamentals of Graphics concepts, and standards
- Understand the algorithms that form the foundation of computer graphics.
- Provide 3D representation for their applications
- Understand varios transformation techniques and their application
- Interpret parallel and oblique projections and their applications

Unit 1- Introduction to computer graphics & graphics systems: Overview of computer graphics, representing pictures, preparing, presenting & interacting with pictures for presentations, Visualization & image processing, RGB color model, direct coding, lookup table, storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc., Active & Passive graphics devices, Computer graphics software.

Unit 2- Points & lines: Line drawing algorithms; DDA algorithm, Bresenhan's line algorithm, Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

Unit 3- 2D transformation & viewing Basic transformations: Translation , rotation, scaling, Matrix representations & homogeneous coordinates, transformations between coordinate systems, reflection shear, Transformation of points, lines , parallel lines, intersecting lines. Viewing pipeline, Window to viewport co-ordinate transformation , clipping operations , point clipping , line clipping, clipping circles, polygons & ellipse.

Unit 4- 3D transformations: Translation, rotation, scaling & other transformations. Rotation about an arbitrary axis in space, reflection through an arbitrary plane, general parallel projection transformation, clipping, viewport clipping, 3D viewing.

Unit 5- Curves representation: Surfaces , designs , Bezier curves , B-spline curves, end conditions for periodic B-spline curves, rational B-spline curves. Hidden surfaces Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Printer‟s algorithm, scan-line algorithm; Hidden line elimination, wire frame methods , fractal - geometry. **Color & shading models** Light & color model, interpolative shading model and Texture

Text Books

1. Hearn, Baker – " Computer Graphics (C version 2nd Ed.)" – Pearson education
2. Z. Xiang, R. Plastock – " Schaum‟s outlines Computer Graphics (2nd Ed.)" – TMH
3. D. F. Rogers, J. A. Adams – " Mathematical Elements for Computer Graphics
4. Mukherjee, Fundamentals of Computer graphics & Multimedia, PHI

PCS-351 Design & Analysis of Algorithms Lab
B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
-	-	2	**Class Work**	**:25 Marks**
			Exam.	**:25 Marks**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs.**

COURSE OUTCOMES

Upon successful completion of the course, the students will be able to

- Solve recurrence equations by considering time and space complexity.
- Analyze the complexities of various problems in different domains.
- Solve the problems that comprises of shortest route issue.
- Solve the problems that address the issue of dynamic programming
- Synthesize efficient algorithms in common engineering design situations.

LIST OF EXCERCISES

1. Programming that uses recurrence relations to analyze recursive algorithms.
2. Computing best, average, and worst case time complexity of various sorting techniques.
3. Performance analysis of different internal and external sorting algorithms with different type of data set.
4. Use of divide and conquer technique to solve some problem that uses two different algorithm for solving small problem.
5. Implementation of different basic computing algorithms like Hash tables, including collision-avoidance strategies, Search trees (AVL and B-trees).
6. Consider the problem of eight queens on an (8x8) chessboard. Two queens are said to attack each other if they are on the same row, column, or diagonal. Write a program that implements backtracking algorithm to solve the problem i.e. place eight non-attacking queens on the board.
7. Write a program to find the strongly connected components in a digraph.
8. Write a program to implement file compression (and un-compression) using Huffman's algorithm.
9. Write a program to implement dynamic programming algorithm to solve the all pairs shortest path problem.
10. Write a program to solve 0/1 knapsack problem using the following:
    a) Greedy algorithm.
    b) Dynamic programming algorithm.
    c) Backtracking algorithm.
    d) Branch and bound algorithm.
11. Write a program that uses dynamic programming algorithm to solve the optimal binary search tree problem.
12. Write a program for solving traveling sales persons problem using the following:
    a) Dynamic programming algorithm.
    b) The back tracking algorithm.
    c) Branch and Bound.

PCS-352 Java Programming Lab
B.Tech. Semester –V (Computer Science & Engg.)

L	T	P		
-	-	2	**Class Work**	**:25 Marks**
			Exam.	**:25 Marks**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs.**

COURSE OUTCOMES

Upon successful completion of the course, the students will be able to

- Develop programs using object oriented concepts using arrays and string classes
- Demonstrate features such as Inheritance, Interfaces with access specifiers and exception handling
- Demonstrate multithreading programming concepts to solve real world problems
- Design and implement GUI based applications.
- Develop web application using JDBC and Servlets

LIST OF EXPERIMENTS

1. Write a program to implement matrix multiplication using multi-dimensional arrays.
2. Write a program to implement all String class functionalities.
3. Write a program to demonstrate the working of access specifiers in Inheritance.
4. Develop a program for banking application with exception handling. Handle the exceptions in following cases:
    a) Account balance <1000
    b) Withdrawal amount is greater than balance amount
    c) Transaction count exceeds 3
    d) One day transaction exceeds 1 lakh.
5. Write a program to implement Thread class and runnable interface.
6. Write a program to implement producer-consumer problem using Inter threaded communication
7. Write a program to demonstrate the usage of event handling.
8. Write a program to depict all the cases of layout manager.
9. Create a Student database and store the details of the students in a table. Perform the SELECT, INSERT, UPDATE and DELETE operations using JDBC connectivity.
10. Write a RMI application to fetch the stored procedure from the remote server side.
11. Design a login page using servlets and validate the username and password by comparing the details stored in the database.

PCS-353 Industrial Training
B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
-	-	2	**Class Work**	**:50 Marks**
			Exam.	**:--**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs**

About Industrial Training

It is an organized method or activity of enhancing and improving skill set and knowledge of engineering students which boost their performance and consequently helping them to meet their career objectives.Industrial Training is an essential component in the development of the practical and professional skills required for an Engineer and an aid to prospective employment

Objectives of Industrial Training

• The main objective of Industrial Training is to expose the students to actual working environment and enhance their knowledge and skill from what they have learned in the college.
• Another purpose of this program is to enhance the good qualities of integrity, responsibility and self-confidence. All ethical values and good working practices must be followed by student.
• It is also to help the students about the safety practices and regulations inside the industry and to instill the spirit of teamwork and good relationship between students and employees.

Course Outcomes

At the end of Industrial Training, the students will be able to

- Understand organizational issues and its impact on organization and employees.
- Identify industrial problems and suggest possible solutions.
- Relate, apply and adapt relevant knowledge, concepts and theories within an industrial organization, practice and ethics.
- Apply technical knowledge in an industry to solve real world problems.
- Demonstrate effective group communication, presentation, self-management and report writing skills**.**

PCS-354 Computer Networks Lab

B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
-	-	2	**Class Work**	**:25 Marks**
			Exam.	**:25 Marks**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs**

COURSE OUTCOMES

Upon Completion of this course, the students will be able to

- Learn about hardware component like RJ-45 connector, CAT-6 Cable etc.
- Implement the various services of data link layer.
- Configuration of router, hub, switch etc
- Configuration of server in programming mode they will learn about socket programming, client server programming for deeply understanding TCP/ IP model and various protocols.
- Configure their own Network management systems

In simulation area, they will work on Cisco networking, NS-2 or NS-3 tools for more clear understanding about computer network

1. Installation and configuration of NS2 and Qual Net
2. Creating a network: nodes, links and queues, Creating connections, traffic and computing routers Insertion of errors and analysis of trace file.
3. Study of basic network command and network configuration commands.
4. Simple project on NS2 – wired, wireless and combination of wired and wireless
5. Implementation of new protocols in NS2
6. Simulation study of pure ALOHA protocol;
7. Simulation study of slotted ALOHA protocol;
8. Simulation study of Token Bus LAN protocol;
9. Simulation study of Token Ring LAN protocol;
10. Simulation study of WAN protocol like Frame Relay, X. 25
11. Study of 802. 11 wireless LAN protocols.
12. Implement the Distance Vector Routing protocol for finding the shortest path.
13. Write a program to connect server with client and passes information from one system to another and vice versa that by creating / establishing connection.

TCS-361/TOE-50 Artificial Intelligence
B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

COURSE OUTCOMES
After undergoing this course, the students will be able to:

- Knowledge of the fundamentals of soft computing and applications of soft computing to solve various problems.
- Understanding of Fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
- Understanding of the principles of Artificial Neural Network, different types of neural network and their applicability.
- Familiar with the concepts of Genetic algorithms, and various techniques
- Classification problems and fundamentals of Machine Learning and classification and various applications.

Unit 1- Introduction: What is AI, Foundations of AI, History of AI, The State of the Art, AI Techniques, Problem Solving: Problem solving agents,uniformed search strategies, Informed search strategies, Constraint Satisfaction Problems.

Unit 2- Knowledge Representation: Approaches and issues in knowledge representation, Knowledge Based Agents, Propositional Logic, Predicate Logic- Unification and Resolution, Weak slot –Filler Structure, Strong slot-Filler structure.

Unit 3- Probabilistic Reasoning: Probability, conditional probability, Bayes Rule, Bayesian Networks-representation, construction and inference, Brief introduction of Neural Networks, Fuzzy Logic and Genetic Algorithms

Unit 4- Planning and Learning: Planning with state space search, conditional planning, continuous planning, Multi-Agent planning. Forms of learning,Inducative Learning, Statistical learning method and Reinforcement learning.

Unit 5- Advanced Topics: Expert Systems- Representation- Expert System shells- Knowledge Acquisition with examples**. Game Playing-**Minimax Search Procedure, Alpha-Beta Pruning, Imperfect, Real-Time Decisions.
Swarm Intelligent Systems- Ant Colony System, Development, Application and Working of Ant Colony System.

LIST OF SUGGESTED BOOKS

1. Stuart Russell and Peter Norvig, “Artificial Intelligence: A Modern Approach” , 3rd Edition, Prentice Hall
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw Hill
3. N. P. Padhy, “Artificial Intelligence and Intelligent System”, Oxford University Press, 2005
4. SarojKaushik, “Artificial Intelligence”, Cengage Learning India, 2011

TCS-362/TOE-48 Web Technology

B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

COURSE OUTCOMES: Upon successful completion of this course, the student will be able to:

- Plan, design, create, and implement a web site;
- Use the concept of xml, css and DHTML
- Develop a static and dynamic websites.
- Establish the database connectivity over a website.

UNIT-I Introduction to HTML: HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets;
Introduction to JavaScript: Scripts, Objects in Java Script, Dynamic HTML with Java Script
XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

UNIT-II Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizes, Java Beans API, Introduction to EJB's
UNIT-III Web Servers and Servlets: Tomcat web server, Introduction to Servelets: Lifecycle of a Serverlet, JSDK, The Servelet API, The javax.servelet Package, Reading Servelet parameters, Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues.
UNIT-IV Introduction to JSP: The Problem with Servelet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat

UNIT-V JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations.

TEXT BOOKS, AND/OR REFERENCE MATERIAL:

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech
2. The complete Reference Java 2 Fifth Edition by Patrick Naughton and Herbert Schildt. TMH (Chapters: 25)
3. Java Server Pages –Hans Bergsten, SPD O'Reilly.
4. Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia
5. Jocl Sklar, "Web Warrier guide to web design technologies", Cengage Learning, New Delh

TCS-363 Software Engineering
B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon Successful completion ofthis course, the students will be able to

- Identify appropriate software design model based on requirement analysis.
- Formulate Software Requirements Specification (SRS) reports for the real world application
- Translate a specification into a design and identify the components to build the architecture
- Plan a software engineering process to account for quality issues and non-functionalrequirements
- Estimate the work to be done, resources required and the schedule for a software project plan

Unit 1- : **Introduction to Software Engineering**: Introduction, software applications, importance of software evolution of software, Software Components, Software Characteristics, Software Crisis & myths. Software Engineering paradigms: introduction, principles & Processes, Software Quality Attributes. Comparison between software engineering & computer science, & software engineering & Engineering. Some terminologies: product & process, deliverables and milestones, measures, metric & indicators. Programs & software products. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, RAD model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

Unit 2- Software Requirement Analysis: Structured analysis, object oriented analysis, software requirement specification, validation.

Unit 3- Design and Implementation of Software: software design fundamentals, design methodology (structured design and object oriented design), design verification, monitoring and control coding.

Unit 4- Testing : Testing fundamentals, white box and black box testing software testing software testing strategies: unit testing, integration testing, validation testing , system testing, debugging.

Unit 5- Software Reliability: Metric and specification, fault avoidance and tolerance, exception handling, defensive programming.Software Maintenance – maintenance characteristics, maintainability, maintenance tasks, maintenance side effects. CASE tools, software certification- requirement, types of certification, third part certification. Software Re-Engineering, reverse software Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, CASE: introduction, levels of case, architecture, case building blocks, objectives, case repository, characteristics of case tools, categories, Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.

Books

1. Pressman S.Roger, Software Engineering, Tata McGraw-Hill
2. JalotePankaj, An integrated approach to software engineering , Narosa Publishing House
3. Sommervillelan, Software Engineering, 5th ed., Addison Wesley-2000

TAH-362-Organizational Behaviour
B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
2	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

COURSE OBJECTIVE: The Course aims to provide an understanding of Human Relations and Behavior at the individual, group and organizational level in the changing global scenario.

UNIT I: FUNDAMENTALS OF OB: (8hours)
Definition, scope & importance of OB, Relationship between OB and the individual, Theoretical framework cognitive, behaviorist and social cognitive, Limitations of OB

UNIT II: ATTITUDE: (8 hours)
Importance of attitude in an organization, components of attitude, Developing Emotional intelligence at the workplace, Definition and importance of personality for performance, Types of personality and Significant personality traits suitable to the workplace. Perception, Motivation, the content theories (Maslow's Need Hierarchy & Herzberg's two factor model theory)

UNIT III: FOUNDATIONS Of Group Behavior: (8 hours)
Meaning of group behavior & group dynamics, Types of Groups, Need of Work Teams in organizations, Team effectiveness & Team building. Concept of Leadership, Styles of leadership, Transformational leadership and Success stories of today's Global and Indian leaders.

UNIT IV: ORGANIZATIONAL CULTURE: (8 hours)
Meaning of organizational culture, Creating & Sustaining organization culture Types of culture (Strong-Weak, Soft- Hard, & Formal-Informal), Creating positive organizational culture, Workplace spirituality.

UNIT V: ORGANIZATIONAL CHANGE: (8 hours)
Definition & nature of organizational change, Types of change, Forces that act as stimulants to change. Implementing organizational change(How to overcome change, Approaches to manage change, Kurt Lewin's –Three step model, Leading the change process, Dealing with Individual & Group Resistance, Intervention Strategies for facilitating organizational change, Developing organizations).

TEXT BOOKS

1. Bhattacharaya, Deepak Kumar (2016). Organizational Behaviour, 2nd edition. Oxford – New Delhi.
2. Nahavandi, Afsaneh; Robert B. Denhardt; Janet V. Denhardt and Maria P. Aristigueta (2017) Organizational Behaviour. Sage
3. Kumar, Arun and N Meenakshi (2016). Organizational Behaviour – Text and cases, 1st edition. . Vikas – New Delhi
4. Singh, Kavita (2015). Organizational Behaviour: Text & Cases, 3rd edition. Vikas – New Delhi.
5. Luthans, Fred (2006). Organizational Behaviour, 11th edition. Tata McGraw Hill – New Delhi.

COURSE OUTCOME-
CO-1. Understanding of scope & significance of OB with regard to cognitive framework.
CO-2 Understanding of the behavior with overview of attitude, personality and perception.
CO-3 To enhance ovrall skills for organizational effectiveness.
CO-4 To develops the understanding of the how to create and sustain organization culture.
CO-5 To develop problem-solving capabilities for effectively managing the organizational processes.

ECS-321 Cryptography & Network Security
B.Tech. Semester –VI (Computer Science & Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon Successful completion ofthis course, the students will be able to

- Identify the various attacks and its issues.
- Learn usage of cryptographic algorithms for avoiding basic level threats.
- Comprehend the issues involved in Integrity, Authentication and Key Management techniques.
- Realize the importance of user authentication and Kerberos concepts.
- Acquire the knowledge of network and system security domain.

Unit 1- Introduction of Cryptography: Introduction To security: Attacks, Services and Mechanisms, Conventional Encryption: Conventional Encryption Model, Steganography, Block Cipher Principles, DES Standard, DES Strength, Differential and Linear Cryptanalysis, Block Cipher Modes of Operations.Double DES, Triples DES, Blowfish, International Data Encryption Algorithm,Placement of Encryption Function, Key Distribution, Random Number Generation and Traffic confidentiality

Unit 2- Number Theory and Public Key Encryption:Fermat's and Euler's Theorem, Primality Testing, Chinese Remainder Theorem , Public-Key Cryptography: Principles of Public-Key Cryptosystems, RSA Algorithm.

Unit 3- Key Management : Key Management scenario in secret key and public key cryptography, Diffie Hellman Key Exchange algorithm, OAKLEY and ISAKMP key management protocol, Elliptic Curve Cryptography

Unit 4-Hash Functions: Message Authentication and Hash Functions: Authentication Requirements,Authentication Functions, Message Authentication Codes, Hash Function Birthday Attacks, Security of Hash Function and MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signatures, Digital Signature Standard (DSS).

Unit 5- Network and System Security: Authentication Applications: Kerberos, X.509, Electronic Mail Security, Pretty Good Privacy (PGP),S/Mine Security: Architecture, Authentication Header, Encapsulating Security Payloads, Combining Security Associations, Key Management, Web Security: Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction (SET), System Security: Intruders, Viruses, Firewall Design Principles, Trusted Systems.

Books

1. William Stallings, "Cryptography and Network Security: Principles and Practice"' Prentice hall, New Jersey
2. Johannes A. Buchmann, "Introduction to Cryptography" Springer-Verlag
3. AtulKahate, "Cryptography and Network Security" TMH
4. Network Security Bible : Eric Cole, Wiley dreamtech India Pvt. Ltd.
5. Practical Cryptography “Bruce Schneier” Wiley dreamtech India Pvt. Ltd

ECS-322 Distributed Systems
B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

COURSE OUTCOMES
Upon Successful completion of this course, the students will be able to

- Acquire the theoretical and conceptual foundations of distributed computing.
- Conceptualize the ideas of distributed operating systems and its issues.
- Understand the issues involved in distributed resource environment
- Realize the importance of transaction and how to recovery the system from deadlocks.
- Explore the principles of fault tolerance and its protocols.

Unit 1- Distributed Environment: Introduction, Limitations, Remote Procedure Call, Remote Object Invocation, Message-Oriented Communication, Unicasting, Multicasting and Broadcasting, Group Communication.

Unit 2-Distributed Operating Systems: Issues in Distributed Operating System, Threads in Distributed Systems, Clock Synchronization, Causal Ordering, Global States, Election Algorithms, Distributed Mutual Exclusion, Distributed Deadlock, Agreement Protocols

Unit 3- Distributed Resource Management: Distributed Shared Memory, Data-Centric Consistency Models, Client-Centric Consistency Models, Distributed File Systems, Sun NFS.

Unit 4- Distributed Transaction Processing: Transactions, Nested Transactions, Locks, Optimistic Concurrency Control, Timestamp Ordering, Comparison, Flat and Nested Distributed Transactions, Atomic Commit Protocols, Concurrency Control in Distributed Transactions, Distributed Deadlocks, Transaction Recovery, Overview of Replication And Distributed Multimedia Systems.

Unit 5- Fault Tolerance And Consensus: Introduction to Fault Tolerance, Distributed Commit Protocols, Byzantine Fault Tolerance, Impossibilities in Fault Tolerance.

TEXT BOOK(S)

1. A.S.Tanenbaum, M.Van Steen, “Distributed Systems”, Pearson Education, 2007.
2. MukeshSinghal, NiranjanG.Shivaratri “Advanced Concepts in Operating Systems”, McGrawHill Series in Computer Science, 2011.

REFERENCES

1. George Coulouris, Jean Dollimore, Tim Kindberg, “Distributed Systems Concepts and Design”, 3rd Edition, Pearson Education Asia, 2002.
2. M.L.Liu, “Distributed Computing Principles and Applications”, Pearson Addison Wesley, 2004.
3. Andrew S.Tenenbaum “Modern Operating system”, 3rd Edition, Pearson Addison Wesley, 2008.

ECS-323 Real Time System

B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon successful completion of this course, the students will be able to

- Grasp a fundamental understanding of goals, components and evolution of real time systems
- Explain the concepts of real time scheduling
- Learn the scheduling policies of modern operating systems
- Understand the resource access control techniques in real time systems.
- Understand the concept of real time communication

Unit 1-Introduction: Definition, Typical Real Time Applications: Digital Control, High Level Controls, Signal Processing etc., Release Times, Deadlines, and Timing Constraints, Hard Real Time Systems and Soft Real Time Systems, Reference Models for Real Time Systems: Processors and Resources, Temporal Parameters of Real Time Workload, Periodic Task Model, Precedence Constraints and Data Dependency.

Unit 2-Real Time Scheduling: Common Approaches to Real Time Scheduling: Clock Driven Approach, Weighted Round Robin Approach, Priority Driven Approach, Dynamic Versus Static Systems, Optimality of Effective-Deadline-First (EDF) and Least-Slack-Time-First (LST) Algorithms, Offline Versus Online Scheduling, Scheduling Aperiodic and Sporadic jobs in Priority Driven and Clock Driven Systems.

Unit 3-Resources Access Control: Effect of Resource Contention and Resource Access Control (RAC), Nonpreemptive Critical Sections, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority-Ceiling Protocol, Use of Priority-Ceiling Protocol in Dynamic Priority Systems, PreemptionCeiling Protocol, Access Control in Multiple-Unit Resources, Controlling ConcurrentAccesses to Data Objects.

Unit 4-Multiprocessor System Environment: Multiprocessor and Distributed System Model, Multiprocessor Priority-Ceiling Protocol,Schedulability of Fixed-Priority End-to-End Periodic Tasks, Scheduling Algorithms for Endto-End Periodic Tasks, End-to-End Tasks in Heterogeneous Systems, Predictability andValidation of Dynamic Multiprocessor Systems, Scheduling of Tasks with Temporal Distance Constraints.

Unit 5-Real Time Communication: Model of Real Time Communication, Priority-Based Service and Weighted Round-Robin Service Disciplines for Switched Networks, Medium Access Control Protocols for Broadcast Networks, Internet and Resource Reservation Protocols, Real Time Protocols,Communication in Multicomputer System, An Overview of Real Time Operating Systems.

Books

1. Jane W. S. Liu , Real Time Systems, Pearson Education Publication.
2. Prof. Albert M. K. Cheng, John Wiley, Real-Time Systems: Scheduling, Analysis, and Verification , Sons Publications

ECS-324 Data Science

B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon successful completion of this course, the students will be able to

- Demonstrate the mathematical foundations needed for data science.
- Collect, explore, clean,and manipulate data.
- Demonstrate the basic concepts of machine learning
- Implement models such as k-nearest Neighbors, Naive Bayes, linear and logistic regression, decision trees, neural networks and clustering.
- Build data science applications using Python based toolkits.

Unit 1-Introduction to Data Science: Concept of Data Science, Traits of Big data, Web Scraping, Analysis vs Reporting

Unit 2-Introduction to Programming Tools for Data Science: Toolkits using Python: Matplotlib, NumPy, Scikit-learn, NLTK Visualizing Data: Bar Charts, Line Charts, Scatterplots Working with data: Reading Files, Scraping the Web, Using APIs (Example: Using the Twitter APIs), Cleaning , Manipulating Data, Rescaling, Dimensionality Reduction

Unit 3-Mathematical Foundations: Linear Algebra: Vectors, Matrices, Statistics: Describing a Single Set of Data, Correlation, Simpson's Paradox, Correlation and Causation Probability: Dependence and Independence, Conditional Probability, Bayes's Theorem, Random Variables, Continuous Distributions, The Normal Distribution

Unit 4-Machine Learning: Overview of Machine learning concepts – Over fitting and train/test splits, Types of Machine learning – Supervised, Unsupervised, Reinforced learning, Introduction to Bayes Theorem, Linear Regression- model assumptions, regularization (lasso, ridge, elastic net), Classification and Regression algorithms- Naïve Bayes, K-Nearest Neighbors, logistic regression, support vector machines (SVM), decision trees, and random forest, Classification Errors, Analysis of Time Series- Linear Systems Analysis, Nonlinear Dynamics, Rule Induction, Neural Networks- Learning and Generalization, Overview of Deep Learning.

Unit 5-Case Studies of Data Science Application: Weather forecasting, Stock market prediction, Object recognition, Real Time Sentiment Analysis.

LIST OF SUGGESTED BOOKS

1. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media
2. AurélienGéron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, O'Reilly Media
3. Jain V.K., "Data Sciences", Khanna Publishing House, Delhi.

ECS-325Microprocessors

B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

COURSE OUTCOMES

Upon successful completion of this course, the students will be able to

- Understand the basics of 8085 microprocessor and its instruction set.
- Understand the 8086 architecture and its instruction set.
- Understand the 8086 programming.
- Know about the 8089 microprocessor's interfaces and their architecture
- Describe the evolution and various types of advanced micoprocesors.

Unit 1- Introduction to Microprocessors: Evolution of Microprocessors, Classification of microprocessors, Basic functional blocks of a microprocessor, Microprocessor- based system (Organization of microcomputer).

Unit 2- 8085 MICROPROCESSOR: Architecture; Addressing modes; Instruction Set: Data transfer instructions, Arithmetic instructions, Logical instructions, Branching instructions, Machine control instructions; Timing diagram of 8085 instructions; Assembly Language Programming.

Unit 3- 8086 MICROPROCESSOR: Architecture, Physical address, segmentation, memory organization, Bus cycle, Instruction Set, Addressing modes, difference between 8085 & 8086, Assembler Directives , Assembly Language Programming of 8086.

Unit 4- 8051 MICROCONTROLLERS: Fundamental differences of microprocessors and microcontroller, Introduction to Architecture and instruction set of 8051 microcontroller, Direct Memory Access and DMA Controlled I/O, Numeric Processor 8087 and I/O Processor 8089, Introduction to ARM Microcontroller.

Unit 5- ADVANCE MICROPROCESSORS: Architecture and functional description of Programmable Peripheral Interface (8255), operating modes: BSR, I/O mode- Mode 0, 1 and 2, Programmingof8255, Architecture and functional description of USART (8251), Priority Interrupt Controller (8259), Memory Interfacing, Introduction to 80286, 80386, 80486 microprocessors

Books:

1. R.S Gaonkar,"Microprocessor Architecture, Programming and Applications with 8085/8080A", Wiley Eastern Limited
2. Barry B. Brey, Intel Microprocessors, 8th Edition , Pearson Education/Prentice Hall
3. Y.-C. Liu and G. A. Gibson, "Microprocessor Systems: The 8086/8088 family Architecture, Programming & Design", PHI.
4. A. K. Ray and K M Bhurchandi, "Advanced Microprocessors and Peripherals", TMH.
5. D.V. Hall, "Microprocessors and Interfacing", TMH, 2nd Ed.

ECS-331 Internet of Things (IOT)

B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon completion of this course, the students will be able to

- Understand the application areas of IOT
- Explore interconnection and integration of the physical world
- Design & develop IOT Devices
- Realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks
- Understand the building blocks of Internet of Things and their characteristics.

Unit 1-INTRODUCTION TO IOT: Internet of Things - Physical Design- Logical Design- IOT Enabling Technologies - IOT Levels & Deployment Templates - Domain Specific IOTs - IOT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology

Unit 2-IOT ARCHITECTURE: M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture

Unit 3-IOT PROTOCOLS: Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN - CoAP - Security

Unit 4-BUILDING IOT WITH RASPBERRY PI & ARDUINO: Building IOT with RASPERRY PI- IoT Systems - Logical Design using Python – IoT Physical Devices & Endpoints - IoT Device -Building blocks - Raspberry Pi -Board - Linux on Raspberry Pi - Raspberry Pi Interfaces -Programming Raspberry Pi with Python - Other IoT Platforms - Arduino.

Unit 5-CASE STUDIES AND REAL-WORLD APPLICATIONS: Real world design constraints - Applications - Asset management, Industrial automation, smart grid, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT – Software & Management Tools for IoT, Cloud Storage Models & Communication APIs - Cloud for IoT - Amazon Web Services for IoT

Books

1. ArshdeepBahga, Vijay Madisetti, ―Internet of Things – A hands-on approach‖, Universities Press, 2015
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), ―Architecting the Internet of Things‖, Springer, 2011.
3. Honbo Zhou, ―The Internet of Things in the Cloud: A Middleware Perspective‖, CRC Press, 2012.
4. Jan Ho¨ ller, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.

ECS-332 /TOE-49 Adhoc and Sensor Network
B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon successful completion of this course, the students will be able to

- Impart the trends in emerging field of wireless ad hoc and sensor networking.
- Focus on layered communication modeling, such as the media access control and network layer.
- Understand the basic concept of QoS and Multicast routing protocol.
- Address quality of service issues and network reliability for transmission of real-time information.
- Learn the various routing protocols of ad hoc and sensor networks

Unit 1- ADHOC NETWORKS INTRODUCTION: Introduction to Wireless Communication Technology, Characteristics of the Wireless Channel, IEEE 802.11a/b Standard, Origin of Ad-hoc Packet Radio Networks, Architecture of PRNETS, Introduction to Ad-hoc Wireless Networks, Heterogeneity in Mobile Devices.

Unit 2- ADHOC NETWORK ROUTING PROTOCOLS: Introduction -to designing a Routing Protocol, Classifications of Routing Protocols, Destination Sequenced Distance Vector (DSDV), Dynamic Source Routing (DSR), Zone Routing Protocol (ZRP), Wireless Routing Protocol (WRP), Source—Initiated On—Demand Approaches, Ad hoc On-Demand Distance Vector Routing , AODV.

Unit 3- QoS AND Multicast Routing Protocol in MANET: Issues and challenges in providing QoS in Adhoc Wiress Networks, Introduction to QoS in Ad hoc Wireless Networks, Classifications of QoS Solutions, Introduction to Multicast Routing Protocol, Classifications of Multicast Routing Protocols.

Unit 4- WSN INTRODUCTION: Characteristic requirements, Challenges of sensor networks Emerging technologies for wireless sensor networks, Advantages of sensor networks, Sensor network applications.

Unit 5- WSN PROTOCOLS: Communication protocols, MAC protocaols, Namlng and Addressing-Routing protocols, Energy efficient routing.

Text Books

1. C. Siva Ram Murthy and B.S. Manoj, “Ad Hoc ereless Networks Archltectures and Protocols”, 2nd Edition, Pearson Education, 2007.
2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach”, Elsevier, 2007.
3. Holger Karl & Andreas Willig, “Protocols and Archltectures for Wireless Sensor Networks”, John
4. Wiley, 2005.

ECS-333 Quantum Computing

B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

At the end of this course, the students will be able to

- Explain the working of a Quantum Computing program
- Understand its architecture and programing model
- Develop quantum logic gate circuits
- Develop quantum algorithm
- Program quantum algorithm on major toolkits

Unit 1- Introduction to Quantum Computing: Motivation for studying Quantum Computing ,Major players in the industry (IBM, Microsoft, Rigetti, D-Wave etc.) Origin of Quantum Computing , Overview of major concepts in Quantum Computing, Qubits and multi-qubits states, Bloch Sphere representation,Quantum Superposition, Quantum Entanglement

Unit 2-Math Foundation for Quantum Computing: Matrix Algebra: basis vectors and orthogonality, inner product and Hilbert spaces, matrices, and tensors, unitary operators and projectors, Dirac notation, Eigen values and Eigen vectors.

Unit 3-Building Blocks for Quantum Program: Architecture of a Quantum Computing platform, Details of q-bit system of information representation: Block Sphere ,Multi-qubits States ,Quantum superposition of qubits (valid and invalid superposition).,Quantum Entanglement ,Universal quantum gates, Quantum Fourier Transform.

Unit 4-Quantum Algorithms: Basic techniques exploited by quantum algorithms. The quantum search algorithm, Quantum Walks, Major Algorithms ,Shor's Algorithm ,Grover's Algorithm ,Deutsch's Algorithm,Deutsch -Jozsa Algorithm

Unit 5-Toolkits:OSS Toolkits for implementing Quantum program, IBM quantum experience, Microsoft Q, RigettiPyQuil (QPU/QVM)

LIST OF SUGGESTED BOOKS

1. Michael A. Nielsen, "Quantum Computation and Quantum Information", Cambridge University Press.
2. David McMahon, "Quantum Computing Explained", Wiley IBM Experience.

ECS-334 Augemented Reality (Ar)/Virtual Reality (Vr)

B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcome

Upon completion of the course, students will be able to

- Understand geometric modelling and Virtual environment.
- Study about Virtual Hardware and Software
- Present geometric model for VR systems
- Identify which type hardware and software is suiable to design their own VR systems
- Develop Virtual Reality applications.

Unit 1-Introduction to Virtual Reality: Virtual Reality and Virtual Environment: Introduction, Computer graphics, Real time computer graphics, Flight Simulation, Virtual environment requirement, benefits of virtual reality, Historical development of VR, Scientific Landmark,3D Computer Graphics: Introduction, The Virtual world space, positioning the virtual observer, the perspective projection, human vision, stereo perspective projection, 3D clipping, Colour theory, Simple 3D modelling, Illumination models, Reflection models, Shading algorithms, Radiosity, Hidden Surface Removal, Realism-Stereographic image.

Unit 2-Geometric Modelling: Geometric Modelling: Introduction, From 2D to 3D, 3D space curves, 3D boundary representation Geometrical Transformations: Introduction, Frames of reference, Modelling transformations, Instances, Picking, Flying, Scaling the VE, Collision detection Generic VR system: Introduction, Virtual environment, Computer environment, VR technology, Model of interaction, VR Systems.

Unit 3-Virtual Environment: Animating the Virtual Environment: Introduction, The dynamics of numbers, Linear and Non-linear interpolation, the animation of objects, linear and non-linear translation. Physical Simulation: Introduction, Objects falling in a gravitational field, Rotating wheels, Elastic collisions, projectiles, simple pendulum, springs, Flight dynamics of an aircraft.

Unit 4-VR Hardware and Software: Human factors: Introduction, the eye, the ear, the somatic senses.
VR Hardware: Introduction, sensor hardware, Head-coupled displays, Acoustic hardware, Integrated VR systems. VR Software: Introduction, Modelling virtual world, Physical simulation, VR toolkits, Introduction to VRML

Unit 5-VR Applications: Introduction, Engineering, Entertainment, Science, Training. The Future: Virtual environment, modes of interaction.

LIST OF SUGGESTED TEXT BOOKS

1. John Vince, “Virtual Reality Systems “, Pearson Education Asia, 2007.
2. Anand R., “Augmented and Virtual Reality”, Khanna Publishing House, Delhi.
3. Adams, “Visualizations of Virtual Reality”, Tata McGraw Hill, 2000.
4. Grigore C. Burdea, Philippe Coiffet , “Virtual Reality Technology”, Wiley Inter Science, 2nd Edition, 2006.

ECS-335 Fuzzy Logic

B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes:

- To impact knowledge on fuzzy logic principles
- To understand Fuzzy Logic Methods
- To understand the fuzzy logic controllers
- To understand the data analysis
- To understand the uses of fuzzy logic

Unit – I: Introduction to Fuzzy Logic: Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

UNIT II: Fuzzy Logic System Components: Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

UNIT III : Fuzzy Logiccontrollers

Fuzzy logic controllers – principles – review of control systems theory – various industrial applications of FLC adaptive fuzzy systems – fuzzy decision making – Multiobjective decision making , Fuzzy Logic classification: fuzzy classification – means clustering – fuzzy pattern recognition – image processing applications – systactic recognition – fuzzy optimization.

UNIT IV: Fuzzy Data analysis: introduction, methods for fuzzy data analysis, algorithmic approaches, and knowledge based approaches, neural net approaches, dynamic fuzzy data analysis, problem descriptions, similarities of function, approaches for analysis dynamic systems, tools for fuzzy data analysis.

UNIT V: Applications Fuzzy Logic

Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

TEXT BOOK:

- Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Rai – PHI Publication.

REFERENCE BOOKS:

- Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications.

PCS-361 Artificial Intelligence Lab
B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
-	-	2	**Class Work**	**:25 Marks**
			Exam.	**:25 Marks**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs.**

COURSE OUTCOMES

After undergoing this course, the students will be able to

- Discuss Artificial Intelligence techniques for building well engineered and efficient intelligent systems.
- Describe the nature of AI problem and provide the solution as a particular type.
- Learning optimization and inference algorithms for model learning
- Solve game challenging problems
- Design and develop programs for an agent to learn and act in a structured environment.

LIST OF PRACTICALS

1. Write a python program to implement simple Chatbot?
2. Implementation of following algorithms:
   a. A* and Uniform cost search algorithms.
   b. Implement AO* Search algorithm.
   c. Write a python program to implement Breadth First Search Traversal.
   d. Implementation of TSP using heuristic approach.
3. Implementation of Hill-climbing to solve 8- Puzzle Problem.
4. Write a python program to implement Water Jug Problem?
5. Write a program to implement Hangman game using python.
6. Write a program to implement Tic-Tac-Toe game using python.
7. Write a Program for Expert System by Using Forward Chaining.
8. Write a python program to remove stop words for a given passage from a text file using NLTK?
9. Write a python program to implement stemming for a given sentence using NLTK?
10. Write a python program to implement Lemmatization using NLTK.
11. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
12. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

PCS-362 Web Technology Lab
B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
-	-	2	**Class Work**	**:25 Marks**
			Exam.	**:25 Marks**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs.**

COURSE OUTCOMES

Upon Successful completion of this course, the students will be able to

• Understand, analyze and apply the role of languages HTML, JavaScript, JSP in the workings of the web and web applications
• Analyze a web page and identify its elements and attributes.
• Able to develop web pages using JDBC
• Able to build web applications using JSP.
• Develop and Deploy an Enterprise Application.

LIST OF EXERCISES

- 1. Develop a java application for Bank Transaction with different constraints.
- 2. Develop a java program to get employees details with given constraints.
- 3. Analyze and design the java code for given problems.
- 4. Compute Body Mass Index.
- 5. Implement Body Mass Index Calculator.
- 6. Simpsons Database: There is a database for Springfield Elementary School with the following tables:
- a. Courses(id, name, teacher_id)
- b. Grades(student_id, course_id, grade)
- c. Students(id, name, email, password)
- d. Teachers(id, name)
- 7. World Database: There is a world database with the following tables:
- 1. Countries (code, name, continent, surface_area, population, life_expectancy, gnp, ...)
- 2. Cities (id, name, country_code, district, population)
- 3. CountriesLanguages (country_code, language, official, percentage)
- 8. Design a web page for an Online voting Form with various HTML components.
- 9. Design a web page for an Email Registration Form with various HTML components. Develop a Servlet application to receive the email registration information and store the details into a table.
- 10. Design a web page for integrating the RMI server program to find minimum and maximum of three numbers send by the client program. Design a GUI Form for the RMI client to collect three numbers and display the result of minimum, maximum using Text Field.

PCS-363 Software Engineering Lab

B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
-	-	2	**Class Work**	**:25 Marks**
			Exam.	**:25 Marks**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs**

Course Outcome

Upon successful completion of this course, the student will be able to:

- Apply software development practices in projects
- Express project requirements in IEEE SRS format
- Design using standard design methodologies
- Implement the project using a programming language and platform
- Test and debug the project

LIST OF EXERCISES

1. Prepare the SRS document. You should identify the appropriate requirements for each problem.
2. Draw the Use Case diagrams, Domain Models, and Class Diagrams using Rational Rose. Draw the Sequence Diagrams and Collaboration Diagrams for each Use Case, using Rational Rose. Draw the State Chart Diagrams and Activity Diagrams using Rational Rose, wherever necessary.
3. Develop the corresponding software using Java with an interactive GUI and appropriate Database.
4. Develop software to automate the bookkeeping activities of a 5-star hotel. The local newspaper and magazine delivery agency wants to automate the various clerical activities associated with its business. Develop software for this.
5. A small automobile spare parts shop sells the spare parts for vehicles of several makes and models. Each spare part is typically manufactured by several small industries. To streamline the sales and supply ordering, the shop owner wants to automate the activities associated with his business. Develop software for this.
6. Develop software for the automation of the dispensary of your Institute. Develop software for automating various activities of an Estate Office.
7. Develop word-processing software with some limited number of facilities such as making bold, italics, underline, cut, copy and paste, etc.
8. Develop a graphics editor software package, using which one can create/modify several common types of graphics entities.
9. Develop software for automating various activities of the department offices of your Institute.
10. Write a C function for searching an integer value from a large sorted sequence of integer values stored in array of size 100, using the binary search method. Build the control flow graph of this function using any compiler-writing tool.
11. Write a program in Java to determine its cyclomatic complexity.
12. Write a program in Java to determine the number of defects still remaining after testing, using error seeding methodology.

PCS-364 Mini Project

B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P
-	-	4

Class Work	**:50 Marks**
Exam.	**:50 Marks**
Total	**:100 Marks**
Duration of Exam	**: 3 Hrs**

Course Objectives

On successful completion of this course, the students shall be able to

- Discover potential research areas in the field of information technology
- Create very precise specifications of the IT solution to be designed
- Have introduction to the vast array of literature available about the various research challenges in the field of IT
- Use all concepts of IT in creating a solution for a problem
- Have a glimpse of real world problems and challenges that need IT-based solutions.

TCS-471 /TOE-46 Machine Learning
B.Tech. Semester –VII (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcome

Upon completion of this course, the students will be able to

- Understand complexity of Machine Learning algorithms and their limitations;
- Understand modern notions in data analysis oriented computing;
- Capableof applying common Machine Learning algorithms in practice and implementing their own
- Capable of performing distributed computations
- Capable of performing experiments in Machine Learning using real-world data

Unit 1- INTRODUCTION: Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants – Perceptron – Linear Separability – Linear Regression.

Unit 2- LINEAR MODELS: Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multilayer Perceptron in Practice – Examples of using the MLP – Overview – Deriving BackPropagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines.

Unit 3- TREE AND PROBABILISTIC MODELS: Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms – Vector Quantization – Self Organizing Feature Map

Unit 4- DIMENSIONALITY REDUCTION AND EVOLUTIONARY MODELS: Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting Lost Example – Markov Decision Process

Unit 5- GRAPHICAL MODELS: Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

References

1. EthemAlpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series) Third Edition, MIT Press, 2014
2. Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014
3. Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖, First Edition, Cambridge University Press, 2012.
4. Stephen Marsland, ―Machine Learning – An Algorithmic Perspective‖, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

ECS-441 Blockchain
B.Tech. Semester –VII (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

COURSE OUTCOMES

At the end of this course, the students will be able to

- Understand Blockchain technology.
- Develop Blockchain based solutions and write smart contract using Hyperledger Fabric and Ethereum frameworks.
- Build and deploy Blockchain application for on premise and cloud-based architecture.
- Develop the concepts for safe use of crypto currency
- Integrate ideas from various domains and implement them using Blockchain technology

Unit 1-Introduction: Overview of Blockchain, Public Ledgers, Bitcoin, Smart Contracts, Block in a Blockchain, Transactions, Distributed Consensus, Public vs Private Blockchain, Understanding Crypto currency toBlockchain, Permissioned Model of Blockchain, Overview of Security aspects of Blockchain. Basic Crypto Primitives: Cryptographic Hash Function, Properties of a hash function, Hash pointer and Merkle tree, Digital Signature, Public Key Cryptography, A basic cryptocurrency.

Unit 2-Understanding Blockchain with Crypto currency: Bitcoin and Blockchain: Creation of coins, Payments and double spending, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay. Working with Consensus in Bitcoin: Distributed consensus in open environments, Consensus in a Bitcoin network, Proof of Work (PoW) – basic introduction, HashcashPoW, BitcoinPoW, Attacks on PoW and the monopoly problem, Proof of Stake, Proof of Burn and Proof of Elapsed Time, The life of a Bitcoin Miner, Mining Difficulty, Mining Pool.

Unit 3-Understanding Blockchain for Enterprises: Permissioned Block chain: Permissioned model and use cases, Design issues for Permissioned Blockchains, Execute contracts, State machine replication, Overview of Consensus models for permissioned Blockchain- Distributed consensus in closed environment, Paxos, RAFT Consensus, Byzantine general problem, Byzantine fault tolerant system, Lamport-Shostak-Pease BFT Algorithm, BFT over Asynchronous systems.

Unit 4-Enterprise application of Blockchain: Cross border payments, Know Your Customer (KYC), Food Security, Mortgage over Block chain, Block chain enabled Trade, We Trade – Trade Finance Network, Supply Chain Financing, Identity on Blockchain

Unit 5-Blockchain application development: Hyperledger Fabric- Architecture, Identities and Policies, Membership and Access Control, Channels, Transaction Validation, Writing smart contract using Hyperledger Fabric, Writing smart contract using Ethereum, Overview of Ripple and Corda

LIST OF SUGGESTED BOOKS

1. Daniel Drescher. “Blockchain Basics: A Non-Technical Introduction in 25 Steps”, Apress.
2. Antony Lewis, “The Basics of Bitcoins and Blockchains: An Introduction to Cryptocurrencies and the Technology that Powers Them (Cryptography, Crypto Trading, Digital Assets)”, Mango Publications.
3. Melanie Swan, “Blockchain: Blueprint for a New Economy”, O’Reilly, 2015

ECS-442/TOE-47 Mobile Computing
B.Tech. Semester –VII (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcome
Upon completion of this course, the students will be able to

- Impart knowledge of mobile and wireless computing systems and techniques.
- Understand the knowledge of wireless network
- Understand the concepts of security and failure detection and recovery strategies.
- Understand the concepts routing protocols.
- Understand the working of mobile tracking in wireless network

Unit 1- Introduction : Issues, Challenges, and benefits of Mobile Computing, IEEE 802.11 & Bluetooth, Wireless Multiple access protocols,Sspread spectrum, cellular wireless networks.

Unit 2- Data Management Issues: Wireless computing , nomadic computing, ubiquitous computing and tunneling, data replication for mobile computers, adaptive Clustering for Mobile Wireless networks, LEACH and TORA, mobile TCP (M-TCP)Spooning TCP, Frequency for radio transmission.

Unit 3- Distributed location Management: pointer forwarding strategies, Process communication techniques, Socket Programming, RPC, RMI, Mobile IP, TCP Over wireless. Hidden and exposed terminal problems,

Unit 4- Routing Protocols: Routing Protocol, Dynamic State Routing (DSR), Ad hoc On-Demand Distance Vector (AODV), and Destination Sequenced Distance – Vector Routing (DSDV), Cluster Based Routing Protocol (CBRP).

Unit 5- Fault tolerrence and security : Security and fault tolerance, transaction processing in Mobile computing environment. Mobile Agent Systems: Aglets, PMADE, Case Studies, agent failure scenarios, node failure detection and recovery.

Books

1. Tanenbaum, A.S., Computer Networks, 4th Ed., Pearson Education.
2. Milojicic, D., Douglis, F. and Wheeler R., (ed.), Mobility Processes, Computers and Agents, Addison Wesley.
3. Lange, D.B. and Oshima, M., Programming and Deploying Java Mobile Agents with Aglets, Addison Wesley.
4. Schildt, H., The Complete Reference Java 2, 5th Ed., McGraw-Hill.
5. Stevens, W. R., Unix network Programming: Vol. II, 2nd Ed., Pearson Education.
6. Hansman, U. and Merck, L., Principles of Mobile computing, 2nd Ed., Springer.

ECS-443 Multi-Agent Intelligent Systems

B.Tech. Semester –VII (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon completion of this course, the students will be able to

- Understand the notion of an agent, how agents are distinct from other software paradigms
- Understand the key issues associated with constructing agents capable of intelligent autonomous action, and the main approaches taken to developing such agents
- Understand the key issues in designing societies of agents that can effectively cooperate in order to solve problems.
- Understand the key types of multi-agent interactions possible in such systems
- Understand the main application areas of agent-based solutions, and be able to develop a meaningful agent-based system using a contemporary agent development platform.

Unit 1-Introduction: what is an agent?: agents and objects; agents and expert systems; agents and distributed systems; typical application areas for agent systems.

Unit 2-Intelligent Agents: the design of intelligent agents - reasoning agents (egAgentO), agents as reactive systems (egsubsumption architecture); hybrid agents (eg PRS)

Unit 3-Layered agents: Agents (egInterrap) a contemporary (Java-based) framework for programming agents (eg the Jack language, the JAM! system).

Unit 4-Multi-Agent Systems: Classifying multi-agent interactions - cooperative versus non-cooperative; zero-sum and other interactions; what is cooperation? how cooperation occurs - the Prisoner's dilemma and Axelrod's experiments; Interactions between self-interested agents: auctions & voting systems: negotiation; Interactions between benevolent agents:

Unit 5-Cooperative distributed problem solving (CDPS), partial global planning; coherence and coordination; Interaction languages and protocols: speech acts, KQML/KIF, the FIPA framework. **Advanced topics:** One issue selected from the contemporary research literature, perhaps by guest lecturer..

Books

1. Michael Wooldridge ,An Introduction to MultiAgent Systems - Second Edition. (Wiley, 2009)
2. Rafael H. Bordini, Jomi Fred Hubner and Michael Wooldridge , Programming Multi-agent Systems in AgentSpeak Using Jason. (Wiley, 2007)

ECS-455 Data Mining
B.Tech. Semester –VII(Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcome

Students who successfully complete this course should be able to

- Interpret the contribution of data warehousing and data mining to the decision-support level of organizations
- Evaluate different models used for OLAP and data preprocessing
- Categorize and carefully differentiate between situations for applying different data-mining techniques: frequent pattern mining, association, correlation, classification, prediction, and cluster and outlier analysis
- Design and implement systems for data mining
- Evaluate the performance of different data-mining algorithms
- Propose data-mining solutions for different applications

Unit 1- DATA WAREHOUSE: Data Warehousing - Operational Database Systems vs Data Warehouses - Multidimensional Data Model - Schemas for Multidimensional Databases – OLAP operations – Data Warehouse Architecture – Indexing – OLAP queries & Tools.

Unit 2- DATA MINING & DATA PREPROCESSING: Introduction to KDD process – Knowledge Discovery from Databases - Need for Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

Unit 3- ASSOCIATION RULE MINING: Introduction - Data Mining Functionalities - Association Rule Mining - Mining Frequent Itemsets with and without Candidate Generation - Mining Various Kinds of Association Rules - Constraint – Based Association Mining.

Unit 4- CLASSIFICATION & PREDICTION: Classification vs Prediction – Data preparation for Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

Unit 5- CLUSTERING: Cluster Analysis - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High- Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis. **Data Visualization:**Principles, Parallel Coordinates, Visualization Neural Networks, Visualization of trees.

BOOKS:

1. Jiawei Han and MichelineKamber, “Data Mining Concepts and Techniques”,Second Edition, Elsevier, Reprinted 2011.
2. K.P. Soman, ShyamDiwakar and V. Ajay, “Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, “Introduction to Data Mining with Case Studies”, Easter Economy Edition

ECS-451 Soft Computing
B.Tech. Semester –VII (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon completion ofthis course, the students will be able to

- Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems Implement neural networks to pattern classification and regression problems.
- Apply genetic algorithms to combinatorial optimization problems.
- Apply to design their own optimized algorithm and fuzzy sets for problem solving and decision making.
- Mining the bulk of data present in the warehouse
- Effectively use existing software tools to solve real problems using a soft computing approach.

Unit 1- Introduction to Genetic Algorithm:introduction to soft computing, soft computing vs hard computing, Genetic Operators and Parameters, Genetic Algorithms in Problem Solving, Theoretical Foundations of Genetic Algorithms, Implementation Issues, challenges and applications of G.A.

Unit 2- Artificial Neural Networks & Learning : Introduction to Learning concept: Supervised Learning, Unsupervised Learning and Reinforcement Learning,Neural Model and Network Architectures,Model of Artificial Neuron, Different Activation Functions, Perceptron network, Perceptron Learning, Supervised Hebbian Learning,Adaptive Linear Neuron, Backpropagation network, Backpropogation learning,Fundamentals of Associative Memory, Associative memory models, Auto associative memory, Bi-directional hetero associative memory.

Unit 3- Competitive Networks: Introduction to Competitive Nerual Networks, Principles of Competitive Learning, Hopfield Network, Computing with Neural Nets and applications of Neural Network.

Unit 4- Introduction to Fuzzy Sets:introduction to fuzzy sets, difference between fuzzy sets and crisp sets theory, Operations on Fuzzy sets, Fuzzy properties, Fuzzy Relations, Fuzzy Measures, Applications of Fuzzy Set Theory to different branches of Science and Engineering.

Unit 5- Knowledge discovery in databases:KDD process, star schema, snowflack schema,Data mining and web mining using soft computing techniques.new datawarehouse architecture, database vs datawarehouse bioinformatics, amazon redshift, google big query, panoply.

Books

1. M. Mitchell, An Introduction to Genetic Algorithms, Prentice-Hall, 1998.
2. D. E. Goldberg, Genetic Algorithms in Search, Optimization, and Machine Learning, Addison-Wesley, 1989.
3. S. V. Kartalopoulos, Understanding Neural Networks and Fuzzy Logic: Basic Concepts and Applications, IEEE Press - PHI, 2004.

4. S. Rajasekaran& G. A. VijayalakshmiPai, Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications, PHI, 2003.
5. S. N. Sivanandam& S. N. Deepa, Principles of Soft Computing, Wiley - India, 2007

ECS-452 Cloud Computing
B.Tech. Semester –VII (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon completion of this course, the students will be able to

- Impart the knowledge of cloud computing and technologies, issues in cloud computing etc.
- identify the architecture, infrastructure and delivery models of cloud computing
- Apply suitable virtualization concept.
- Choose the appropriate Programming Models and approach for Services
- Address the core issues of cloud computing such as security, privacy and interoperability

Unit 1- Introduction to Cloud Computing: Definition, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS and Others, Organizational scenarios of clouds, Administering & Monitoring cloud services, benefits and limitations, Deploy application over cloud.
Cloud computing platforms: Infrastructure as service: Amazon EC2, Platform as Service: Google App Engine, Microsoft Azure, Utility Computing, Elastic Computing

Unit 2- Introduction to Cloud Technologies: Study of Hypervisors, Web services: SOAP and REST, SOAP versus REST, AJAX: asynchronous 'rich' interfaces, Mashups: user interface services.
Virtualization Technology: Virtual machine technology, Virtual Machine migration, virtualization applications in enterprises, Pitfalls of virtualization Multitenant software: Multi-entity support, Multi-schema approach, Multi-tenancy using cloud data stores, Data access control for enterprise applications,

Unit 3- Data and Security in the cloud: Relational databases, Cloud file systems: GFS and HDFS, Big Table, HBase and Dynamo. Map-Reduce and extensions: Parallel computing, Map-Reduce model, Enterprise batch processing using Map-Reduce.
Cloud computing security challenges: Virtualization security management- virtual threats, VM Security Recommendations, VM-Specific Security techniques, Secure Execution Environments and Communications in cloud

Unit 4- Service Management and Monitoring in Cloud: Traditional Approaches to SLO Management, Types of SLA, Life Cycle of SLA, SLA Management in Cloud.
Monitoring in cloud:Implementing real time application over cloud platform, Cloud Federation, QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Cloud Middleware, load balancing, resource optimization, resource dynamic reconfiguration,

Unit 5- Cloud computing platforms: Installing cloud platforms and performance evaluation Features and functions of cloud platforms: Xen Cloud Platform, Eucalyptus, OpenNebula, Nimbus, T-Platform, Apache Virtual Computing Lab (VCL), Enomaly Elastic Computing Platform

Books

1. Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper, Cloud Computing for Dummies (Wiley India Edition)
2. GautamShroff, Enterprise Cloud Computing, Cambridge
3. Ronald Krutz and Russell Dean Vines Cloud Security, Wiley-India
4. "Cloud Computing: Principles and Paradigms", RajkumarBuyya, James Broberg, Andrzej Goscinski, Wiley, New York, USA

ECS-453 Reliable Computing

B.Tech. Semester –VII (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon successful completion of this course, the students will be able to

- Learn basic model of reliability and faults
- Understand the principles behind reliability
- Understand Hardware fault tolerance
- Understand Software fault tolerance
- Learn the programming tools in designing reliable systems

Unit 1-Reliability& fault: Definition, System reliability, Parameter values, Reliability models for hardware redundancy , Testing: Various testing methods, Definition, Fault types, Detection, Redundancy, Data diversity, Reversal checks, Byzantine failures, Integrated failure handling..

Unit 2- Hardware Fault Tolerance:-Definition, Fault types, Detection, Redundancy, Data diversity, Reversal checks, Byzantine failures, Integrated failure handling.canonical and Resilient Structures- Series and Parallel Systems, Non-Series/Parallel Systems, *M*-of-*N* Systems, Voters, Variations on *N*-Modular Redundancy, Duplex Systems, Other Reliability Evaluation Techniques-Poisson Processes, Markov Models, Fault-Tolerance Processor-Level Techniques, WatchdogProcessor, Simultaneous Multithreading for Fault Tolerance, Byzantine Failures, Byzantine Agreement with Message Authentication.

Unit 3-Testability for Hardware: testability for combinational circuits: Basic concepts of Testability, Controllability and observability, The Reed Muller's expansion technique, use of control and syndrome testable designs. Design for testability by means of scan: Making circuits Testable, Testability Insertion, Full scan DFT technique- Full scan insertion, flip-flop Structures, Full scan design and Test, Scan Architecturesfull scan design, Shadow register DFT, Partial scan methods, multiple scan design, other scan designs.

Unit 4- Software Fault Tolerance: Acceptance Tests Single-Version Fault Tolerance- Wrappers, Software Rejuvenation, Data Diversity, Software Implemented Hardware Fault Tolerance (SIHFT), *N*-Version Programming-Consistent Comparison Problem, Version Independence, Recovery Block Approach- Basic Principles, Success Probability Calculation, Distributed Recovery Blocks, Preconditions, Postconditions, and Assertions, Exception-Handling- Requirements from Exception-Handlers, Basics of Exceptions and Exception-Handling

Unit 5-Programming Languages and Tools: Desired Language Characteristics, Data typing, control structures, Hierarchical decomposition, Packages, Exception handling, Over loading and Generics, Multi tasking, Task scheduling, Timing specification., Flex, Euclid, Environments, Run time support.

Books

1. Israel Koren And C. Mani Krishna, "Fault-Tolerant Systems, Morgan Kaufmann publisher
2. C. Siva Ram Murthy and G. Manimaran, 'Resource Management in Real Time Systems and Networks', the MIT Press, 2001.
3. Phillip A. Laplante, 'Real-Time Systems Design and Analysis – An Engineers Hand book', Printice Hall India, 3rd edition, 1997.

ECS-454Software Project Management

B.Tech. Semester –VII (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

COURSE OUTCOMES

Upon completion of this course, the students will be able to

- Produce the quality product without defects.
- Complete the task with better quality on time.
- Format their process of modelling
- Streamline their activities to yield better result
- Manage the people and control the defects.

Unit 1- Basic Concepts: Product, Process and Project, Definition, Components of Software Project Management(SPM), Challenges and Opportunities, Tools and Techniques, Managing Human Resource and Technical Resource, Costing and pricing of projects, Training and development, Project management technique, Product Life Cycle , Project Life Cycle Models.

Unit 2- Format Process Models And Their Use: Definition and Format Model for a Process, ISO 9001 and CMM Models and their relevance to Project Management, Other Emerging Models like People CMM

Unit 3- Umbrella Activities In Projects: Metrics, Methods and Tools for Metrics, Issues of Metrics in multiple Projects, Configuration Management, Software Quality Assurance, Quality Standards and Certifications, Process and Issues in obtaining Certifications, Risk issues in Software Development and Implementation, Identification of Risks , Resolving and Avoiding risks, Tools and Methods for Identifying Risk Management.

Unit 4- Instream Activities In Project: Project Initiation, Project Planning, Execution and Tracking, Project Wind up, Concept of Process, Project Database.

Unit 5- Engineering And Issues In Project Management: Requirements, Design, Development, Testing, Maintenance, Deployment, Engineering Activities and Management Issues in Each Phase, Special Considerations in Project Management for India and Geographical Distribution Issues.

TEXT BOOK(S)

1. Royce and Walker, “Software Project Management”, 2nd Edition, Pearson Education, 2002.

REFERENCES

1. Bob Hughes and Mike Cotterell, “Software Project Management”, 5th Edition, Tata McGrawHill, 2011.
2. Kelker, S. A, “Software Project Management”, 2nd Edition, Prentice Hall, 2003.
3. Gopalaswamy Ramesh, "Managing Global Projects", 1st Reprint Edition, Tata McGraw Hill,2006.
4. Robert K. Wysocki, “Executive's Guide to Project Management”, 2nd Edition, John Wiley &Sons, 2011.
5. Teresa and luckey, Joseph Phillips, “Software project Management for dummies”, 3rd Edition, Wiley publishing Inc., 2006.

PCS-471 Machine Learning Lab

B.Tech. Semester –VII (Computer Science &Engg.)

L	T	P		
-	-	2	**Class Work**	**:35 Marks**
			Exam.	**:25 Marks**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs**

Course Objectives

On successful completion of this course, the students shall be able to

- Make use of Data sets in implementing the machine learning algorithms
- Understand the implementation procedures for the machine learning algorithms.
- Design Java/Python programs for various Learning algorithms.
- Apply appropriate data sets to the Machine Learning algorithms.
- Identify and apply Machine Learning algorithms to solve real world problems.

Lab Experiments:

1. Implement and demonstratethe FIND-Salgorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithmto output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge toclassify a new sample.
4. Build an Artificial Neural Network by implementing the Backpropagationalgorithm and test the same using appropriate data sets.
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

PCS-472 Project-I

B.Tech. Semester –VII (Computer Science &Engg.)

L	T	P		
-	-	8	**Class Work**	**:100 Marks**
			Exam.	**:100 Marks**
			Total	**:200 Marks**
			Duration of Exam	**: 3 Hrs**

Course Objectives

On successful completion of this course, the students shall be able to

- Take up investigative study in the broad field of Computer Science & Engineering, either fully theoretical/practical or involving both the theoretical and practical work
- Take up project assigned by the Department on an individual basis or in a group under the guidance of a supervisor
- Survey and study published literature on the assigned topic, identify the research gaps and work out a systematic approach to the problem related to the assigned topic
- Conduct preliminary analysis, modeling, simulation and experiment
- Prepare a report on the study conducted and make presentation before the Department

The objective of Project-Iis to enable the student to take up investigative study in the broad field of Computer Science & Engineering, either fully theoretical/practical or involving both theoretical and practical work which is to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor. This is expected to provide a good initiation for the student(s) in R&D work.

Key Points:

- Survey and study of published literature on the assigned topic.
- Working out a systematic approach to the problem related to the assigned topic.
- Conducting preliminary Analysis, Modelling, Simulation and Experiment
- Preparing a report on the study conducted for presentation to the Department
- Final Seminar, as oral Presentation before a Departmental Committee.

PCS-473 Industrial Training
B.Tech. Semester –VII (Computer Science &Engg.)

L	T	P		
-	-	2	**Class Work**	**:50 Marks**
			Exam.	**:--**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs**

About Industrial Training

It is an organized method or activity of enhancing and improving skill set and knowledge of engineering students which boost their performance and consequently helping them to meet their career objectives.Industrial Training is an essential component in the development of the practical and professional skills required for an Engineer and an aid to prospective employment

Objectives of Industrial Training

• The main objective of Industrial Training is to expose the students to actual working environment and enhance their knowledge and skill from what they have learned in the college.
• Another purpose of this program is to enhance the good qualities of integrity, responsibility and self-confidence. All ethical values and good working practices must be followed by student.
• It is also to help the students about the safety practices and regulations inside the industry and to instill the spirit of teamwork and good relationship between students and employees.

Course Outcomes

At the end of Industrial Training, the students will be able to

- Understand organizational issues and its impact on organization and employees.
- Identify industrial problems and suggest possible solutions.
- Relate, apply and adapt relevant knowledge, concepts and theories within an industrial organization, practice and ethics.
- Apply technical knowledge in an industry to solve real world problems.
- Demonstrate effective group communication, presentation, self-management and report writing skills**.**

TAH-473 Engineering Economics
B.Tech. Semester –VII(Computer Science &Engg.)

L	T	P		
2	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

COURSE OBJECTIVE- The Course aims to make student understand various social, legal and economic factors effecting business world so that to help take risk and challenges for Managerial Decision Making.

UNIT I: INTRODUCTION & OVERVIEW : (8 hours)
Introduction to Economics, Evolution, Nature and Significance of Economics, Fundamental Principles, Relation of Science, Engineering and Technology to Economics.

UNIT II: MICRO AND MACRO ECONOMICS : (8 hours)
Meaning, Nature, Significance of Micro and Macro Economics, Importance of Micro and Macro Economics, Differences and Interrelationship between Micro and Macro Economics, Economic Static and Dynamic Analysis.

UNIT III: DEMAND & SUPPLY ANALYSIS : (8 hours)
Demand Analysis for Decision Making-Determinants of demand, Law of demand, Law of supply; Indifference Curve Analysis; elasticity of demand, Price, Income and Substitution effect.

UNIT IV: MONEY AND BANKING: (8 hours)
Evolution of Money (Barter Process), Functions of Money, Value of Money, Inflation and Measure to control it. Introduction to Banking, Banking structure in India, Commercial and Central Banking in India.

UNIT V: CENTRAL BANKING: (8 hours)
Definition of Central Banking, Evolution of Central Banking, Functions of a Central Bank, Difference between Commercial and Central Banks, Monetary and Fiscal Policies with their objectives

TEXT BOOKS

1. *Dwivedi, D.N. (2015). Managerial Economics, 8th edition. Vikas – New Delhi.*
2. *Mithani, D.M. (2017). Managerial Economics: Theory & Applications. Himalayan – Mumbai.*
3. *Maheswari, Y. (2013). Managerial Economics, 13th edition. Prentice Hall – New Delhi*
4. *Agarwal, Vanita (2013). Managerial Economics. Pearson – New Delhi*
5. *Salvatore, Dominick (2015). Managerial Economics in a Global Economy, 8th edition.Oxford University Publication – New Delhi*
6. *Hirschey, Mark (2013). ManagerialEconomics.Cenage – New Delhi*

COURSE OUTCOME
CO-1 Helps to know the application of engineering to economics.
CO-2 The learning outcome for the students would be they get the actual difference between micro and macro economics.
CO-3 It gives students an introduction to the tools used by micro-economists and serves as a foundation to many economics courses that follow such as labor, financial and industrial economics.
CO-4 Provide the ability to use theories in analyzing economic phenomena for solving monetary problems.
CO-5 Helps in understanding the concept of banking operations in India.

TCS-481 Digital Image Processing
B.Tech. Semester –VII (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon completion ofthis course, the students will be able to

- Understanding the fundamentals of digital image processing.
- Knowledge and understanding of image processing in spatial domain.
- Familiar with concepts of digital image processing in Frequency domain.
- Fundamentals of color image processing and Morphological Image Processing.
- Knowledge and understanding of image Registration and image features.

Unit 1-Introduction: Digital Image Processing, The origins of Digital Image Processing, Examples of Digital Image Processing application, Fundamental steps in Digital Image processing, Components of Image Processing system Fundamentals: Elements of Visual Perception, Light and Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Some basic Relationships between Pixels, Linear and Nonlinear Operations, An introduction to mathematical tool used in digital image processing.
Unit 2-Image Enhancement in the spatial domain: Background, Some basic gray level transformation, Introduction of Histogram processing, Enhancement using Arithmetic/Logic operations, Basics of spatial filtering, Smoothing spatial filters, Sharpening spatial filters, Concept of Sampling.

Unit 3-Image Restoration: Model of the Image Degradation/Restoration process, Noise Models, Restoration in the presence of noise only spatial filtering, Inverse filtering, Minimum Mean Square Error (Wiener) filtering, Geometric mean filter.

Unit 4-Image Compression: Fundamentals, Lossy Compression, Lossless Compression, ImageCompression models, Error-free Compression : Variable length coding, LZW coding, Bit plane coding, Run length coding, Introduction to JPEG, introduction to color image processing, color fundamentals, color models, Pseudocolor image processing.

Unit 5-Morphology and Segmentation: Erosion, Dilation, Duality, Opening and Closing, Hit-and Miss transform, Morphological **Algorithms :**Boundry Extraction, Hole filling, Extraction of connected components, Convex Hull, Concept of Thinning and Thickning.

Image Segmentation: Definition, characteristics of segmentation Detection of Discontinuities, Thresholding, Region based segmentation. Introduction Object Recoginition, pattern and Pattern classes.

References

1. Rafael C. Gonzalez and Richard E.Woods. ,Digital Image Processing: Addision Wesley.
2. Anil K. Jain , Fundamentals of Digital Image Processing, PHI.
3. B. Chanda& D. DuttaMajumber , Digital Image Processing and Analysis , PHI.
4. Dwayne Phillips , Image Processing in C , BPB

ECS-461 Embedded Systems
B.Tech. Semester –VIII (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon successful completion of this course, the students will be able to

- Develop assembly language programs for 8051 and its applications in the field of information technology using different types of interfacing
- Acquire knowledge on embedded systems basics and describe the architecture and operations of ARM processor
- Develop skills in writing small programs for ARM processor
- Apply different types of interfaces with interrupt handling mechanism
- Understand the multiple process operating environments and use standard system call interfaces to monitor and control processes

Unit 1-Review of Embedded Hardware: Gates: Timing Diagram- Memory –microprocessors Buses Direct Memory Access-Interrupts- Built-ins on the Microprocessor-Conventions used on Schematics chematic. Interrupts Microprocessor Architecture-Interrupt Basics- Shared Data Problem-Interrupt latency.

Unit 2-Microchip PIC Micro controller: Introduction, CPU Architecture- Registers- Instruction sets addressing modes- Loop timing- Timers- Interrupts, Interrupt timing, I/O Expansion, I2C Bus Operation Serial EEPROM, Analog to Digital converter, UART-Baud Rate- Data Handling-Initialization, Special Features – Serial Programming-Parallel Slave Port.

Unit 3-Embedded Microcomputer Systems: Motorola MC68H11 Family Architecture, Registers , Addressing modes Programs. Interfacing methods parallel I/O interface, Parallel Port interfaces, Memory Interfacing, High Speed I/O Interfacing, Interrupts-Interrupt service routine-Features of interrupts-Interrupt vector and Priority, Timing generation and measurements, Input capture, Output compare, Frequency Measurement, Serial I/O devices RS 232,RS485.

Unit 4-Software Development: Round–Robin, Round robin with Interrupts, function-Queue- Scheduling Architecture, Algorithms. Introduction to - Assembler- Compiler –Cross Compilers and Integrated Development Environment (IDE). Object Oriented Interfacing, Recursion, Debugging strategies, Simulators

Unit 5-Real Time Operating Systems: Task and Task States, Tasks and data, Semaphores and shared Data Operating system Services-Message queues-Timer function-Events-Memory Management, Interrupt Routines in an RTOS environment, Basic design using RTOS.

Books

1. David E Simon, “An embedded software primer”, Pearson Education Asia, 2001
2. John B Pitman, “Design with PIC Micro controllers”, Pearson Education Asia, 1998
3. Jonartthan W. Valvano, “Embedded Micro computer Systems, Real time Interfacing”, Thomson learning 2001.

ECS-462 Cyber Security
B.Tech. Semester –VIII (Computer Science & Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon completion of this course, the students will be able to

- Relate and safeguard their organizations from the scenarios of passive and active attacks.
- Understand the terminologies and vulnerabilities in the field of cyber security
- Demonstrate the use of anti-malware tools for enhancing system network protection
- Understand and analyze digital forensics with evidence
- Understand the basic principles of Ethical Hackingalong with its techniques.

Unit 1- Cryptography and Cryptanalysis: Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication, Digital Signatures, Security Protocols: - Security at Network Layer-IPsec, Security at Transport Layer- SSL and TLS, Security at the Application Layer- PGP and S/MIME, , Steganography (tools)

Unit 2- Cyber Security: Essential Terminologies - CIA, Risks, Breaches, Threats, Attacks, Challenges, Port Scanners, Cyber Security Vulnerabilities-Authentication, Authorization, Unprotected Broadband communications, Poor Cyber Security Awareness, Organizational Guidelines for Internet Usage, Incident Handling: An Essential Component of Cyber security, Media and Asset Protection, Importance of Endpoint Security in Organizations, Introduction to Biometrics systems.

Unit 3- Malware: Explanation of Malware, Types of Malware: Virus, Worms, Trojans, Rootkits, Robots, Adware's, Spywares, Ransomware, Zombies etc., Malware Analysis, Antivirus Protection, Anti Spywares, System tuning tools, and Anti Phishing tools.

Unit 4- Digital Forensics: Introduction to Digital forensics, Digital Evidence, Life cycle, Challenges, Computer forensics, Need for Computer Forensic, E-mail Forensics, Mobile Forensics, Network Forensics, Forensics Auditing and Anti-forensics.

Unit 5- Introduction to Ethical Hacking: Terminology, Attack Types, Purpose, Types of Hacking, Categories of Hackers, Penetration Testing-Legal and Ethical Considerations, Creating and Implementing a Test Plan, Social Network protection, Foot printing, password crackingand other ethical hacking techniques.

TEXT BOOK(S)

1. Nina Godbole, SunitBelapure, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India (P) Ltd., 2011.
2. Whitaker, Newman, "Penetration Testing and Network Defense", Cisco Press, Indianapolis, 2006.

ECS-463Information Theory and Coding

B.Tech. Semester –VIII (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon successful completion of this course, the students will be able to

- Measure and analyze the quantity of information associated to events or random variables.
- Determine the limits of communications systems in terms of source and channel coding.
- Examine linear block codes and the algebraic structures used in the construction and in the decoding of cyclic codes.
- Calculate the error probability of a channel coding system with hard or soft decoding.
- Describe the coding techniques used in composite codes like LDPC and turbo codes that can reach the channel capacity

Unit 1-Introduction to information theory, information associated to an event, entropy, joint entropy, conditional entropy, mutual information, relationship between entropy and mutual information, the Venn diagram, chain rules for entropy and mutual information, Log sum inequality,

Unit 2-Data processing theorem, entropy of continuous random variables. Data compression, example of codes, Kraft-Macmillan inequality, source coding and entropy, Huffman codes., high probability sets ant typical dataset compression.

Unit 3-Introduction to channel coding , basic concepts of block codes like Hamming distance Hard decoding and performance over a binary symmetric channel,Channels, channel coding, channel capacity and the general random coding theorem soft decoding and performance over a Gaussian channel with a BPSK input.

Unit 4-Linear block codes, generator matrix, parity check matrix, singleton bound, Syndrome table and decoding over a binary symmetric channel, examples of linear block codes, Recall of arithmetic structures, vector Space, Galois field, cyclic codes, BCH codes, Peterson decoding algorithm, Reed Solomon codes. Convolution codes, structure, Trellis diagram, state diagram, transfer function calculation, Recursive Systematic convolutional codes.

Unit 5-Introduction to composite codes, LDPC codes, Tanner graph, Iterative decoding of LDPC codes over an erasure channel, Soft-Input Soft-Output decoding, A posteriori probability and Log likelihood ratio, Iterative decoding of LDPC codes over a Gaussian channel, encoding and iterative decoding of turbo codes.

Books

1. T. M. Cover, J. A, Thomas, "Elements of information theory," WielyInterscience, 2nd Edition, 2006
2. R. W. Hamming, "Coding and information theory," Prentice Hall Inc., 1980.

ECS-464 Data Analytics
B.Tech. Semester –VIII (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:50 Marks**
			Exam.	**:100 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon completion of this course, the students will be able to

- Appreciate the fundamentals and describe what Big Data Analytics is.
- Understand the Big Data flow and apply necessary components to build a Big Data Analytics System.I.
- Identify and successfully apply appropriate techniques and tools to solve Big Data problems.
- Analyze the requirements for a Big Data Analytics System for departmental organizational requirements using Hadoop.
- Understand Big Data ecosystem, specifically PIG and Hive.

Unit 1- INTRODUCTION TO BIG DATA: Introduction To Big Data Platform – Challenges Of Conventional Systems – Web Data – Evolution Of Analytic Scalability, Analytic Processes And Tools, Analysis Vs Reporting – Modern Data Analytic Tools, Stastical Concepts: Sampling Distributions, Resampling, Statistical Inference, Prediction Error.

Unit 2- DATA ANALYSIS: Regression Modeling, Multivariate Analysis, Bayesian Modeling, Inference And Bayesian Networks, Support Vector And Kernel Methods, Analysis Of Time Series: Linear Systems Analysis, Nonlinear Dynamics – Rule Induction – Neural Networks: Learning And Generalization, Competitive Learning, Principal Component Analysis And Neural Networks; Fuzzy Logic: Extracting Fuzzy Models From Data, Fuzzy Decision Trees, Stochastic Search Methods.

Unit 3- MINING DATA STREAMS: Introduction To Streams Concepts – Stream Data Model And Architecture – Stream Computing, Sampling Data In A Stream – Filtering Streams – Counting Distinct Elements In A Stream – Estimating Moments – Counting Oneness In A Window – Decaying Window – Realtime Analytics Platform(RTAP) Applications – Case Studies – Real Time Sentiment Analysis, Stock Market Predictions.

Unit 4- FREQUENT ITEMSETS AND CLUSTERING: Mining Frequent Itemsets – Market Based Model – Apriori Algorithm – Handling Large Data Sets In Main Memory – Limited Pass Algorithm – Counting Frequent Itemsets In A Stream – Clustering Techniques – Hierarchical – K- Means – Clustering High Dimensional Data – CLIQUE And PROCLUS – Frequent Pattern Based Clustering Methods – Clustering In Non-Euclidean Space – Clustering For Streams And Parallelism.

Unit 5- FRAMEWORKS AND VISUALIZATION: MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases – S3 – Hadoop Distributed File Systems – Visualizations – Visual Data Analysis Techniques, Interaction Techniques; Systems And Applications.

BOOKS

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
2. AnandRajaraman And Jeffrey David Ullman, Mining Of Massive Datasets,Cambridge University Press, 2012.
3. Bill Franks, Taming The Big Data Tidal Wave: Finding Opportunities In Huge Data Streams With Advanced Analytics, John Wiley & Sons, 2012.
4. Glenn J. Myatt, Making Sense Of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O‟Reilly, 2011.

PCS-481 Digital Image Proccesing Lab

B.Tech. Semester –VIII (Computer Science &Engg.)

L	T	P		
-	-	2	**Class Work**	**:25 Marks**
			Exam.	**:25 Marks**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs**

The experiments will be based on the following

LIST OF EXPERIMENTS

1. Write a program to extract different Attributes of an Image.

2. Write a program to display gray scale image, resize image, transform image.

3. Write a program to convert color image to gray scale image, Color image into Binary Image, Separate color image into three separate R, G, B planes, combine three separate R, G, B planes to create color image.

4. Write a program for Flip given image horizontally, modify program of horizontal flipping for getting vertical flipping, Perform image arithmetic operation.

5. Write a program for Power Law Transformation.

6. Write a program for Histogram Mapping and Equalization.

7. Write a program for Image Smoothening and Sharpening.

8. Write a program for Edge Detection using

- Sobel Operator
- Prewitt Operator
- Roberts Operators.

9. Write a program to implement segmentation using Global threshold method.

10. Write a program to implement segmentation using local thresholding method.

11. Write a program for Morphological Operations on Binary Images.

PCS-482 Project-II

B.Tech. Semester –VIII (Computer Science &Engg.)

L	T	P		
-	-	16	**Class Work**	**:200 Marks**
			Exam.	**:200 Marks**
			Total	**:400 Marks**
			Duration of Exam	**: 3 Hrs**

Course Objectives

On successful completion of this course, the students shall be able to

- Extend further the investigative study taken up under Project-I, either fully theoretical/practical or involving both the theoretical and practical work under the guidance of a supervisor from the Department alone or jointly with a supervisor drawn from R&D laboratory/industry and obtain a good training in R&D work and technical leadership
- Review and finalize the approach to the problem relating to the assigned topic and prepare an action plan for preparing conducting the investigation and assign responsibilities for team work
- Conduct detailed analysis, modeling, simulation, design, problem solving or experiment as needed on the assigned topic
- Develop product/process, test, draw results and conclusions, and give direction for future research and prepare a paper for conference presentation/publication in journals, if possible
- Prepare a project report in the standard format for being evaluated by the Department and make final presentation on the project

The object of Project II is to enable the student to extend further the investigative study taken up under project I, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership.

- Review and finalization of the Approach to the Problem relating to theassigned topic andPreparing an Action Plan for conducting the investigation, including team work.
- Detailed Analysis/Modelling/Simulation/Design/Problem Solving/Experiment as needed.
- Final development of product/process, testing, results, conclusions and future directions andPreparing a paper for Conference presentation/Publication in Journals, if possible.
- Preparing a Dissertation in the standard format for being evaluated by the Department.
- Final Seminar Presentation before a Departmental Committee.

PCS-483 Seminar

B.Tech. Semester –VIII (Computer Science &Engg.)

L	T	P		
-	-	2	**Class Work**	**:50 Marks**
			Exam.	**:--**
			Total	**:50 Marks**
			Duration of Exam	**: 3 Hrs**

Course Objectives

On successful completion of this course, the students shall be able to

- Express themselves fluently and appropriately in social and professional contexts
- Develop the sub-skills required for paper presentation and group discussions
- Acquire the soft skills and interpersonal skills which will help them in their workplace needed for these functions
- Collect materials from books, Internet, journals, and newspapers for the seminar theme and prepare a short seminar report
- Make presentation on the topic, answer the queries/questions that come forward, clarify and supplement if necessary, and submit a report

SEMINAR: Seminar presentation on the themes allotted:

Each student should collect materials from Books, Internet, Journals and Newspapers for hlslher theme and prepare a short Seminar for 4 to 5 Pages. During the seminar session each student is - expected to prepare and present a topic, for duration of about 15 to 20 minutes. It should be followed by a Viva Voce during which others should come forward to question, clarify, supplement or evaluate. The student is evaluated based on the presentation skill, concept and Query clarification. At the end of the semester, he / she can submit a report on his / her topic of seminar and marks are given based on the report. A Faculty is to be allotted and he / she will guide and monitor the progress of the student and maintain the attendance also. The seminar will be assessed by a committee appointed by the department.

Some of the themes like:

- Cloning
- Artificial satellites Cyber Revolution Space research Nano Technology Robotics ‘
- Artificial intelligence Role of Fibre Optics
- Industrial development and ecological issues
- Recent trends in Automobiles
- Hazards of E-waste
- Mobile Jammer T
- Touch Screen Technology :
- 4G Technology .
- Tsunami Warning System A\P
- Blue Tooth Technology
- Blockchain
- Machine Learning
- Virtual Reality