EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
II-YEAR (III-SEMESTER)
(Effective from session: 2019-20)

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 & ALGORITHMS	3	1	0	40	40	80	120	200	4
2.	TCS-232	GRAPH THEORY	3	1	0	40	40	80	120	200	4
3.	TES-232	ANALOG ELECTRONIC CIRCUITS	3	1	0	40	40	80	120	200	4
4.	TES-233	DIGITAL ELECTRONICS	3	1	0	40	40	80	120	200	4
5.	TBS-231	MATHEMATICS-III	3	1	0	40	40	80	120	200	4
PRACTICAL											
6.	PCS-231	DATA STRUCTURE & ALGORITHMS LAB	0	0	2	10	15	25	25	50	1
7.	PCS-232	IT WORKSHOP	1	0	4	10	15	25	25	50	3
8.	PES-232	ANALOG ELECTRONIC CIRCUITS LAB	0	0	2	10	15	25	25	50	1
9.	PES-233	DIGITAL ELECTRONICS LAB	0	0	2	10	15	25	25	50	1
10.	GPP 231	GENERAL PROFICIENCY	0	0	0	0	50	50	0	50	0
SEMESTER TOTAL			**16**	**5**	**10**	**240**	**310**	**550**	**700**	**1250**	**26**

EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
II-YEAR (IV-SEMESTER)
(Effective from session: 2019-20)

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	40	40	80	120	200	4
2.	TCS-242	OPERATING SYSTEMS	3	1	0	40	40	80	120	200	4
3.	TCS-243	DESIGN & ANALYSIS OF ALGORITHMS	3	1	0	40	40	80	120	200	4
4.	TCS-244	DISCRETE MATHEMATICS	3	1	0	40	40	80	120	200	4
5.	THS-241	MANAGEMENT 1 (ORGANIZATIONAL BEHAVIOUR/ FINANCE & ACCOUNTING)	3	0	0	30	30	60	90	150	3
6.	TMC-242	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	2	0	0	15	10	25	50	75	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	DESIGN & ANALYSIS OF ALGORITHMS LAB	0	0	2	10	15	25	25	50	1
10.	GPP 241	GENERAL PROFICIENCY	0	0	0	0	50	50	0	50	0
SEMESTER TOTAL			**17**	**4**	**6**	**235**	**295**	**530**	**695**	**1225**	**22**

EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
III-YEAR (V-SEMESTER)
(Effective from session: 2020-21)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME					
						SESSIONAL EXAM			ESE	Subject Total	Credits
			L	T	P	CT	TA	Total			
THEORY											
1.	TCS-351	DATABASE MANAGEMENT SYSTEMS	3	1	0	40	40	80	120	200	4
2.	TCS-352	OBJECT ORIENTED PROGRAMMING	2	1	0	30	30	60	90	150	3
3.	TCS-353	FORMAL LANGUAGE & AUTOMATA THEORY	3	1	0	40	40	80	120	200	4
4.	TES-351	SIGNALS & SYSTEMS	3	0	0	30	30	60	90	150	3
5.	THS-351	PRINCIPLES OF MANAGEMNET	3	0	0	30	30	60	90	150	3
6.	ECS-31X	ELECTIVE-I	3	0	0	30	30	60	90	150	3
7.	TMC-351	CONSTITUTION OF INDIA	2	0	0	15	10	25	50	75	0
PRACTICAL											
8.	PCS-351	DATABASE MANAGEMENT SYSTEMS LAB	0	0	2	10	15	25	25	50	1
9.	PCS-352	OBJECT ORIENTED PROGRAMMING 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			**19**	**3**	**4**	**235**	**290**	**525**	**700**	**1225**	**22**

ELECTIVE-I

ECS-311 SOFTWARE ENGINEERING
ECS-312 QUEUING THEORY AND MODELING
ECS-313 COMPUTER GRAPHICS
ECS-314 FAULT TOLERANT COMPUTING
ECS-315 COMPUTAIONAL NUMBER THEORY

EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
III-YEAR (VI-SEMESTER)
(Effective from session: 2020-21)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME					
						SESSIONAL EXAM			ESE	Subject Total	Credits
			L	T	P	CT	TA	Total			
THEORY											
1.	TCS-361	COMPLIER DESIGN	3	1	0	40	40	80	120	200	4
2.	TCS-362	COMPUTER NETWORKS	3	1	0	40	40	80	120	200	4
3.	ECS-32X	ELECTIVE-II	3	0	0	30	30	60	90	150	3
4.	ECS-33X	ELECTIVE-III	3	0	0	30	30	60	90	150	3
5.	TOE-XY	OPEN ELECTIVE-I	3	0	0	30	30	60	90	150	3
PRACTICAL											
6.	PCS-361	COMPLIER DESIGN LAB	0	0	2	10	15	25	25	50	1
7.	PCS-362	COMPUTER NETWORKS LAB	0	0	2	10	15	25	25	50	1
8.	PCS-363	MINI PROJECT	0	0	4	0	0	50	50	100	2
9.	GPP 361	GENERAL PROFICIENCY	0	0	0	0	50	50	0	50	0
SEMESTER TOTAL			**15**	**2**	**8**	**190**	**250**	**490**	**610**	**1100**	**21**

ELECTIVE-II
ECS-321 ARTIFICIAL INTELLIGENCE
ECS-322 DISTRIBUTED SYSTEMS
ECS-323 REAL TIME SYSTEM
ECS-324INFORMATION THEORY AND CODING
ECS-325 JAVA PROGRAMMING

ELECTIVE-III
ECS-331 EMBEDDED SYSTEMS
ECS-332 WEB TECHNOLOGY
ECS-333 VLSI SYSTEM DESIGN
ECS-334 DATA MINING
ECS-335 HUMAN COMPUTER INTERACTION

EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
IV-YEAR (VII-SEMESTER)
(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.	ECS-44X	ELECTIVE-IV	3	0	0	30	30	60	90	150	3
2.	ECS-45X	ELECTIVE-V	3	0	0	30	30	60	90	150	3
3.	TOE-XY	OPEN ELECTIVE-II	3	0	0	30	30	60	90	150	3
4.	THS-471	ENGINEERING ECONOMICS	3	0	0	30	30	60	90	150	3
PRACTICAL											
5.	PCS-471	PROJECT-I	0	0	8	0	0	100	100	200	4
6.	PCS-472	INTERNSHIP/ INDUSTRIAL TRAINING	0	0	2	0	0	50	0	50	1
7.	GPP 471	GENERAL PROFICIENCY	0	0	0	0	50	50	0	50	0
SEMESTER TOTAL			**12**	**0**	**10**	**120**	**170**	**440**	**440**	**900**	**17**

ELECTIVE-IV
ECS-441 CRYPTOGRAPHY & NETWORK SECURITY
ECS-442 INTERNET-OF-THINGS
ECS-443 DIGITAL IMAGE PROCESSING
ECS-444 MULTI-AGENT INTELLIGENT
ECS-445 QUANTUM COMPUTING

ELECTIVE-V

ECS-451 SOFT COMPUTING
ECS-452 CLOUD COMPUTING
ECS-453MOBILE COMPUTING
ECS-454 DIGITAL SIGNAL PROCESSING
ECS-455 COMPUTIONAL GEOMETRY

EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
IV-YEAR (VIII-SEMESTER)
(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.	ECS-46X	ELECTIVE-VI	3	0	0	30	30	60	90	150	3
2.	TOE-XY	OPEN ELECTIVE-III	3	0	0	30	30	60	90	150	3
3.	TOE-XY	OPEN ELECTIVE-IV	3	0	0	30	30	60	90	150	3
PRACTICAL											
4.	PCS-481	PROJECT-II	0	0	32	0	0	400	400	800	16
5.	PCS-482	SEMINAR	0	0	2	0	0	50	0	50	1
6.	GPP 481	GENERAL PROFICIENCY	0	0	0	0	50	50	0	50	0
SEMESTER TOTAL			**9**	**0**	**34**	**90**	**140**	**680**	**670**	**1350**	**26**

ELECTIVE-VI

ECS-461 MACHINE LEARNING
ECS-462 AD-HOC AND SENSOR NETWORKS
ECS-463 CYBER LAW AND ETHICS
ECS-464 COMPUTAIONAL COMPEXITY
ECS-465 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)
(COMMAN FOR ALL BRANCHES)
(Effective from session: 2018-19)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME					
						SESSIONAL EXAM			ESE	Subject Total	Credits
			L	T	P	CT	TA	Total			
THEORY											
1.	TES-111/121	PROGRAMMING FOR PROBLEM SOLVING	3	1	0	40	40	80	120	200	4
PRACTICAL											
2.	PES-111/121	PROGRAMMING FOR PROBLEM SOLVING LAB	0	0	2	10	15	25	25	50	1

TES-111/ 121 Programming For Problem Solving

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

L	T	P		
3	1	-	**Class Work**	**:80 Marks**
			Exam.	**:120 Marks**
			Total	**:200 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 IC programs using operators
- Develop conditional and iterativestatements to write C programs
- Exercise user defined functions to solvereal time problems
- Inscribe C programs that use Pointers toaccess arrays, strings and functions.
- Exercise user defined data typesincluding structures and unions to solve problems
- Inscribe C programs using pointers andto allocate memory using dynamic memorymanagement functions.
- Exercise files concept to show input andoutput of files in C

UNIT I

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 II

Arithmetic expressions and precedence ,Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching, Iteration and loops.

UNIT III

Arrays, Arrays (1-D, 2-D), Character arrays and Strings. 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, Ackerman function etc. Quick sort or Merge sort.

UNIT IV

Basic Algorithms, Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

UNIT V

Structure: Structures, Defining structures and Array of Structures, 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

PES-111/121 Programming For Problem Solving Lab

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

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

The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.

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

TES- 232 Analog Electronic Circuits
B.Tech. Semester –III (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:80 Marks**
			Exam.	**:120 Marks**
			Total	**:200 Marks**
			Duration of Exam	**: 3 Hrs.**

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

- Understand the characteristics oftransistors.
- Design and analyse various rectifier and amplifiercircuits.
- Design sinusoidal and non-sinusoidaloscillators.
- Understand the functioning of OP-AMP and design OP-AMP basedcircuits.

UNIT I:Diode circuits:junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, Zener diodes, clamping and clippingcircuits.

UNIT II :BJT circuits: Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal model, biasing circuits, current mirror; common-emitter, common-base and common- collector amplifiers; Small signal equivalent circuits, high-frequency equivalent circuits

UNIT III MOSFET circuits: MOSFET structure and I-V characteristics. MOSFET as a switch. MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits - gain, input and output impedances, trans- conductance, high frequency equivalent circuit.

UNIT IV Differential, multi-stage and operational amplifiers: Differential amplifier; power amplifier; direct coupled multi-stage amplifier; internal structure of an operational amplifier, ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidthproduct)

UNIT V: Linear applications of op-amp: Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, P, PI and PID controllers and lead/lag compensator using an op-amp, voltage regulator, oscillators (Wein bridge and phase shift).

Analog to Digital Conversion.Nonlinear applications of op-amp Hysteretic Comparator, Zero Crossing Detector, Square-wave and triangular-wave generators.Precision rectifier, peak detector.Monoshot.

Text/References:

1. S. Sedra and K. C. Smith, Microelectronic Circuits, New York, Oxford University Press,1998.
2. J. V. Wait, L. P. Huelsman and G. A. Korn, Introduction to Operational Amplifier theory and applications, McGraw Hill U. S., 1992.
3. J. Millman and A. Grabel, Microelectronics, McGraw Hill Education,1988.
4. P.Horowitz and W.Hill,TheArtofElectronics",CambridgeUniversityPress,1989.
5. P. R. Gray, R. G. Meyer and S. Lewis, Analysis and Design of Analog Integrated Circuits, John Wiley & Sons,2001.

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

L	T	P		
3	1	-	**Class Work**	**:80 Marks**
			Exam.	**:120 Marks**
			Total	**:200 Marks**
			Duration of Exam	**: 3 Hrs.**

Course outcomes:

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

- For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify thecorrectness.
- For a given Search problem (Linear Search and Binary Search) student will able to implementit.
- For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computationcomplexity.
- Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
- Student will able to implement Graph search and traversal algorithms and determine the time and computationcomplexity

UNIT I

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 II

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 III

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 IV

Trees: 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.

UNIT V

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.

Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

Books

1. Ellis Horowitz, SartajSahni,Fundamentals of Data Structures, Illustrated Edition by Computer SciencePress.

TES-233 Digital Electronics

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

L	T	P		
3	1	-	**Class Work**	**:80 Marks**
			Exam.	**:120 Marks**
			Total	**:200 Marks**
			Duration of Exam	**: 3 Hrs.**

CourseOutcomes

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

- At the end of this course, students will demonstrate the ability to
- Understand working of logic families and logicgates.
- Design and implement Combinational and Sequentiallogiccircuits.
- Understand the process of Analog to Digital conversion and Digital to Analog conversion.
- Be able to use PLDs to implement the given logicalproblem.

UNIT I:Fundamentals of Digital Systems and logicfamilies: Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples ofICgates, number systems-binary, signed binary, octal hexadecimal number, binaryarithmetic,one's and two's complements arithmetic, codes, error detecting and correctingcodes,characteristics of digital lCs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-statelogic.

UNIT II: Combinational DigitalCircuits: Standard representation for logic functions, K-map representation, simplification oflogicfunctions using K-map, minimization of logical functions. Don't care conditions, Multiplexer,De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder,serialadder, ALU, elementary ALU design, popular MSI chips, digital comparator,paritychecker/generator, code converters, priority encoders, decoders/drivers for display devices,Q-M method offunctionrealization.

UNIT III: Sequential circuits and systems:A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-T andD- typesflipflops,applicationsofflipflops,shiftregisters,applicationsofshiftregisters,serialto parallel converter, parallel to serial converter, ring counter, sequence generator,ripple(Asynchronous) counters, synchronous counters, counters design using flip flops,specialcounterIC's, asynchronous sequential counters, applicationsofcounters.

UNIT IV A/D and D/A Converters: Digital to analog converters: weighted resistor/converter, R-2R Ladder D/Aconverter,specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit,analog to digital converters: quantization and encoding, parallel comparator A/Dconverter,successive approximation A/D converter, counting A/D converter, dual slope A/Dconverter,A/Dconverterusingvoltagetofrequencyandvoltagetotimeconversion,specificationsofA/Dconverters, example of A/D converterICs

UNIT V Semiconductor memories and Programmable logic devices. Memory organization and operation, expanding memory size, classification andcharacteristicsof memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD,Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array(FPGA).

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.

TBS-231 Mathematics-III
B.Tech. Semester –III (Computer Science &Engg.)

L	T	P		
2	-	-	**Class Work**	**:25 Marks**
			Exam.	**:50 Marks**
			Total	**:75 Marks**
			Duration of Exam	**: 3 Hrs.**

TCS-232 Graph Theory
B.Tech. Semester –III (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:80 Marks**
			Exam.	**:120 Marks**
			Total	**:200 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

Upon successful completion of this module students will be able to

- Demonstrate knowledge of the syllabus material;
- Write precise and accurate mathematical definitions of objects in graph theory;
- Use mathematical definitions to identify and construct examples and to distinguish examples from non-examples;
- Validate and critically assess a mathematical proof, Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory;
- Reason from definitions to construct mathematical proofs;
- Write about graph theory in a coherent and technically accurate manner.

UNIT I

INTRODUCTION: Graphs – Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits –Connectedness – Components – Euler graphs – Hamiltonian paths and circuits – Trees – Properties of trees – Distance and centers in tree – Rooted and binary trees.

UNIT II

TREES, CONNECTIVITY &PLANARITY:panning trees – Fundamental circuits – Spanning trees in a weighted graph – cut sets – Properties of cut set – All cut sets – Fundamental circuits and cut sets – Connectivity and separability – Network flows – 1-Isomorphism – 2-Isomorphism – Combinational and geometric graphs – Planer graphs – Different representation of a planer graph.

UNIT III

MATRICES, COLOURING AND DIRECTED GRAPH: Chromatic number – Chromatic partitioning – Chromatic polynomial – Matching – Covering – Four color problem – Directed graphs – Types of directed graphs – Digraphs and binary relations – Directed paths and connectedness – Euler graphs.

UNIT IV

PERMUTATIONS &COMBINATIONS: Fundamental principles of counting - Permutations and combinations - Binomial theorem - combinations with repetition - Combinatorial numbers - Principle of inclusion and exclusion - Derangements - Arrangements with forbidden positions.

UNIT V

GENERATING FUNCTIONS: Generating functions - Partitions of integers - Exponential generating function – Summation operator - Recurrence relations - First order and second order – Non-homogeneous recurrence relations - Method of generating functions.

Text Books

1.NarsinghDeo, 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.

PES-232 Analog Electronic Circuits 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.**

Hands-on experiments related to the course contents of TES-233

PCS-231 Data Structure & Algorithms 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.**

Hands-on experiments related to the course contents of TCS-231

PES-233 Digital 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.**

Hands-on experiments related to the course contents of PES-234

PCS-232 IT Workshop (SCI Lab/Matlab)
B.Tech. Semester –III (Computer Science &Engg.)

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

Hands-on experiments related to the course contents of PCS-232

TCS-241 Computer Organization & Architecture

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

L	T	P		
3	1	-	**Class Work**	**:80 Marks**
			Exam.	**:120 Marks**
			Total	**:200 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, addressing modes, instructionset.
- Write assembly language program for specified microprocessor for computing
- 16 bitmultiplication, division and I/O deviceinterface (ADC, Control circuit, serial portcommunication).
- Write a flowchart for Concurrent access to memory and cache coherency in **Parallel Processors** and describe theprocess.
- Given a CPU organization and instruction, design a memory module and analyze its operation by interfacing with theCPU.
- Given a CPU organization, assess its performance, and apply design techniques to enhance performance using pipelining, parallelism and RISCmethodology

UNIT I

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU – registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some commonCPUs.

Data representation: signed number representation, fixed and floating point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-andadd, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating pointarithmetic.

UNIT II

Introduction to x86 architecture.**CPU control unit design**: hardwired and micro-programmed design approaches, Case study – design of a simple hypotheticalCPU.**Memory system design**: semiconductor memory technologies, memory organization.

UNIT III

Peripheral devicesandtheircharacteristics:Input-outputsubsystems,I/Odevice interface,I/O transfers –programcontrolled, interrupt driven and DMA,privileged and non-privilegedinstructions,softwareinterruptsand exceptions. Programsand processes – role of interrupts in process statetransitions, I/O device interfaces – SCII, USB

UNIT IV

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards.

Parallel Processors:Introduction toparallelprocessors, Concurrent access to memory and cachecoherency.

UNIT V

Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, writepolicies.

Books

1. "Computer Organization and Design: The Hardware/Software Interface" , 5th Edition by David A. Patterson and John L. Hennessy,Elsevier.
2. " Computer Organization and EmbeddedSystems" , 6th Editionby CarlHamacher, McGraw Hill HigherEducation.

Reference books

1. John P. Hayes , Computer Architecture and Organization, 3rd Edition WCB/McGraw-Hill
2. William Stallings ,Computer Organization and Architecture: Designing for Performance , 10th Edition PearsonEducation.
3. Vincent P. Heuring and Harry F. Jordan ,Computer System Design and Architecture, 2nd Edition PearsonEducation.

TCS-242/TOE-42 Operating Systems
B.Tech. Semester –IV (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:80 Marks**
			Exam.	**:120 Marks**
			Total	**:200 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.
- For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the accesstime.
- Design and implement file managementsystem.
- For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/Ocontrollers.

UNIT I

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS OperatingSystem.

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 II

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, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problemetc.

UNIT III

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 IV

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).

I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms

UNIT V

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency andperformance.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks

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.

Reference books

1. Charles Crowley, Irwin Publishing, Operating System: A Design-oriented Approach, 1st Edition
2. Gary J. Nutt,Addison-Wesley, Operating Systems: A Modern Perspective, 2nd Edition
3. Maurice Bach, Design of the Unix Operating Systems, 8th Edition , Prentice-Hall ofIndia
4. Daniel P. Bovet, Marco Cesati, Understanding the Linux Kernel, 3rd Edition, O'Reilly andAssociates

TCS-243 Design & Analysis of Algorithms

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

L	T	P		
3	1	-	**Class Work**	**:80 Marks**
			Exam.	**:120 Marks**
			Total	**:200 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

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

- For a given algorithms 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. For a given problems of dynamic-programmingand
- develop the dynamic programming algorithms, and analyze it to determine its computationalcomplexity.
- For a given model engineering problem model it using graph and write the corresponding algorithm to solve theproblems.
- Explain the ways to analyze randomized algorithms (expected running time, probability oferror).
- Explain what an approximation algorithm is. Compute the approximation factor of an approximation algorithm (PTAS andFPTAS).

UNIT I

Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method andMasters' theorem.

UNIT II

Fundamental Algorithmic Strategies: Brute-Force, Greedy,Dynamic Programming, Branch- and-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving , Bin Packing, Knap Sack TSP. Heuristics – characteristics and their applicationdomains.

UNIT III

Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network FlowAlgorithm.

UNIT IV

Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reductiontechniques.

UNIT V

Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems beyond NP – PSPACE

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.
3. UdiManber, Addison-Wesley, Algorithms -- A Creative Approach, 3RD Edition, Reading,MA.

TCS-244 Discrete Mathematics
B.Tech. Semester –IV (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:80 Marks**
			Exam.	**:120 Marks**
			Total	**:200 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

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

- For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives
- For a given a problem, derive the solution using deductive logic and prove the solution based on logicalinference
- For a given a mathematical problem, classify 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 I

Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernsteintheorem.
Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem ofArithmetic.

UNIT II
Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination.

UNIT III
Propositional Logic: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. **Proof Techniques:** Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity andSufficiency.

UNIT IV
Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semi Groups, Monoids,Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, PermutationGroups,Substructures, Normal Subgroups,AlgebraicStructureswith two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring,Identities of BooleanAlgebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive NormalForm

UNIT V
Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortestdistances.

Books

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw –Hill
2. Susanna S. Epp, Discrete Mathematics with Applications,4th edition, Wadsworth Publishing Co.Inc.
3. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw –Hill.

Reference books

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application to Computer Science", TMG Edition,TataMcgraw-Hill
2. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. Schaum's Outlines Series, Seymour Lipschutz, MarcLipson,Discrete Mathematics, Tata McGraw -Hill

THS-241 Management 1 (Organizational Behaviour/ Finance & Accounting)
B.Tech. Semester –IV (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs.**

TMC-242 Essence of Indian Traditional Knowledge
B.Tech. Semester –IV (Computer Science &Engg.)

L	T	P		
2	-	-	**Class Work**	**:25 Marks**
			Exam.	**:50 Marks**
			Total	**:75 Marks**
			Duration of Exam	**: 3 Hrs.**

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.**

Prerequisites : Knowledge of C/C++ Programming is essential.
The experiments will be based on the following :- TCS 241**Computer Organization & Architecture**

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.**

Prerequisites : Knowledge of C/C++ Programming is essential.
The experiments will be based on the following :- TCS 242 **Operating Systems**

PCS-243 Design & Analysis of Algorithms Lab
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.**

Prerequisites : Knowledge of C/C++ Programming is essential.
The experiments will be based on the following :- TCS 243 **Design & Analysis of Algorithms**

TCS-351/TOE-40 Database Management Systems
B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:80 Marks**
			Exam.	**:120 Marks**
			Total	**:200 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 I
Database system architecture: Data Abstraction, DataIndependence,Data Definition Language(DDL), Data Manipulation Language(DML).
Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulationoperations.

UNIT II
Relational query languages: Relational algebra, Tuple and domain relational calculus, QBE.
Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

UNIT III
Storage strategies: Indices, B-trees, hashing**.**
Relational database design: Domain and data dependency, Armstrong'saxioms, Normal forms, Dependency preservation, Losslessdesign.

UNIT IV
Transaction processing: Concurrency control, ACID property, Serializabilityof scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Databaserecovery.

UNIT V
Advanced topics: 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 , 6th Edition,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

TCS-352/TOE-43 Object Oriented Programming
B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
3	0	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**

Duration of Exam : 3 Hrs

Course Outcomes

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

- After taking the course, students will be able to:
- Specify simple abstract data types and design implementations, using abstraction functions to documentthem.
- 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.
- Design applications with an event-driven graphical userinterface.

UNIT I:BASIC CONCEPTS

Object oriented programming concepts: objects, classes, methods and messages, abstraction and encapsuiation, inheritance, abstract classes, polymorphism. Introduction to C++ Classes and objects: classes, structures and classes, unions and classes, friend functions, friend classes, inline functions, parameterized constructors, static class members, scope resolution operator, nested classes, local classes, passing objects to functions, returning objects; object assignment. Arrays, Pointers, References and Dynamic Allocation Operators: Arrays of Objects, Pointers to Objects, Type Checking, This Pointer, Pointers to Derived Types, Pointers to Class Members, References, Dynamic Allocatlon Operators.

UNIT ll: FUNCTION OVERLOADING AND CONSTRUCTORS

Function Overloading, Overloading Constructors, Copy Constructors, Finding the Address of Overloaded Functions, Overload Anachronism, 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, Overioading Comma"Operator.;

UNIT lll: INHERITANCE AND POLYMORPHISM

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

UNIT IV: TEMPLATES AND EXCEPTION HANDLING

Templates: Generic Functions, Applying Generic Functions, Generic Classes, Type name 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 Handiing.

UNIT V: /O STREAMS

Streams and formatted 1/O, Overloading<< and >>. File: 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.

References

1. Ira Pohl, “Object Oriented Programming using C++", 2nd Edition, Pearson Education, Reprint 2004.
2. Stanley B. Lippman, JoseeLajoie, Barbara E. Moé, “C++ Primer”, 5th Edition, Pearson Education, 2013."
3. B. Stroustrup, “The C++ Programming language”, 3rd Edition, Pearson Education, 2004.
4. E. Balagurusamy, “Object Oriented Programming with C++", Tata McGraw-Hill, 2008.

TCS-353 Formal Language & Automata Theory
B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:80 Marks**
			Exam.	**:120 Marks**
			Total	**:200 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 and machines.
- Design finite automata to accept a set of strings of a language.
- 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 free grammars
- Distinguish between computability and non-computability and Decidability and undecidability.

UNIT I

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

UNIT II

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 forregular languages, minimization of finite automata.

UNIT III

Context-free languages and pushdown automata: Context-free grammars (CFG) and languages (CFL), Chomskyand Greibach normal forms, nondeterministic pushdown automata (PDA) and equivalence with CFG, parsetrees, ambiguity in CFG, pumping lemma for context-free languages, deterministic pushdown automata, closureproperties of CFLs.

UNIT IV

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 Turingmachines, nondeterministic TMs and equivalence with deterministic TMs, unrestricted grammars and equivalence with Turing machines, TMs as enumerators.

UNIT V

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

Reference /Books

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages,
   and Computation, Pearson Education Asia.
2. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, Pearson Education Asia.
3. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer.
4. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing.
5. John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw Hill.

TES-351 Signals & Systems
B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

Course Outcomes

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

- At the end of this course, students will demonstrate the ability to
- Understand the concepts of continuous time and discrete timesystems.
- Analyse systems in complex frequencydomain.
- Understand sampling theorem and itsimplications.

UNIT I: Introduction to Signals and Systems:

Signals and systems as seen in everyday life, and in various branches of engineering and science. Signal properties: periodicity, absolute integrability, determinism and stochastic character. Some special signals of importance: the unit step, the unit impulse, the sinusoid, the complex exponential, some special time-limited signals; continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity: additivity and homogeneity, shift-invariance, causality, stability, realizability.Examples.

UNIT II: Behavior of continuous and discrete-time LTI systems:

Impulse response and step response, convolution, input-output behavior with aperiodic convergent inputs, cascade interconnections. Characterization of causality and stability of LTI systems.System representation through differential equations and difference equations.State-space Representation of systems.State-Space Analysis, Multi-input, multi-output representation.State Transition Matrix and its Role. Periodic inputs to an LTI system, the notion of a frequency response and its relation to the impulseresponse.

UNIT III : Fourier, Laplace and z- Transforms:

Fourier series representation of periodic signals, Waveform Symmetries, Calculation of Fourier Coefficients. Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality.

UNIT IV

The Discrete- Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT). Parseval's Theorem. Review of the Laplace Transform for continuous time signals and systems, system functions, poles and zeros of system functions and signals, Laplace domain analysis, solution to differential equations and system behavior. The z-Transform for discrete time signals and systems, system functions, poles and zeros of systems and sequences, z-domainanalysis.

UNIT V: Sampling and Reconstruction

The Sampling Theorem and its implications.Spectra of sampled signals. Reconstruction: ideal interpolator, zero-order hold, first-order hold. Aliasing and its effects.Relation between continuous and discrete time systems. Introduction to the applications of signal and system theory: modulation for communication, filtering, feedback controlsystems.

Text/References

1. V. Oppenheim, A. S. Willsky and S. H. Nawab, " Signalsand systems", Prentice Hall India,1997.
2. J. G. Proakis and D. G. Manolakis, " Digital Signal Processing: Principles, Algorithms, and Applications" , Pearson,2006.
3. H. P. Hsu, " Signals and systems", Schaum'sseries, McGraw Hill Education,2010.
4. S. Haykinand B. V. Veen, " Signals and Systems", John Wiley and Sons,2007.
5. V. Oppenheim and R. W. Schafer, " Discrete-Time Signal Processing", Prentice Hall,2009.
6. M. J. Robert " Fundamentals of Signals and Systems", McGraw Hill Education, 2007.
7. P. Lathi, " LinearSystems and Signals", Oxford University Press,2009.

THS-351 Principles of Managemnet
B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

ECS-311/TOE-43 Software Engineering
B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 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 built the architecture
- Plan a software engineering process to account for quality issues and non-functional requirement
- Estimate the work to be done, resources required and the schedule for a software project plan

UNIT I
Software and Software Engineering: Software characteristics, software crisis, software engineering paradigms. Planning a software project-software cost estimation , project scheduling, personal planning, team structure. Software configuration management, quality assurance, project monitoring, risk management.

UNIT II
Software Requirement Analysis: structured analysis, object oriented analysi, software requirement specification, validation.

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

UNIT IV
Testing : Testing fundamentals, white box and black box testing software testing software testing strategies: unit testing, integration testing, validation testing , system testing, debugging.

UNIT V
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.

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
4. Fairley Richard, Software, Software Engineering Concepts, Tata McGraw-Hill

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

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

Course Outcomes

On successful completion of this course, the student should be able to

- Have a fundamental knowledge of the basic probability concepts.
- Have a well-founded knowledge of standard distributions which can describe real life phenomena.
- Acquire skills in handling situations involving more than one random variable and functions of random variables.
- Understand the phenomena which evolve with respect to time in a probabilistic manner.
- Exposed the basic characteristic features of a queuing system and queuing models.

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

UNIT II: 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 III: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 IV:Stochastic Processes: Classification of stochastic processes, the Bernoulli process, renewal process, renewal model of program behavior.

UNIT V: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 Computer Graphics

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

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

COURSE OUTCOME

- Knowledge of the fundamentals of Computer Graphics and various algorithms of line and circle drawing.
- Understand the need of Transformation and various algorithm of clippings
- Fundamentals of three dimensional object representation, transformation
- Interpret parallel and prespective projections and their applications
- Knowledge and understanding of curves and surface and techniques behind animation and their applications.

UNIT I: Introduction to computer graphics & graphics systems Overview of computer graphics, representingpictures, preparing, presenting & interacting with pictures for presentations; Visualization & image processing; RGBcolor 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 II: Points & lines, Line drawing algorithms; DDA algorithm, Bresenham‟s line algorithm, Circle generationalgorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fillalgorithm.

UNIT III: 2D transformation & viewing Basic transformations: translation , rotation, scaling ; Matrixrepresentations & homogeneous coordinates, transformations between coordinate systems; reflection shear;Transformation of points, lines , parallel lines, intersecting lines. Viewing pipeline, Window to viewport co-ordinatetransformation , clipping operations , point clipping , line clipping, clipping circles , polygons & ellipse.

UNIT IV: 3D transformations: translation, rotation, scaling & other transformations. Rotation about an arbitraryaxis in space, reflection through an arbitrary plane; general parallel projection transformation; clipping, viewportclipping, 3D viewing.

UNIT V: Curves Curve representation, surfaces , designs , Bezier curves , B-spline curves, end conditions forperiodic B-spline curves, rational B-spline curves. Hidden surfaces Depth comparison, Z-buffer algorithm, Backface detection, BSP tree method, the Printer‟s algorithm, scan-line algorithm; Hidden line elimination, wire framemethods , fractal - geometry. Color& shading models Light &color model; interpolative shading model; Texture;

Text Books

1. Hearn, Baker – ― Computer Graphics (C version 2nd Ed.)‖ – Pearson education
2. D. F. Rogers, J. A. Adams – ― Mathematical Elements for Computer Graphics
3. Mukherjee, Fundamentals of Computer graphics & Multimedia, PHI
4. Sanhker, Multimedia –A Practical Approach, Jaico

ECS-314 Fault Tolerant Computing
B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 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.

UNIT I:Terminology and definitions: Includes terms such as dependability, reliability, maintainability, availability and safety, taxonomies for dependable systems and fault models.

UNIT II:Design techniques for fault-tolerance: Fault tolerance is achieved by introducing redundancy in the computer system. Various redundancy configurations are described. Hardware redundancy: triple modular redundancy (TMR), active redundancy, hot and cold standby systems, and hybrid redundancy. Software redundancy: N-version programming and recovery blocks. Time redundancy: Methods for detecting and tolerating transient faults. Information redundancy: parity and coding techniques for memory protection. Error detection and recovery: Watchdog-timers, consistency checks, duplication and comparison, forward and backward recovery. Fault-tolerance in distributed systems: failure mode assumptions, Byzantine agreement, time-triggered systems, membership protocols, and clock synchronisation.

UNIT III:Analysis of fault-tolerant system: Reliability block diagrams, fault-trees, Markov chain models, Stochastic Petri, failure mode and effects analysis (FMEA), failure rate prediction for integrated circuits and fault injection. Includes two laboratory classes in which Markov chain models and Stochastic Petri nets are used to analyse reliability and availability of a fault-tolerant system. A special computer program is used to solve the laboratory assignments.

UNIT IV:Development processes: Lifecycle models, hazard analysis, risk analysis, safety case and the IEC 61508 standard.

UNIT V:System examples: Fault-tolerant systems from areas such as space, aviation, road 2/ 3 DIT061 Fault-tolerant Computer Systems, 7.5 higher education credits / Fault-tolerant Computer Systems, 7,5 högskolepoäng Second Cycle vehicles, telecommunication and transaction processing are described, some by guest lecturers from industry.

Books

1. K. K. Pradhan, "Fault Tolerant computing theory and techniques", volume III. Prentice Hall, 2001
2. Anderson and Lee, "Fault Tolerant principles and practice", PH 1989.

ECS-315Computaional Number Theory
B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

Course Outcomes

- Demonstrate proficiency with a wide range of number theoretic algorithms, and understand the complexity of such algorithms.
- Implement instances of these algorithms in popular programming languages.
- Describe and differentiate between probabilistic and deterministic algorithms, analyze the appropriateness of these approaches in a given situation in the context of various applied problems.
- Explain the roles of integer factorization and discrete logarithm problems in modern cryptographic applications.
- Apply analytic heuristics to predict running times for number theoretic algorithms.
- Use mathematical reasoning to establish the validity of mathematical statements.
- Effectively communicate, both orally and written, advanced mathematical concepts.

UNIT I
Algorithms for integer arithmetic: Divisibility, gcd, modular arithmetic, modular exponentiation, Montgomery arithmetic, congruence, Chinese remainder theorem, Hensel lifting, orders and primitive roots, quadratic residues, integer and modular square roots, prime number theorem, continued fractions and rational approximations.

UNIT II
Representation of finite fields: Prime and extension fields, representation of extension fields, polynomial basis,primitive elements, normal basis, optimal normal basis, irreducible polynomials.

UNIT III
Algorithms for polynomials: Root-finding and factorization, Lenstra-Lenstra-Lovasz algorithm, polynomials over finite fields.
Elliptic curves: The elliptic curve group, elliptic curves over finite fields, Schoof's point counting algorithm.

UNIT IV
Primality testing algorithms: Fermat test, Miller-Rabin test, Solovay-Strassen test, AKS test.
Integer factoring algorithms: Trial division, Pollard rho method, *p*-1 method, CFRAC method, quadratic sieve method, elliptic curve method.

UNIT IV
Computing discrete logarithms over finite fields: Baby-step-giant-step method, Pollard rho method, Pohlig-Hellman method, index calculus methods, linear sieve method, Coppersmith's algorithm.
Applications: Algebraic coding theory, cryptography.

Reference

1. V. Shoup, A computational introduction to number theory and algebra, Cambridge University Press.
2. M. Mignotte, Mathematics for computer algebra, Springer-Verlag
3. I. Niven, H. S. Zuckerman and H. L. Montgomery, An introduction to the theory of numbers, John Wiley.
4. R. Lidl and H. Niederreiter, Introduction to finite fields and their applications, Cambridge University Press.
5. A. J. Menezes, editor, Applications of finite fields, Kluwer Academic Publishers
6. J. H. Silverman and J. Tate, Rational points on elliptic curves, Springer International Edition
7. H. Cohen, A course in computational algebraic number theory, Springer-Verlag

TMC-351 Constitution of India
B.Tech. Semester –V (Computer Science &Engg.)

L	T	P		
2	-	-	**Class Work**	**:25 Marks**
			Exam.	**:50 Marks**
			Total	**:75 Marks**
			Duration of Exam	**: 3 Hrs**

PCS-351 Database Management Systems 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**

Prerequisites: Knowledge of Database is essential.

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 theseschemas 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 names and item numbers
d) List the total Bill details with the quantity sold, price of the item and the final amount
e) List the details of the customer who have bought a product which has a price>200
f) Give a count of how many products have been bought by each 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 daily sales date wise 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 an 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 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

PCS-352 Object Oriented 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**

Prerequisites : Knowledge of C/C++ is essential.
The experiments will be based on the following:-TCS 352 **Object Oriented Programming**

TCS-361 Complier Design
B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:80 Marks**
			Exam.	**:120 Marks**
			Total	**:200 Marks**
			Duration of Exam	**: 3 Hrs.**

Course Outcomes

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

- For a given grammar specification develop the lexicalanalyser
- For a given parser specification design top-down and bottom-up parsers
- Develop syntax directed translationschemes
- Develop algorithms to generate code for a targetmachine

UNIT I

The aim is to learn how to design and implement a compiler and also to study the underlying theories. The main emphasis is for the imperative language. 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 II

Syntax Analysis (Parser): Context-free languages and grammars, push-down automata, LL(1) gram-mars and top-down parsing, operator grammars, LR(O), 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 III

Symbol Table: Its structure, symbol attributes and management. Run-time environment: Procedure activation, parameter passing, value return, memory allocation, and scope. Intermediate Code Generation: Translation of differentlanguagefeatures, different types of intermediate forms.

UNIT IV

Code Improvement (optimization): Analysis: control-flow, data-flow dependence etc.; Code improvement local optimization, globaloptimization, loop optimization, peep-hole optimization etc.

UNIT V

Architecture dependent codeimprovement:instruction scheduling (for pipeline), loop optimization (for cachememory) etc. Register allocation and target code generation Advanced topics: Type systems, data abstraction, compilation of Object Oriented features and non-imperative programminglanguages.

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-362/TOE-44 Computer Networks
B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
3	1	-	**Class Work**	**:80 Marks**
			Exam.	**:120 Marks**
			Total	**:200 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) describe the function of eachblock.
- For a given requirement (small scale) of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) design it based on the market available component
- For a given problem related TCP/IP protocol developed the networkprogramming.
- ConfigureDNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software andtools.

UNIT I

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 II

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

UNIT III

Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routingprotocols.

UNIT IV

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 V

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

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. Suggested reference books
4. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.
5. Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall ofIndia.

ECS-321 /TOE-50 Artificial Intelligence
B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

Course Outcomes

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

- Understand the fundamentals of Artificial Intelligence.
- Knowledge of the concepts of propositional logics
- Knowledge gaining of default and non-monotonic logic and understanding of the concepts of neural network.
- Representation of impression and uncertainty, probabilistic techniques.
- Demonstrate the Fuzzy logic concepts and different techniques and their understanding for various applications and intelligent search techniques.

UNIT I
Introduction: Definition of Artificial Intelligence (AI), Evolution of Computing , History of AI, Classical Romantic and modern period, subject area, Architecture of AI machines, logic family, classification of logic.
Production System: Production rules, the working memory, Recognize-act cycle, conflict resolution strategies, refractoriness, specify alternative approach for conflict resolution by Meta rules, Architecture of production system.

UNIT II
Propositional Logic: Proposition, tautologies, Theorem proving, Semantic method of theorem proving, forward chaining, backward chaining standard theorems, method of substitution. Theorem proving using Wang's algorithm.
Predicate Logic: Alphabet of first order logic (FOL), predicate, well formed formula, clause form, algorithm for writing sentence into clause form, Unification of predicates, unification algorithm, resolution Robinson's interface rule, Scene interpretation using predicate logic.

UNIT III
Default and Non monotonic Logic: Axiomatic theory, Monotonicity, non-atomic reasoning using McDermott's NML-I, problems with NML-I, reasoning with NML-II, Case study of Truth Maintenance system(TMS), neural network fundamentals.

UNIT IV
Imprecision and Uncertainty: Definition, Probabilistic techniques, Certainty factor based reasoning, conditional probability. Medical diagnosis problem, Baye's Theorem and its limitations, Bayesian belief network, propagation of belief, Dumpster-Shafer theory of uncertainty management, belief interval, Fuzzy relation, inverse Fuzzy relations, Fuzzy post inverse, Fuzzy Inversion.

UNIT V
Intelligent Search Techniques: Heuristic function, AND-OR graph, OR Graph, Heuristic search, A* algorithm and examples. Logic Programming with Prolog: Logic program, Horn clause, program for scene interpretation, unification of goals, SLD resolution, SLD tree, flow of satisfaction, controlling back tracking using CUT, command use of CUT, implementation of backtracking using stack, risk of using cuts, fail predicate, application of cut-fail combination, replacing cut-fail by not.

Books

1. Konar: Artificial Intelligence and Soft Computing—Behavioral and Cognitive Modeling of Human Brain, CRC Press, USA.
2. E. Charniak and D. McDermott: Introduction to Artificial Intelligence, Addison Wesley Longman.

3. Ellinc and rich: Artificial Intelligence, 2/e 1992.
4. Rich and Knight: Artificial Intelligence, 2/e 1992.

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

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

Course Outcomes

Upon successful completion of this course you should be able to

- Demonstrate knowledge of the basic elements and concepts related to distributed system technologies;
- Demonstrate knowledge of the core architectural aspects of distributed systems;
- Design and implement distributed applications;
- Demonstrate knowledge of details the main underlying components of distributed systems (such as rpc, file systems)
- Use and apply important methods in distributed systems to support scalability and fault tolerance;
- Demonstrate experience in building large-scale distributed applications.

UNIT I Centralized & Client/Server Architecture: Server systems architectures, Models of synchronous and asynchronous distributed computing systems; parallel & distributed systems.

UNIT II Synchronous Networks & Asynchronous Networks: Basic algorithms for synchronous and asynchronous networks;

UNIT III Searching Technique: Breadth first search, depth first search, shortest path, minimum spanning tree.

UNIT IV Advanced Synchronous Algorithms: Distributed consensus with failures, commit protocols; leader election.

UNIT V Asynchronous Shared Memory: Asynchronous shared memory algorithms; mutual exclusion and consensus; relationship between shared memory and network models; asynchronous networks with failures.

Books

1. M. L. Liu, Distributed Computing -- Concepts and Application, Addison Wesley.
2. 2. N. Santoro, Design and Analysis of Distributed Algorithms (Wiley Series on Parallel and Distributed Computing, John Wiley & Sons, 2006.
3. Tanenbaum& Van Steen, Distributed Systems: Principles and Paradigms, 2e, 2007, Prentice-Hall, Inc.

ECS-323 Real Time System

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

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 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. o Understand the concept of real time communication

UNIT I: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 II: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 III: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 IV: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 V: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 INFORMATION THEORY AND CODING

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

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

Course Outcomes

- 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 bloc 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 technics used in composite codes like LDPC and turbo codes that can reach the channel capacity

UNIT I

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 II

Markov chains, data processing theorem, entropy of continuous random variables. (4 lectures) Data compression, example of codes, Kraft-Macmillan inequality, source coding and entropy, Huffman codes. Channels, channel coding, channel capacity and the general random coding theorem.

UNIT III

Introduction to channel coding and to the basic concepts of block codes like Hamming distance and the minimum Hamming distance of a block codes, Hard decoding and performance over a binary symmetric channel, soft decoding and performance over a Gaussian channel with a BPSK input.

UNIT IV

Linear block codes, generator matrix, parity check matrix, singleton bound, Syndrome table and decoding over a binary symmetric channel, examples of linear bloc 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 V

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. Introduction to coded modulations, Trellis coded modulations, Bit-Interleaved coded modulations. Performance of a channel coding system over Gaussian and Rayleigh channels:Matlab simulation.

References

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-325/TOE-45 JAVA PROGRAMMING
B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 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, methods and string handling to solve simple problems.
- Design Java object classes based on Object-Oriented concepts
- Use simple try-catch blocks for Exceptlon Handling and manage /O streams oriented interactions.
- Develop multi-thread programming for concurrency control based applications
- Construct user interfaces for Java applications and applets using GUI elements

UNIT I: JAVA BASICS AND OOPS

The Genesis of Java, Overview of Java, Data Types, Varlables and Arrays, Operators, Control Statements, Introducing Classes, Methods and Classes, Inheritance: Basics, Using Super, Creating a Multitevel Hierarchy, Method overriding, Using Abstract Classes.

UNIT II: MULTITHREADED PROGRAMMING IN JAVA

Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces Definitions and Implementations, Exception Handling: Types, Try and Catch, Throw, Multithreaded Programming: Creating Threads, Creating Muitiple Threads, Thread Priorities, Synchronization, Inter Thread Communication, Suspending, Resuming and Stopping Threads.

UNIT III: /O AND EXPLORING JAVA l/O

I/O Basics, Reading Console Input, Writing Console output, Natlve Methods, I/ O Classes and Interfaces, File, The Byte Streams, The Character Streams, Using Stream I/ O, Serialization. String Handling, Special string operations, Character extraction, string comparison, Modifying a String.

UNIT IV: 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, Working with Windows, Graphics, Colors and Fonts, Using AWT Controls, Layout Managers and Menus.

UNIT V: JDBC, RMI AND SERVLETS

The Design of JDBC, The Structured Query Language, JDBC Configuration, Executing SQL, QueryExecution Statements, Scrollable and Updatable Result Sets, Row Sets, Metadata, RMI, Architecture, A simple client/server application using RMI, Serviets, Life cycle of a serviet, The javax.serviet Package, The javax.servlethttp Package , Handling HTTP Requests and Responses.

Text Books

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 1, 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

ECS-331 Embedded Systems
B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 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 and lts_appltcatlons using different types of interfaces and with interrupt handling mechanism
- » Understand the multiple process operating environments and use standard system call interfaces to monitor and control processes

UNIT I
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 II
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 III
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 IV
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 V
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.
4. Burns, Alan and Wellings, “Real-Time Systems and Programming Languages”, Second Edition. Harlow: Addison-Wesley-Longman, 1997
5. Grehan Moore, and Cyliax, “Real time Programming: A guide to 32 Bit Embedded Development”, Addison-Wesley-Longman, 1998. 6. Heath Steve, “Embedded Systems Design”, Newnes 1997.

ECS-332/TOE-48 Web Technology

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

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

Course Outcomes

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

- Learn the best practices for designing Web forms and Usability Reviews
- Understand the Principles behind the design and construction of Web applications
- Develop and Deploy an Enterprise Application

UNIT I: WEB ARCHITECTURE

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

UNIT II: HTML-

HTML Basic concepts, Good web design, Images and Anchors, Style sheets, positioning with style sheets. Basic Interactivity and HTML: FORMS, form control, new and emerging form elements.
XML: Relationship between HTML, SGML and XML, Basic XML, Valid documents, ways to use XML, XML for data files, embedding XML into HTML documents.Converting XML to HTML for Display, Displaying XML using CSS and XSL, rewriting HTML as XML, the future of XML.

UNIT III: CGI USING PERL

Introduction to CGl, Alternative technologies, The Hypertext Transport protocol, URLs, HTTP, Browser requests, Server Responses, Proxies, Content Negotiation, The common Gateway Interface, The CGl Environment, Environment variables, CGI Qutput, forms and CGI, Sending Data to the server, form Tags, Decoding from input, Architectural Guidelines, Coding Guidelines, Efficiency and optimization.

UNIT IV: ASP

A simple ASP.NET application, Writing ASP.NET Code, ASP.NET Objects, Introduction to Forms: Web forms, user controls, custom controls; creating controls at runtime. Validity ASP.NET Pages: using validations controls, Customizing validation.

UNIT V: DATABASES '

Creating Databases, SQL statements, Usmg Datasets, Data binding, Data binding Controls. Files: Reading and writing files using ASP.NET.

Books

1. Jeffrey C. Jackson, “Web Technologies: A Computer Science Perspective”, Prentice Hall, 2007
2. Herbert Schildt, “Java: The Complete Reference”, McGraw-Hill Professional, 2006.

Reference

1. Thomas. A Powell, HTML: The Complete Reference, Tata McGraw-Hill Publications.
2. Scott Guelich, ShishirGundavaram, Gunther Birznieks; CGI Programming with PERL: Creating Dynamic Web pages, 2/e, O' Reilly.
3. Doug Tidwell, James Snell, PavelKulchenko; Programming Web Services with SOAP, O' Reilly
4. Pardi, XML in Action, Web Technology, PHI
5. Yong, XML step by step, PHI
6. Aaron, Weiss, Rebecca Taply, Kim Daniels, Stuven Mulder, Jeff Kaneshki, Web Authoring
7. Desk reference, Techmedia publications, ASP.NET Chris payme, Techmedia

ECS-333 VLSI System Design
B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

Course Outcomes

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

- Be able to use mathematical methods and circuit analysis models in analysis of CMOS digital electronics circuits, including logic components and their interconnect.
- Be able to create models of moderately sized CMOS circuits that realize specified digital functions.
- Be able to apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect, and to verify the functionality, timing,power, and parasitic eff ects.
- Have an understanding of the characteristics of CMOS circuit construction and the comparison between diff erent state-of-the-art CMOS technologies and pro-cesses.

UNIT I: REVIEW OF MICROELECTRONICS AND INTRODUCTION TO MOS TECHNOLOGIES: (MOS, CMOS, Bi-CMOS) Technology Trends and Projections.

UNIT II: BASIC ELECTRICAL PROPERTIES OF MOS, CMOS & BICOMS CIRCUITS: Ids -Vds Relationships, Threshold Voltage Vt, Gm, Gds and Wo, Pass Transistor, MOS,CMOS & Bi- CMOS Inverters, Zpu/Zpd, MOS Transistor Circuit Model, Latch-Up in CMOS Circuits.

UNIT III: LAYOUT DESIGN AND TOOLS: Transistor Structures, Wires and Vias, Scalable Design Rules, Layout Design Tools.
LOGIC GATES & LAYOUTS: Static Complementary Gates, Switch Logic, Alternative Gate Circuits, Low Power Gates, Resistive and Inductive Interconnect Delays.

UNIT IV: COMBINATIONAL LOGIC NETWORKS: Layouts, Simulation, Network delay, Interconnect Design, Power Optimization, Switch Logic Networks, Gate and Network Testing.
SEQUENTIAL SYSTEMS: Memory Cells and Arrays, Clocking Disciplines, Design, Power Optimization, Design Validation and Testing.

UNIT V:FLOOR PLANNING & ARCHITECTURE DESIGN: Floor Planning Methods, Off-Chip Connections, High Level Synthesis, Architecture for Low Power, SOCs and Embedded CPUs, Architecture Testing.
INTRODUCTION TO CAD SYSTEMS (ALGORITHMS) AND CHIP DESIGN: Layout Synthesis and Analysis, Scheduling and Printing; Hardware-Software Codesign, Chip Design Methodologies- A simple Design Example.

Text Books

1. Essentials of VLSI Circuits and Systems, K. Eshraghianet . al(3 authors) PHI of India Ltd.,2005
1. Modern VLSI Design, 3rd Edition, Wayne Wolf , Pearson Education, fifth Indian Reprint, 2005.

References

1. Principals of CMOS Design – N.H.E Weste, K.Eshraghian, Adison Wesley, 2nd Edition.
2. Introduction to VLSI Design – Fabricius, MGH International Edition, 1990.
3. CMOS Circuit Design, Layout and Simulation – Baker, Li Boyce, PHI, 2004.

ECS-334 Data Mining
B.Tech. Semester –VI (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 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

UNIT I 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 II 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 III 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 IV 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 V 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.

REFERENCES:

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-335 Human Computer Interaction

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

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

Course Outcome

Upon completion of the course, Students will be able to

- Explain the capabilities of both humans and computers from the viewpoint of human information processing.
- Describe typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms.
- Apply an interactive design process and universal design principles to designing HCI systems.
- Describe and use HCI design principles, standards and guidelines.
- Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems.
- Discuss tasks and dialogs of relevant HCI systems based on task analysis and dialog design.
- Analyze and discuss HCI issues in groupware, ubiquitous computing, virtual reality, multimedia, and Word Wide Web-related environments.

UNIT I:Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design, The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT II:Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

UNIT III:Screen Designing:- Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT IV:Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT V:Software tools – Specification methods, interface – Building Tools. Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

References

1. Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell Bealg, Human – Computer Interaction., Pearson Education
2. Rogers, Sharps. Wiley Dreamtech , Interaction Design Prece
3. SorenLauesen,User Interface Design, Pearson Education.

TOE-41 Data Structure

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

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

Course Outcomes

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

- Implement basic Abstract Data Types like linked list, queue and stack using both static and dynamic memory allocations.
- Recognize the data organization and applications of binary trees and binary search trees
- Analyze the importance of self-balancing trees for effective organizing the data.
- Identify suitable algorithms for solving hashing, shortest path, network link analysis, and minimum spanning tree.
- Identify data structuring strategies that are appropriate to a given contextual problem.

UNIT I: BASIC TERMINOLOGY

Elementary Data Organization, Data Structure Operations, Array Definition and Analysis, Representation of Linear Arrays in Memory, Traversing of Linear Arrays, Insertion and Deletion, Single Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Sparse Matrix.

UNIT II: STACKS AND QUEUES

Operations on Stacks- Push, Pop, Representation of stacks, Applications of stacks - Polish expression and their compilation conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem, Representation of Queues, Operations on queues: Create, Add, Delete, Priority Queues, Dequeues, Circular Queue.

UNIT III: LINKED LISTS

Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list, Polynomial Addition, Header Linked List, Doubly linked list, generalized list.

UNIT IV: TREES& GRAPHS

Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, Extended binary trees, Traversing binary trees, Searching, insertion and Deletion in binary search trees(with and without recursion), AVL trees, Threaded trees, B trees.

Graphs: Terminology and Representations, Graphs &Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees, Shortest path Algorithm.

UNIT V: SEARCHING, SORTING METHODOLOGIES

Bubble sort, Selection Sort, Insertion Sort, Linear Search, Binary Search Stack -Quick Sort, Merge Sort. Two way Merge Sort, Queue- Radix Sort. Tree — Heap Sort.

TEXT BOOK

1. M. A. Weiss, “Data Structures and Algorithm Analysis in C*, 2nd Edition, Pearson Education, 2005.

REFERENCES

1. AV. Aho, J. E. Hopcroft, and J. D. Ullman, “Data Structures and Algorithms”, 1st Edition, Pearson Education, Reprint 2003.
2. R. F. Gilberg, B. A. Forouzan, “Data Structures”, 2nd Edition, Thomson India Edition, 2005.
3. Jean Paul Tremblay & Pal G. Sorenson, “An Introduction to Data Structures and Applications” McGraw-Hill.
4. R.L.Kruse, B.P. Leary, C.L. Tondo, Data Structures and Program Design in C, PHLI.
5. A.M. Tenenbaum, Langsam, Moshe J. Augentem, Data Structures using C, PHI.
6. Data Structure and Program design in C by Robert Kruse, PHI

PCS-361 Complier Design 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**

Prerequisites : Knowledge of C/C++ Programming is essential.
The experiments will be based on the following :- TCS 361 **Complier Design**

PCS-362 Computer Networks 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 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, clientserver 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 understandingabout computer network

1. Installation and configuration of NS2 and Qual Net
2. Creating a network: nodes, links and queues, Creating connections, traffic and computing routersInsertion 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 anotherand vice versa that by creating / establishing connection.

PCS-363 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**

ECS-441 Cryptography & Network Security
B.Tech. Semester –VII (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

Course Oqutcomes

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 Managementtechniques.:
- Realize the importance of user authentication and Kerberos concepts.
- Acquire the knowledge of network security and its applications.

UNIT I

Introduction of Cryptography: Introduction To security: Attacks, Services and Mechanisms, Security,Attacks, Security Services, Conventional Encryption: Classical Techniques, Conventional Encryption Model, and steganography, Classical Encryption Techniques. Modern Techniques: Simplified DES, Block Cipher Principles, DES Standard, DES Strength, Differential and Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operations.

UNIT II

Conventional Encryption Algorithms: Triples DES, Blowfish, International Data Encryption Algorithm,RCS, CAST-128, CR2 Placement and Encryption Function, Key Distribution, Random Number Generation, Placement of Encryption Function.

UNIT III

Public Key Encryption: Public-Key Cryptography: Principles of Public-Key Cryptosystems, RSA Algorithm, Key, Key Management, Fermat's and Euler's Theorm, Primality, Chinese Remainder Theorem.

UNIT IV

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, Authentication Protocol, Digital Signature Standard (DDS) Proof of Digital Signature Algorithm.

UNIT V

Network and System Security: Authentication Applications: Kerberos X-509, Directory Authentication Service, 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.

References

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-442 Internet-of-Things
B.Tech. Semester –VII (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

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

- Able to understand the application areas of IOT
- Students will be explored to the interconnection and integration of the physical world and the
- cyber space. They are also able to design & develop IOT Devices
- Able to realize the revolution of Internet in Mobile Devices, Cloud &SensorNetworks
- Able to understand building blocks of Internet of Things and characteristics.

UNIT I
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 II

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 III

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 IV

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 V

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

References

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-443 Digital Image Processing
B.Tech. Semester –VII (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 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 I

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.

UNIT II

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, Image Enhancement in the Frequency Domain: Introduction.

UNIT III

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, Geometric Transformations,

UNIT IV

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.

UNIT V

Morphology: Dilation, Erosion, Opening and Closing, Hit-and Miss transform, Morphological **Algorithms :**Boundry Extraction, Region filling, Extraction of connected components, Convex Hull, **Image Segmentation:** Definition, characteristics of segmentation Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region based segmentation. Introduction to Representation & Description, Introduction to Object Recoginition.

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-444 Multi-Agent Intelligent

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

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 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 (eg objects) and understand the characteristics of applications that lend themselves to an agent-oriented solution;
- 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, including an understanding of 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 I

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

UNIT II

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

UNIT III

layered agents (egInterrap) a contemporary (Java-based) framework for programming agents (eg the Jack language, the JAM! system).

UNIT IV

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 V

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-445 Quantum Computing

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

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

Course Outcomes

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

- We would like the students to acquire a working knowledge of quantum information theory, with a focus on quantum simulation.
- The course is designed to bring graduate students and others to the level of professional understanding such that they may begin research at the forefront of quantum computing.

UNIT I
Introduction: Introducing quantum mechanics. Quantum kinematics, quantum dynamics, quantum measurements.Singlequbit, multiqubits, gates. Density operators, pure and mixed states, quantum operations, environmental effect, decoherence. Quantum no-cloning, quantum teleportation.

UNIT II
Quantum Cryptography: Cryptography, classical cryptography, introduction to quantum cryptography. BB84, B92 protocols. Introduction to security proofs for these protocols.

UNIT III
Quantum Algorithm: Introduction to quantum algorithms. Deutsch-Jozsa algorithm, Grover's quantum search algorithm, Simon's algorithm.Shor's quantum factorization algorithm.

UNIT IV
Error Correction: Errors and correction for errors. Simple examples of error correcting codes in classical computation.Linear codes.Quantum error correction and simple examples.Shor code.

UNIT V
Quantum Entanglement: Quantum correlations, Bell's inequalities, EPR paradox. Theory of quantum entanglement.Entanglement of pure bipartite states.Entanglement of mixed states. Peres partial transpose criterion. NPT and PPT states, bound entanglement, entanglement witnesses

Books

1. M.A. Nielsen and I.L.Chuang,Quantum Computation and Quantum Information, Cambridge University Press 2000.

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

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

Course Outcomes

Upon completion ofthis course, the students will be abie to

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

UNIT I: Introduction to Genetic Algorithm: Genetic Operators and Parameters, Genetic Algorithms in Problem Solving, Theoretical Foundations of Genetic Algorithms, Implementation Issues.

UNIT II: Artificial Neural Networks &Learning : Neural Model and Network Architectures, Perceptron Learning, Supervised Hebbian Learning, Backpropagation, Associative Learning.

UNIT III: Competitive Networks: Hopfield Network, Computing with Neural Nets and applications of Neural Network.

UNIT IV: Introduction to Fuzzy Sets: Operations on Fuzzy sets, Fuzzy Relations, Fuzzy Measures, Applications of Fuzzy Set Theory to different branches of Science and Engineering.

UNIT V: Knowledge discovery in databases: Data mining and web mining using soft computing techniques. Soft computing approaches to information systems project management.

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	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

Course Outcomes

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

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

Unit I 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, Comparison among SAAS, PAAS, IAAS Cloud computing platforms: Infrastructure as service: Amazon EC2,Platform as Service: Google App Engine, Microsoft Azure, Utility Computing, Elastic Computing

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

Unit III Data in the cloud: Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. Map-Reduce and extensions: Parallel computing, The map-Reduce model, Parallel efficiency of Map-Reduce, Relational operations using Map-Reduce, Enterprise batch processing using Map-Reduce, Introduction to cloud development, Example/Application of Mapreduce, Features and comparisons among GFS,HDFS etc, Map-Reduce model Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud Cloud computing security architecture: Architectural Considerations- General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro-architectures; Identity Management and Access control-Identity management, Access control, Autonomic Security
Cloud computing security challenges: Virtualization security management- virtual threats, VM Security Recommendations, VM-Specific Security techniques, Secure Execution Environments and Communications in cloud

Unit IV Issues in cloud computing, Implementing real time application over cloud platform Issues in Intercloud environments, QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computing environment. Cloud Middleware. Mobile Cloud Computing. Inter Cloud issues. A grid of clouds, Sky computing, load balancing, resource optimization, resource dynamic reconfiguration, Monitoring in Cloud

Unit V Cloud computing platforms, Installing cloud platforms and performance evaluation Features and functions of cloud platforms: Xen Cloud Platform, Eucalyptus, OpenNebula, Nimbus, TPlatform, 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

ECS-453/TOE-47 Mobile Computing
B.Tech. Semester –VII (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

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

- To impart knowledge of mobile and wireless computing systems and techniques.
- To understand the knowledge of wireless network
- To understand the concepts of mobile discovery process.
- To understand the concepts routing protocols.
- To understand the working of mobile tracking in wireless network

UNIT I Introduction : Issues, Challenges, and benefits of Mobile Computing, IEEE 802.11 & Bluetooth, Wireless Multiple access protocols.

UNIT II Data Management Issues:data replication for mobile computers, adaptive Clustering for Mobile Wireless networks, LEACH and TORA.

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

UNIT IV Mobile Agents Computing: Security and fault tolerance, transaction processing in Mobile computing environment. Mobile Agent Systems: Aglets, PMADE, Case Studies.

UNIT V 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).

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.
7. J. Schiller, Mobile Communications, Addison Wesley.
8. M. V. D. Heijden, M. Taylor, Understanding WAP, Artech House.
9. Charles Perkins, Mobile IP, Addison Wesley.
10. Charles Perkins, Ad hoc Networks, Addison Wesley.

ECS-454 Digital Signal Processing

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

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

Course Outcomes

Students who successfully complete the course will be able to

- determine the spectral coefficients and the Fourier series components of discrete-time signals.
- determine the frequency response and the z-transform of discrete-time systems.
- determine the discrete Fourier transform of discrete-time signals.
- calculate the outputs of discrete-time systems in response to inputs.
- design Finite Impulse Response (FIR) and Infinite Impulse Response (IIR) filters, and evaluate the performance to meet expected system specifications using MATLAB..
- demonstrate an understanding of contemporary issues by reviewing recent technical articles and establishing between the course material and the content of the article.

UNIT I SIGNALS AND SYSTEMS

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

UNIT II FREQUENCY TRANSFORMATIONS

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

UNIT III IIR FILTER DESIGN

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

UNIT IV FIR FILTER DESIGN

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

UNIT V FINITE WORD LENGTH EFFECTS IN DIGITAL FILTERS

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

Text Book/ References

1. John G. Proakis&DimitrisG.Manolakis, “Digital Signal Processing – Principles, Algorithms & Applications”, Fourth Edition, Pearson Education / Prentice Hall, 2007.
2. Emmanuel C..Ifeachor, &Barrie.W.Jervis, “Digital Signal Processing”, Second Edition, Pearson Education / Prentice Hall, 2002.

3. Sanjit K. Mitra, “Digital Signal Processing – A Computer Based Approach”, Tata McGraw Hill, 2007.
4. 3. A.V.Oppenheim, R.W. Schafer and J.R. Buck, “Discrete-Time Signal Processing”, 8th Indian Reprint, Pearson, 2004.
5. Andreas Antoniou, “Digital Signal Processing”, Tata McGraw Hill, 2006

ECS-455Computional Geometry
B.Tech. Semester –VII (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

Course Outcomes

- Define fundamental and advanced concepts in Geometrical objects, Computational Geometry and it's application domain,
- Convex Combination of points, Orthogonal Range Searching, Voronoi Diagram and Visibility Graph.
- Recognize the appropriateness of Matlab software to Implement geometrical concepts for developing applications in
- real world geometric applications like fractal computation and image processing.
- Compose computing concepts to solve indirect problems from direct problems
- Demonstrate and share the work with others by performing effective communication
- Operate with the usage of Internet to work with geometrical calculations

UNIT I

Introduction : Algorithmic Background ,Data Structures,Geometric Preliminaries, Models of Computation Geometric Searching :Introduction,Point-Location Problems,Range-Searching Problems

UNIT II

Convex Hulls: Preliminaries,Problem Statement and Lower Bounds,Convex Hull Algorithms in the Plane,Graham'sScan,Jarvis'sMarch,QUICKHULLtechniques,Dynamic Convex Hull,Convex Hull in 3D

UNIT III

Proximity Problem: A Collection of Problems,A Computational Prototype: Element Uniqueness,LowerBounds,The Closest-Pair Problem: A Divide-and-Conquer Approach,TheVoronoi Diagram ,Proximity Problems Solved by the Voronoi Diagram

UNIT IV

Triangulation: Planar Triangulations,Greedy Triangulations , Partitioning a Polygon into Monotone Pieces,Triangulating a Monotone Polygon, Delaunay Triangulation , Intersections

UNIT V

Application Areas: Planar Applications: Intersection of Convex Polygons, Star-shaped Polygons; Intersection of Line Segments.
3D Applications: Intersection of 3D Convex Polyhedra; Intersection of Half-spaces

Books

1. F. P. Preparata and M.I. Shamos, Computational Geometry: An Introduction, Springer-Verlag, 1985.
2. M. de Berg, M. van Kreveld, M. Overmars, O. Schwarzkopf, Computational Geometry: Algorithms and Applications, Springer-Verlag, Revised Second Edition, 2000.

References

1. Joseph O'Rourke, Computational Geometry in C, Cambridge University Press, 2nd Edition, 1998.

PCS-471 Project-I

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

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

The object of Project | is 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 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.

The assignment to normally include:

- Survey and study of published literature on the assigned topic;
- Working out a prelihinary approach to the Problem relating to the assigned topic
- Conducting preliminafy Analysis/Modelling/Simulation/Experiment/Design/Feasibility
- Preparing a Written Report on the Study conducted fof'presentation to the De‘partment
- Final Seminar, as oral Presentation before a DepartttmentalCommitttee.

PCS-472 Internship/ 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**.**

ECS-461/TOE-46 Machine Learning

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

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 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;
- be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
- be capable of performing distributed computations;
- be capable of performing experiments in Machine Learning using real-world data

UNIT I 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 II 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 III 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 IV 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 V 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-462/TOE-49 Ad-Hoc and Sensor Networks
B.Tech. Semester –VIII (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

Course Outcomes

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

- Able to understand and explain the fundamentals of wireless communication technology, concept of ad-hoc and sensor networks, their applications.
- Knowledge and understanding in handing various issues in Designing a Routing Protocol for Ad Hoc Wireless Networks.
- Understanding of the fundamentals of Multicast routing In Adhoc Networks and working of various protocols.
- Able to understand the working of Transport layer- security protocols
- Able to understand QoS and Energy management including various management schemes.

UNIT I: 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 II: ADHOC NETWORK ROUTING PROTOCOLS

Introduction -to designing a Routing Protocol, Classifications of Routing Protocols, Wireless Routing Protocol (WRP), Source—Initiated On—Demand Approaches, Ad hoc On-Demand Distance Vector Routing (AODV, Introduction to Multicast Routing Protocol, Classifications of Multicast Routing Protocols.

UNIT III: QoS AND ENERGY MANAGEMENT .

introduction to QoS in Ad hoc Wireless Networks, Classifications of QoS Solutions, Classification of Energy Management Schemes, Transmission Power Management Schemes, System Power Management Schemes. . :

UNIT IV: WSN INTRODUCTION

Introduction, Characteristic requirements, Challenges of sensor networks Emerging technologies for wireless sensor networks, Advantages of sensor networks, Sensor network applications.

UNIT V: 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.

References

1. C.K. Toh, “Ad hoc Mobile Wireless Networks, Protocols and Systems”, 2nd Edition, Pearson
2. Education, 2008.
3. Azzedine Boukerche, “Handbook of Algorithms for Wireless Networking and Mobile
4. Computing”, 2" Edition, CRC Press, 20086.
5. Charles E. Perkins, "Ad Hoc Networking”, Addison Wesley, 2000.
6. KazemSohraby, Daniel Minoli, &TaiebZnati, “Wireless Sensor Networks- Technology, Protocols, and Applications”, John Wiley, 2007.
7. . Anna Hac “Wrreless Sensor Network Designs”, JohnWiley,2003.

ECS-463 Cyber Law and Ethics
B.Tech. Semester –VIII (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

Course Outcomes

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

- Students identify and analyze statutory, regulatory, constitutional, and organizational laws that affect the information technology professional.
- Students locate and apply case law and common law to current legal dilemmas in the technology
- field.
- Students apply diverse viewpoints to ethical dilemmas in the information technology field and recommend appropriate actions.
- Students distinguish enforceable contracts from non-enforceable contracts.
- Students demonstrate leadership and teamwork.

UNIT I: Cyber laws and rights in today's digital age; IT Act, Intellectual Property Issues connected with use and management of Digital Data The similar Acts of other countries Information Warfare:

UNIT II : Nature of information warfare, including computer crime and information terrorism;

UNIT III Threats to information resources, including military and economic espionage, communications eavesdropping, computer break-ins, denial-of-service, destruction and modification of data, distortion and fabrication of information, forgery, control and disruption of information How, electronic bombs, and sops and perception management.

UNIT IV Countermeasures, including authentication, encryption, auditing, monitoring, intrusion election, and firewalls, and the limitations of those countermeasures.

UNIT V Cyberspace law and law enforcement, information warfare and the military, and intelligence in the information age.Information warfare policy and ethical Issues.

References

1. Hon C Graff, Cryptography and E-Commerce - A Wiley Tech Brief, Wiley Computer Publisher, 2001
2. Michael Cross, Norris L Johnson, Tony Piltzecker, Security, Shroff Publishers and Distributors Ltd.

CS-464 ComputaionalCompexity

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

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 Marks**
			Total	**:150 Marks**
			Duration of Exam	**: 3 Hrs**

Course Outcomes

On successful completion of this module, the student should

- Be familiar with the limits of models of computation under the Church-Turing hypothesis.
- Be familiar with the complexity classes P, NP, co-NP, NP-hard, and others.
- Be able to evaluate specific algorithms in terms of worst- and average-case complexity of performance.

UNIT I

Computability: Review of Turing Machines, view of PDAs, 2DFAs, FAs as restricted TMs and related theorems. Tape reduction, and robustness of the model.Encoding and Enumeration of Turing Machines, Undecidability.

UNIT II

Rice-Myhill-Shapiro theorem: Relativisation. Arithmetic and Analytic Hierarchy of languages.Proof of Godel's incompleteness theorem based on computability.Kolmogorov Complexity. Resource bounded computation. Notion of a computational resource.Blum's Speedup theorem.

UNIT III

Time Complexity: Time as a resource, Linear Speedup theorem. Crossing Sequences and their applications.Hierarchy theorems.P vs NP.Time Complexity classes and their relationships.Notion of completeness, reductions.Cook-Levin Theorem.Ladner's theorem.RelativizationBarrier : Baker-Gill-Solovoy theorem.

UNIT IV

Space Complexity: Space as a resource. PSPACE, L and NL.Reachability Problem, Completeness results.Savitch's theorem, Inductive Counting to show Immerman-Szelepscenyi theorem. Reachability Problems**,** Expander Graphs, SL=L

UNIT V

Complexity of Counting &Randomization : Counting Problems. Theory of #P-completeness. The complexity classes PP, ParityP, BPP, RP, BPP is in P/poly, Toda's theorem.

Text Books

1. Dexter Kozen,Automata and Computability
2. Dexter Kozen,Theory of Computation
3. Du and Ko , Theory of Computational Complexity

ECS-465 Data Analytics
B.Tech. Semester –VIII (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 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.
- Have an in-depth understanding and comparison of the Big Data ecosystem, specifically PIG, Hive.

UNIT I : 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 II : 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 III : 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 IV : 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 V : 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 Analystics, John Wiley & Sons, 2012.
4. Glenn J. Myatt, Making Sense Of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O"Reilly, 2011.

TOE-46 Microprocessors
B.Tech. Semester –VIII (Computer Science &Engg.)

L	T	P		
3	-	-	**Class Work**	**:60 Marks**
			Exam.	**:90 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 8086 microprocessor's interfaces and their architecture
- .Describe the evolution and various types of advanced microprocessors.

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

UNIT II: 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 III: 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 IV: 8051 MICROCONTROLLERS

Fundamental differences of microprocessors and microcontrollers, Introduction to Architecture and instruction set of 8051 microcontroller.

UNIT V: ADVANCE MICROPROCESSORS '

Architecture and functional description of Programmable Peripheral interface (8255), operating modes: "BSR, /O mode- Mode 0, 1 and 2, Programming 8255, Architecture and functional description of USART (8251), Priority Interrupt Controller (8259), interfacing of A/D and D/A converters, Memory Interfacing, Application of peripheral devices: temperature control, waveform generation and stepper

motor control.

Books

1. R.S. Gaonkar, "Microprocessor Archltecture Programming and Applications with 8085/8080A"",
2. Wiley Eastern Limited.
3. Barry B. Brey, Intel M|croprocessors, 8th Edition, Pearson Education/Prentice Hall.

W

4. Y.C. Liu and G.A. Gibson, “Microprocessor Systems: The 8086/8088 Family Architecture, Programming & Design”, PHI. ‘
5. A.K. Ray and K.M. Bhurchandi, “Advanced Microprocessors and Peripherals”, TMH.

PCS-481 Project-II

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

L	T	P		
-	-	32	**Class Work**	**:400 Marks**
			Exam.	**:400 Marks**
			Total	**:800 Marks**
			Duration of Exam	**: 3 Hrs**

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. The assignment to normally include: '

- Indepth study of the topic assigned in the light of the Report prepared under Project 1.
- Review and finalization of the Approach to the Problem relating to theassigned topic.
- Preparing 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.
- Preparing 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-482 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 OUTCOMES

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

- Identify new directions of various cutting-edge technologies.
- Express themselves fluently and ethically in social and professional contexts.
- Show an ability to explain complex technology in a logical and convincing way.
- Develop the skills required for paper presentations and group discussions.
- To impart skills in preparing detailed report describing the topic.

Description

- Each student should collect materials from Books, Internet, Journals and Newspapers for his/her theme and prepare a short seminar power point presentation.
- 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 other students also come forward to question, clarify, supplement or evaluate. The student evaluation is 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 coordinator is to be allotted and he / she will guide and monitor the progress of the student and maintain the attendance also.

Some of the themes like:

- Block chain
- Cyber Security
- Data Science
- Machine Learning
- Full Stack
- MERN Stack
- Web Development
- Python Programming
- Deep Learning
- IoT
- Data Analytics
- Cloud Computing
- Flutter
- Django