EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
II-YEAR (III-SEMESTER)
(Effective from session: 2012-13)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME				
						SESSIONAL EXAM			ESE	Subject Total
			L	T	P	CT	TA	Total		
THEORY										
1.	TCS 231	DATA STRUCTURES	3	1	-	30	20	50	100	150
2.	TEC 232	DIGITAL ELECTRONICS	3	1	-	30	20	50	100	150
3.	TCS 232	WEB TECHNOLOGIES	3	1	-	30	20	50	100	150
4.	TCS 233	DISCRETE STRUCTURES	3	1	-	30	20	50	100	150
5.	TAH 232	MATHEMATICS- III	3	1	-	30	20	50	100	150
PRACTICAL										
6.	PCS 231	DATA STRUCTURES (Pr)	-	-	2	10	15	25	25	50
7.	PEC 232	DIGITAL ELECTRONCIS (Pr)	-	-	2	10	15	25	25	50
8.	PCS 232	WEB TECHNOLOGIES (Pr)	-	-	2	10	15	25	25	50
9.	PCS 233	COMPUTER WORKSHOP (Pr)	-	-	2	10	15	25	25	50
10.	GPP 231	GENERAL PROFICIENCY	-	-	-	-	50	50	-	50
SEMESTER TOTAL			**15**	**5**	**8**	**190**	**210**	**400**	**600**	**1000**

EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
II-YEAR (IV-SEMESTER)
(Effective from session: 2012-13)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME				
						SESSIONAL EXAM			ESE	Subject Total
			L	T	P	CT	TA	Total		
THEORY										
11.	TCS 241	DATABASE MANAGEMENT SYSTEMS	3	1	-	30	20	50	100	150
12.	TCS 242	OBJECT ORIENTED PROGRAMMING AND DESIGN	3	1	-	30	20	50	100	150
13.	TCS 243	OPERATING SYSTEMS	3	1	-	30	20	50	100	150
14.	TCS 244	STATISTICAL MODELING AND QUEUING THEORY	3	1	-	30	20	50	100	150
15.	TCS 245	THEORY OF COMPUTATION	3	1	-	30	20	50	100	150
PRACTICAL										
16.	PCS 241	DATABASE MANAGEMENT SYSTEMS (Pr)	-	-	2	10	15	25	25	50
17.	PCS 242	OBJECT ORIENTED PROGRAMMING AND DESIGN (Pr)	-	-	2	10	15	25	25	50
18.	PCS 243	OPERATING SYSTEMS (Pr)	-	-	2	10	15	25	25	50
19.	PCS 244	QUEUING THEORY (Pr)	-	-	2	10	15	25	25	50
20.	GPP 241	GENERAL PROFICIENCY	-	-	-	-	50	50	-	50
SEMESTER TOTAL			**15**	**5**	**8**	**190**	**210**	**400**	**600**	**1000**

EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
III-YEAR (V-SEMESTER)
(Effective from session: 2012-13)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME				
						SESSIONAL EXAM			ESE	Subject Total
			L	T	P	CT	TA	Total		
THEORY										
21.	TCS 351	ANALYSIS AND DESIGN OF ALGORITHMS	3	1	-	30	20	50	100	150
22.	TCS 352	COMPUTER ARCHITECTURE	3	1	-	30	20	50	100	150
23.	TCS 353	JAVA PROGRAMMING	3	1	-	30	20	50	100	150
24.	TEC 354	MICROPROCESSORS	3	1	-	30	20	50	100	150
25.	TCS 354	ARTIFICIAL INTELLIGENCE	3	1	-	30	20	50	100	150
PRACTICAL										
26.	PCS 351	ANALYSIS AND DESIGN OF ALGORITHMS (Pr)	-	-	2	10	15	25	25	50
27.	PCS 352	COMPUTER ARCHITECTURE(Pr)	-	-	2	10	15	25	25	50
28.	PCS 353	JAVA PROGRAMMING(Pr)	-	-	2	10	15	25	25	50
29.	PEC 354	MICROPROCESSORS (Pr)	-	-	2	10	15	25	25	50
30.	GPP 351	GENERAL PROFICIENCY	-	-	-	-	50	50	-	50
SEMESTER TOTAL			**15**	**5**	**8**	**190**	**210**	**400**	**600**	**1000**

EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
III-YEAR (VI-SEMESTER)
(Effective from session: 2012-13)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME				
						SESSIONAL EXAM			ESE	Subject Total
			L	T	P	CT	TA	Total		
THEORY										
31.	TCS 361	COMPILER DESIGN	3	1	-	30	20	50	100	150
32.	TCS 362	COMPUTER NETWORKS	3	1	-	30	20	50	100	150
33.	TCS 363	SOFTWARE ENGINEERING	3	1	-	30	20	50	100	150
34.	TCS 364	DISTRIBUTED SYSTEMS	3	1	-	30	20	50	100	150
35.	TAH 361	INDUSTRIAL ECONOMICS & MANAGEMENT	3	1	-	30	20	50	100	150
PRACTICAL										
36.	PCS 361	COMPILER DESIGN (Pr)	-	-	2	10	15	25	25	50
37.	PCS 362	COMPUTER NETWORKS (Pr)	-	-	2	10	15	25	25	50
38.	PCS 363	SOFTWARE ENGINEERING (Pr)	-	-	2	10	15	25	25	50
39.	PCS 364	SEMINAR	-	-	2	-	50	50	-	50
40.	GPP 361	GENERAL PROFICIENCY	-	-	-	-	50	50	-	50
SEMESTER TOTAL			**15**	**5**	**8**	**180**	**245**	**425**	**575**	**1000**

EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
IV-YEAR (VII-SEMESTER)
(Effective from session: 2012-13)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME				
						SESSIONAL EXAM			ESE	Subject Total
			L	T	P	CT	TA	Total		
THEORY										
41.	TCS 471	COMPUTER GRAPHICS AND ANIMATION	3	1	-	30	20	50	100	150
42.	TCS 472	ADVANCED COMPUTER ARCHITECTURE	3	1	-	30	20	50	100	150
43.	TCS 473	ADVANCED DATABASE MANAGEMENT SYSTEMS	3	1	-	30	20	50	100	150
44.	ECS 47X	ELECTIVE-I	3	1	-	30	20	50	100	150
45.	ECS 47Y	ELECTIVE-II	3	1	-	30	20	50	100	150
PRACTICAL										
46.	PCS 471	COMPUTER GRAPHICS AND ANIMATION(Pr)	-	-	2	10	15	25	25	50
47.	PCS 472	INDUSTRIAL TRAINING	-	-	2	-	50	50	-	50
48.	PCS 473	PROJECT-I	-	-	4	25	25	50	50	100
49.	GPP 471	GENERAL PROFICIENCY	-	-	-	-	50	50	-	50
SEMESTER TOTAL			**15**	**5**	**8**	**185**	**240**	**425**	**575**	**1000**

ELECTIVE-I		**ELECTIVE-II**	
COURSE CODE	**SUBJECT**	**COURSE CODE**	**SUBJECT**
ECS 470	DIGITAL SIGNAL PROCESSING & APPLICATIONS	ECS 475	E-COMMERCE
ECS 471	INFORMATION & COMMUNICATION THEORY	ECS 476	CRYPTOGRAPHY & NETWORK SECURITY
ECS 472	MOBILE COMPUTING	ECS 477	DATA WAREHOUSING & DATA MINING
ECS 473	EMERGING TRENDS & TECHNOLOGIES	ECS 478	DIGITAL IMAGE PROCESSING
ECS 474	WIRELESS NETWORKS	ECS 479	DISTRIBUTED OPERATING SYSTEMS

EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
IV-YEAR (VIII-SEMESTER)
(Effective from session: 2012-13)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME				
						SESSIONAL EXAM			ESE	Subject Total
			L	T	P	CT	TA	Total		
THEORY										
50.	TCS 481	ADHOC NETWORKS	3	1	-	30	20	50	100	150
51.	TCS 482	EMBEDDED SYSTEMS	3	1	-	30	20	50	100	150
52.	ECS 48X	ELECTIVE-III	3	1	-	30	20	50	100	150
53.	ECS 48Y	ELECTIVE-IV	3	1	-	30	20	50	100	150
PRACTICAL										
54.	PCS 481	ADHOC NETWORKS(Pr)	-	-	2	10	15	25	25	50
55.	PCS 482	PROJECT II	-	-	6	50	50	100	200	300
56.	GPP 481	GENERAL PROFICIENCY	-	-	-	-	50	50	-	50
SEMESTER TOTAL			**12**	**4**	**8**	**180**	**195**	**375**	**625**	**1000**

ELECTIVE-III		**ELECTIVE-IV**	
COURSE CODE	**SUBJECT**	**COURSE CODE**	**SUBJECT**
ECS 480	CLOUD COMPUTING	ECS 485	ADVANCE COMPUTER NETWORKS
ECS 481	DISTRIBUTED DATABASES	ECS 486	DISTRIBUTED ALGORITHMS
ECS 482	FAULT TOLERANT SYSTEMS	ECS 487	GRID COMPUTING
ECS 483	REAL TIME SYSTEMS	ECS 488	QUERY & TRANSACTION PROCESSING
ECS 484	SOFTWARE PROJECT MANAGEMENT	ECS 489	SOFT COMPUTING

TCS 231: Data Structures
B.Tech. Semester –III (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective: To provide basic data structure concepts and their implementation, testing and maintenance for software systems.

Prerequisite: Knowledge of basic C, mathematics, problem solving.

Course Outcome :

- Implement basic ADTs 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 1: Basic Terminology: Elementary Data Organization, Data Structure Operations
Arrays: 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 2: Stacks and Queues: Operations on Stacks- Push, Pop, Peep, Representation of stacks. Application 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 3: 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 4: Trees: 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

Unit 5: Searching, Sorting methodologies: Array- 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.

Books

1. An Introduction To Data Structures and Application by Jean Paul Tremblay & Pal G. Sorenson (McGraw Hill)
2. R.L. Kruse, B.P. Leary, C.L. Tondo, Data structure and program design in C , PHI
3. R. B. Patel, Expert Data Structures With C, Khanna Publications, Delhi, India, 3rd Edition 2008.
4. Data Structures using C by A. M. Tenenbaum, Langsam, Moshe J. Augentem, PHI Pub.
5. Data Structures and Algorithms by A. V. Aho, J. E. Hopcroft and T. D. Ullman, Original edition, AddisonWesley, 1999, Low Price Edition.
6. Fundamentals of Data Structure by Ellis Horowitz & Sartaj Sahni, Pub, 1983. AW
7. Data Structure and Program design in C by Robert Kruse, PHI
8. Theory and Problems of Data Structures by Jr. Symour Lipschetz, Schaum's outline by TMH.
9. Introduction to Computer Science- An algorithms approach, Jean Paul Tremblay, Richard B. Bunt, 2002, TMH.
10. Data Structure and Standard Template Library- Willam J. Collins, 2003, T.M.H

TEC 232 : DIGITAL ELECTRONICS

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

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Prerequisite: Knowledge of Logic gates is essential.

Course Outcome:

- Use DeMorgan's Theorem to simplify a negated expression.
- Formulate and employ a Karnaugh map to reduce Boolean expression.
- Use and explain the logic gates.
- Design and implement combinational and sequential circuits.
- Ability to analyze and design logical families.
- Ability to understand the operations of semiconductor memories.

UNIT 1: MINIMIZATION OF LOGIC FUNCTION: Review of logic gate and Boolean algebra, Standard representation of logical functions, K-map representation and simplification of logical functions, Quinn-McClusky's Algorithm, Don't care conditions, X-OR & X-NOR simplification of K-maps.

UNIT 2: COMBINATIONAL CIRCUITS: Combinational circuit design, adders, subtractor, code converters, magnitude comparators, decoders, encoders, multiplexers, de-multiplexer, parity checker.

UNIT 3: SEQUENTIAL CIRCUITS: R-S, J-K, D, T Flip-flops, race around condition, Master–Slave flip-flops, Edge triggered Flip Flop, Excitation table of a flip-flop, Analysis and design procedure to a synchronous sequential circuit, Conversion of flip flops from one to another.

SHIFT REGISTERS: Buffer register, shift operations, SISO, SIPO, PISO, PIPO, and universal shift registers and applications**.**

COUNTERS: Ripple counter, Decade counter, Design of Synchronous counters, Programmable, down, Up, mod-m counters, difference between synchronous and asynchronous counters, ring, Johnson, cascade counters and application.

UNIT 4: LOGIC FAMILIES: Diode and transistor as a switch, type and specification of digital logic family, RTL, DCTL, DTL, ECL, TTL and its various types, MOS, CMOS, BiCMOS logic families, Characteristics and comparison of logic families.

UNIT 5: SEMICONDUCTOR MEMORIES: Memory organization, Classification and characteristics of memories, sequential memories, RAM – static and dynamic, ROM, PROM, EPROM, EEPROM and Programmable logic arrays.

D/A AND A/D CONVERTERS : Weighted register D/A converter, binary ladder D/A converter, steady state accuracy test, D/A accuracy and resolution, parallel A/D converter, Counter type A/D converter Successive approximation A/D converter, Single and dual slope A/D converter A/D accuracy and resolution.

BOOKS:

1. Digital Principle and applications Malvino, TMH
2. Modern digital electronics R. P. Jain, PHI
3. Digital Logic and Computer Design M. Morris Mano, PHI
4. Digital Electronics R J Tocci, PHI

TCS 232: Web Technologies
B.Tech. Semester –III (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective: To provide hands-on experience on the various web technologies and their implementations.

Prerequisite: Knowledge of html, java script, core java is essential.

Course Outcome:

- Student shall able to develop web application.
- Student shall able to design the static and dynamic web pages.
- Student will strengthen their ability of XML schema and problem solving using DTD.
- Students will express the solutions to CGI problems clearly and precisely.
- Students shall be able to design various web sites using ASP.NET programming approach.
- Student shall be able to design the web project, web forms using web form control approach.

Unit 1: Information Architecture: The role of Information Architect, Collaboration and communication, Organizing information, organizational challenges, Organizing web sites and Intranets, Creating cohesive organization systems, designing navigation systems, types of navigation systems, Integrated navigation elements, designing elegant navigation systems, Searching systems, Searching your web site, designing the search interface, Indexing the right stuff, To search or not to search grouping content, conceptual design, High level Architecture Blueprint. Architectural Page Mockups, Design Sketches. Website development and its phases.

Unit 2: 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 3 : CGI Using PERL: Introduction to CGI, Alternative technologies, The Hypertext Transport protocol, URLs, HTTP, Browser requests, Server Responses, Proxies, Content Negotiation, The common Gateway Interface, The CGI Environment, Environment variables, CGI Output, forms and CGI, Sending Data to the server, form Tags, Decoding from input, Architectural Guidelines, Coding Guidelines, Efficiency and optimization.

Unit 4: Introduction: 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 5 :Databases: Creating Databases, SQL statements, Using Datasets, Data binding, Data binding Controls. Files: Reading and writing files using ASP.Net

Books

1. Thomas A Powell, HTML The Complete Reference, Tata McGraw Hill Publications.
2. SCSEt Guelich, Shishir Gundavaram, Gunther Birzneik; CGI Programming with PERL 2/e, O' Reilly.
3. Doug Tidwell, James Snell, Pavel Kulchenko; 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 Desk reference, Techmedia publications, ASP.Net Chris payme, Techmedia
7 Fundamentals of Internet and World Wide Web, Raymond Greenlaw and Ellen Hepp-2001, TMH.

TCS 233: Discrète Structures
B.Tech. Semester –III (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective : To introduce to the students the fundamental discrete structures used in computer science.

Prerequisite: Knowledge of mathematics.

Course Outcome:

- The student will be able to identify and apply basic concepts of set theory, arithmetic, logic, proof techniques, binary relations, graphs and trees
- The student will be able to produce convincing arguments, conceive and/or analyze basic mathematical proofs and discriminate between valid and unreliable arguments.
- The student will be able to apply the knowledge and skills obtained to investigate and solve a variety of discrete mathematical problems
- The student will be able to combinatorial analysis.
- The student will be able to recurrence relations.

Unit 1: Set Theory: Introduction to set theory, Set operations, Algebra of Sets, Combination of sets, Duality, Finite and infinite sets, Classes of sets, Power sets, Multi sets, Cartesian Product, Representation of relations, Types of relation, Binary relation, Equivalence relations and partitions, Partial ordering relations and lattices, Mathematics Induction, Principle of Inclusion and Exclusion, Propositions.
Function and its types, Composition of function and relations, Cardinality and inverse relations, Functions and Pigeo principles.

Unit 2: Propositional Calculus: Basic operations; AND(^), OR(v), NOT(~), True value of a compound statement, propositions, tautologies, contradictions.

Unit 3: Recursion and Recurrence Relation: linear recurrence relation with constant coefficients, Homogeneous solutions, Particular solutions, Total solution of a recurrence relation using generating functions.

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

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

Books

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

TAH 232 : Mathematics –III
B.Tech. Semester –III (Computer Science & Engg.)

L	T	P
3	1	0

Class Work :50 Marks
Exam. :100 Marks
Total :150 Marks
Duration of Exam : 3 Hrs.

Prerequisite: Knowledge of mathematics.

Course Outcome:

- To understand the basic concepts of integral transforms statistics.
- To make students able to formulate and solve mathematical engineering problems
- To understand the basic concepts of digital image processing.
- To understand probabilistic techniques.
- Will able to formulate complex problem.

Unit 1: Integral Transforms: Fourier Integral, Fourier complex transforms,, Fourier sine and cosine transforms and applications to simple heat transfer equations. Z- transforms and its application to solve difference equations.

Unit 2 : Functions of a Complex Variable –I: Analytic functions, C-R equations and harmonic and functions, Line integral in the complex plane, Cauchy's integral theorem, Cauchy's integral formula for derivative of analytic functions Liouvilles theorem, Fundamentals theorem of algebra.

Unit 3: Functions of a Complex Variable II : Representation of a functions by power series, Taylor's and Laurent's series, Singularities, Zeroes and Poles Residue theorem, evolution of real integrals of type $\int_0^{2\Pi} f(\cos\theta, \sin\theta)d\theta$ and $\int_{-\infty}^{+\infty} f(x)dx$, Conformal mapping and bilinear transformation.

Unit 4 : Statistic and Probability : Correlations and Regression,, Binomial distribution, Poisson distribution, Normal distribution. Conditional Probability, expectation theorem. Binomial expansion.

Unit 5: Curve Fitting and Solution of Equation: Method of least squares and curve fitting of straight line and parabola, Solution of cubic and bi-quadratic equations.

PCS 231: Data Structures (Pr)
B.TECH Semester-III (Computer Science & Engineering)

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.

Course Outcome:

- The student will be able to understand the concepts of data structure, data type and array data structure
- The student will be able to analyze algorithms and determine their time complexity.
- The student will be able to implement linked list data structure to solve various problems.
- The student will be able to understand and apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using C-programming language.
- The student will be able to implement and know when to apply standard algorithms for searching and sorting

The experiments will be based on the following paper: PCS 231 Data Structures

PEC 232: DIGITAL ELECTRONICS (Pr)
B.TECH Semester-III (Computer Science & Engineering)

L	T	P
-	-	2

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

Prerequisite :Logic gates is essential.

Course Outcome:

- Application of DeMorgan's Theorem to simplify a negated expression.
- Implement Karnaugh map to reduce Boolean expression.
- Use of the logic gates.
- Design and implement combinational and sequential circuits.
- Ability to analyze and design logical families and CMOS.
- Ability to understand the operations of semiconductor memories.

The experiments will be based on the following paper (PEC- 232) Digital Electronics.

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

PCS 232: WEB TECHNOLOGIES (Pr)
B.TECH Semester-III (Computer Science & Engineering)

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

Prerequisites : Knowledge of HTML Java Script Programming is essential.

Course Outcome:

- Students can learn HTML tags and solving real world problems of web application.
- Students design XML schema and DTD for solving problems of a database.
- Student able to develop the static and dynamic web pages.
- Students shall be able to design various web sites using ASP.NET programming approach.
- Students shall be able to optimize or re-engineered already existing solutions to various problems.

The experiments will be based on the following paper: TCS 232 Web Technologies

PCS 233: Computer Workshop (Pr)
B.TECH Semester-III (Computer Science & Engineering)

L	T	P
-	-	2

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

Objective : To give the hands on practice of Computer Hardware & Network Technology.

Prerequisite: Knowledge of Basic computer ,parts of computer**.**

Course Outcome:

- Student will know about the component of computer system.
- Student learns about the concepts of various types of I/O devices.
- Student learns about the concepts of various types of motherboard devices.
- Student learns about the concepts of various types of memory devices.
- Student learns about the concepts of various types of networking devices.

INTRODUCTION:-

1. To open the cabinet of Computer
2. To observe external connections
3. To observe different cables and connectors.
4. To disassemble the computer.

HARD DISK:-

1. To install the Hard Disk
2. To make partition of Hard disk
3. To observe Partition Information
4. To delete partitions
5. To format Hard Disk
6. To connect two Hard disks in Master and Slave mode
7. To defrag Hard Disk
8. To free more space by FAT32, by compressing, by drive space, by removing unnecessary files
9. To remove Hard Disk faults by Scandisk, by Norton disk diagnosis (NDD)
10. To copy Hard Disk by Ghost, By Disk Copy, By Master/Slave
11. To carry out Hard Disk Jumper setting
12. To backup & restore Hard Disk
13. To recover lost data by Mirror, Image, Ghost, Lost clusters, Recycle bin, Undelete, unformat Partition
14. To measure access time of Hard Disk .
15. To carry out Master Boot record of Hard Disk by Fdisk
16. To make Hard Disk bootable
17. To carry Head Parking of Hard Disk
18. To remove Virus from Hard Disk
19. To label Partition of Hard Disk
20. To make dual boot system
21. To maintain Hard Disk
22. To troubleshoot Hard Disk faults
23. To observe Hard disk cables
24. To test Hard disk

FLOPPY DRIVE:-

1. To install floppy drive.
2. To format floppy Disk. - 1.4, 1.2 MB
3. To make A & B Configuration of Floppy drives
4. To defrag floppy disk
5. To make more space on floppy disk
6. To test and & align floppy drive Head
7. To copy Floppy Disk
8. To make Emergency Disk / Boot disk / Rescue disk
9. To write protect floppy disk
10. To Clean floppy drive head
11. To test floppy drive

MONITOR:-

1. To change Monitor Resolution/ Dot pitch
2. To change Fonts of monitor display screen
3. To change appearance of monitor display screen
4. To adjust Height, Width, Position, Cushion, Trace of display screen
5. To adjust Brightness and Contrast
6. To set monitor Power off time
7. To apply different Themes on display screen
8. To operate Screen saver
9. To install monitor - Plug & Play
10. To increase monitor performance
11. To change display adaptor card (Video Card)
12. To observe 3D & Direct draw facility
13. To set active desktop page
14. To test and align monitor
15. To set Dos Colour Setting
16. To set Internal Controls of monitor
17. To install monitor

DISPLAY CARD:-

1. How install display card
2. To configure the drivers
3. To change setting of IRQ / DMA/ MEMORY /PORT setting
4. To install /testing resolution / card
5. To make Configure Modes
6. To install Add Video Ram (VRAM)
7. To test display card
8. To make Over Clocking

CPU:-

1. To install Cache Check Cache
2. To make the Check-Types, Speed, Socket, Manufacturer, Voltage
3. To use the See-Heat-sink, FAN, socket, Speed
4. To check Test-CPU speed / NPU speed & Measure
5. To Adjust CPU Speed to Bus Speed
6. To use the Wait state / Fetch cycle / Execute cycle / Instruction Set
7. To install CPU

MEMORY:-

1. To installing the memory
2. To Memory Checking Type, Capacity, Speed
3. To Check & Change Virtual memory
4. To Set Swap memory
5. To make Map memory - used / unused / by
6. To Convert-EMS - XMS
7. To Carry out & setting DMA
8. To Optimize memory by Memory Management
9. To Test Memory
10. To Protected Mode & Virtual Mode
11. To Carry out ROM shadowing
12. To Create-Cache & Use it
13. To Create & Use RAM DISK

MOTHERBOARD:-

1. To Install / Change / Upgrade the mother board.
2. To Check the Chip-Set type
3. To Check the CPU and Socket type
4. To Check memory and Socket type
5. To Check connectors and Sockets IDE1, IDE2, FDC KB, PS/2 Mouse, Com1, Com2, LPT1, Game Port RPS Sockets, ATX socket, PCI Bus, AGP, AMR, ISA, USB, BIOS, CMOS, Battery, Control Panel LS, LED, Reset, Key Lock, IRDA, Size - AT/ATX Manufacturer / Drivers, Fan connectors, WOL, Headers Audio, VGA, CD, Modem, LAN
6. To Test & measure - BUS speed – system, Slots - PCI, ISA, Ports - Com1, Com2, LPT, Game, BIOS,
7. Int. Controller, DMA. Controller, KB Controller, Clock, Timer, C-MOS RAM, LS, Battery
8. To Test On Board - Test / Check, Audio, Video, Modem, LAN
9. To Hardware Monitor
10. To Set Motherboard jumpers
11. To Voltage & Waveforms
12. To Install Drivers

KEY BOARD:-

1. To Test / Check the keyboard.
2. To Measure clock & data signal voltage / Wave forms of keyboard.
3. To Use Special Keys of keyboard.
4. To DosKey of keyboard
5. To Define Key-Macros
6. To Print screen of keyboard
7. To keyboard Typematic Rate
8. To use the keyboard Num Lock
9. How Install the keyboard
10. To DIN to PS2 Converter
11. To Configure Speed / Shape / tail of mouse.
12. To Test/check in Modem in Dos the mouse.
13. To Clean the mouse
14. How Install the Serial / PS2 drivers of mouse
15. To Set Com1 & Com2 of mouse.
16. To Use PS2 to Com1 Converter mouse
17. To Use Com1 to Com2 Converter mouse
18. To Measure Voltages of Switch mode power supply (SMPS).
19. To Install the SMPS.
20. To Test/check the SMPS.
21. To Observe Connectors & Wires colour of SMPS. Types of cabinet

COMPUTER NETWORKING:-

1. To make computer network patch cord.
2. To test the line of internet/intranet.
3. To install Access point.
4. To install the Switch.
5. To install the Hub.
6. To configure IP address
7. To configure Subnet masking
8. To opening and closing of ports.

To configure Router.

TCS 241: Database Management Systems
B.Tech. Semester –IV (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective: To introduce the concepts of database management systems and the design of relational databases.

Prerequisite: Knowledge of databases is essential.

Outcomes:

- To understand the basic concepts of relational database.
- To give knowledge regarding various databases.
- To understand various queries for data retrievals.
- To make student able to understand application, development concept of DBMS
- To understand the application of DBMS in technical society and solve engineering problems.

Unit 1: Introduction: Overview of Database Management System, Various views of data, data models, Schemes, Introduction to Database Languages & Environments, Advantages of DBMS over file processing systems, Responsibility of database administrator, Three levels architecture of database systems, Introduction to Client/Server architecture. Data Models: E-R diagram(Entity Relationship), mapping constraints, keys, Reduction of E-R diagram into tables, Naming secondary storage devices, Network and Hierarchical Model.

Unit 2: Sequential Files: Index sequential files, direct files, Hashing, B-trees index files, Inverted Lists.

Unit 3: Relational Model: Relational Algebra & various operations (set operations, select, project, join, division), Order, Relational calculus: Domain, Tuple. Well formed formula, specification, quantifiers.

Unit 4: Introduction to Query Languages: QBE, integrity constraints, functional dependencies & normalization (Normal forms – up to 5^{th} Normal Form).

Unit 5 : Introduction to Distributed Data processing: Object Oriented Database Management systems, parallel databases, Data mining & data warehousing, Concurrency control: Transaction, Timestamping, Lock based Protocols, serializability and recovery techniques.

Books

1. Database System Concepts by A. Siberschatz, H. F. Korth and S. Sudarshan, 3rd edition, 1997, McGraw-Hill, International Edition.
2. Introduction to Database Management system by Bipin desai, 1991, Galgotia Pub.
3. Fundamentals of Database Systems by R. Elmarsi and S. B. Navathe, 3rd edition, 2000, Addison-Wesley, Low Priced edition.
4. An Introduction to Database Systems by C. J. Date, 7th edition, Addison-Wesley, Low Priced Edition, 2000
5. Database Management and Design by G.W. Hansen and J. V. Hansen, 2nd edition, 1999, Prentice-Hall of India, Eastern Economy Edition.
6. Database Management systems by A. K. Majumdar and P. Bhattacharyya, 5th edition, 1999, Tata McGraw- Hill Publishing.
7. A guide to SQL Standard, Date, C. and Darwen, H. 3rd edition, Reading, MA: 1994, Addison-Wesley.
8. Data Management & File Structure by Looms, 1989, PHI.

TCS 242: Object Oriented Programming & Design
B.Tech. Semester –IV (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective: To provide basic concepts of an object –oriented setting for design, implementation, testing and maintenance of software systems.

Prerequisite: Knowledge of C and C++ is essential.

Outcomes:

- To give knowledge of object oriented Programming as it is supported by most of latest programming languages .
- Use object oriented concept and modeling IT problems .
- To give various applications of object oriented programming in IT world.
- To enhance programming skills of students.
- To understand and learn design, implementation concepts for software systems.

Unit 1: C++ Standard Library: Preprocessor Directives, illustrative Simple C++ Programs. Header Files and Namespaces, library files. Concept of objects, Object Oriented Analysis & Object Modeling techniques.
Object Oriented Concepts: Introduction to Objects and Object Oriented Programming, Encapsulation (Information Hiding), Access Modifiers: Controlling access to a class, method, or variable (public, protected, private, package), Other Modifiers, Polymorphism: Overloading, Inheritance, Overriding, Abstract Classes, Reusability
Classes and Data Abstraction: Introduction, Structure Definitions, Accessing Members of Structures, Class Scope and Accessing Class Members, Controlling Access Function And Utility Functions, Initializing Class Objects: Constructors.

Unit 2: Using Destructors, Classes: Const(Constant) Object And Const Member Functions, Object as Member of Classes, Friend Function and Friend Classes, Using This Pointer, Dynamic Memory Allocation with New and Delete, Static Class Members, Container Classes and Iiterators, Function overloading.
Operator Overloading: Introduction, Fundamentals of Operator Overloading, Restrictions On Operators Overloading, Operator Functions as Class Members vs. as Friend Functions, Overloading, «, »

Unit 3: Inheritance: Introduction, Inheritance: Base Classes And Derived Classes, Protected Members, Casting Base Class Pointers to Derived- Class Pointers, Using Member Functions, Overriding Base -Class Members in a Derived Class, Public, Protected and Private Inheritance, Using Constructors and Destructors in derived Classes, Implicit Derived -Class Object To Base- Class Object Conversion, Composition Vs. Inheritance.
Introduction to Virtual Functions, Abstract ,Base Classes And Concrete Classes, Polymorphism, New Classes And Dynamic Binding, Virtual Destructors, Polymorphism, Dynamic Binding.

Unit 4: Files and I/O Streams and various operation on files: Stream Input/Output Classes and Objects, Stream Output, Stream Input, Unformatted I/O (with read and write), Stream Manipulators, Stream Format States, Stream Error States.

Unit 5: Templates & Exception Handling: Function Templates, Overloading Template Functions, Class Template, Class Templates and Non-Type Parameters, Templates and Inheritance, Templates and Friends.
Templates and Static Members: Introduction, Basics of C++ Exception Handling: Try Throw, Catch, Throwing an Exception;- Catching an Exception, Re-throwing an Exception, Exception specifications, Processing Unexpected Exceptions, Constructors, Destructors and Exception Handling, Exceptions and Inheritance.

Books

1. C++ How to Program by H M Deitel and P J Deitel, 1998, Prentice Hall
2. Object Oriented Programming in Turbo C++ by Robert Lafore ,1994, The WAITE Group Press.
3. Programming with C++ By D Ravichandran, 2003, T.M.H
4. Object oriented Programming with C++ by E Balagurusamy, 2001, Tata McGraw-Hill
5. Computing Concepts with C++ Essentials by Horstmann, 2003, John Wiley,
6. The Complete Reference in C++ By Herbert Schildt, 2002, TMH.
7. C++ Programming Fundamentals by Chuck Easttom, Firewall Media.

TCS 243: Operating Systems
B.Tech. Semester –IV (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective: To provide an understanding of the functions and modules of an operating system and study the concepts underlying its design and implementation.

Prerequisite: Knowledge of C and C++ , data structure ,computer organization is essential.

Outcomes:

- Make students familiar with basics operating systems functions
- To understand the designing and implementation of various hardware architecture.
- To implement various algorithms related to mutual exclusion and synchronization concepts.
- To learn and understand various operating system tasks.
- Students will be able to implement solutions to various real world problems using scheduling techniques .

Unit 1: Introduction: Operating System Classifications, simple monitor, multiprogramming, time sharing, real time systems, Multiprocessor, Networking & Distributed Systems, and Interrupt based Systems, Operating system Services, System calls, and system programs.

Unit 2: CPU Scheduling: Basic Scheduling concepts, process overviews, process states, suspend/resume operations, multitasking and multithreading, schedulers and scheduling algorithms, multiple process scheduling.

Unit 3: Concurrent Processes: Critical section problem, Semaphores, Classical process coordination Problems and their solutions, Interprocess Communications
Deadlocks: Deadlocks Characterization, Deadlock prevention avoidance, detection and recovery.

Unit 4: Memory Management: Partition, Paging and Segmentation, Virtual Memory: Overlays demand paging, performance of demand paging, page-replacement algorithm, and thrashing.

Unit 5: File Systems: File support access methods, allocations methods, contiguous, linked and indexed allocation, Directory system: single level, tree structures, acyclic graph and general graph directories, file protection. Device scheduling: Physical characteristics, disk scheduling, and algorithm: FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK.
Resource Protection: Mechanism policies and domain of protection Access matrix and its implementation, dynamic protecting Structures.

Books

1. Peterson, J.L. & Silbersehatz, A.: Operating System Concepts, Addison, Wesley-Reading. . .
2. Brineh, Hansen: Operating System Principles, Prentice Hall of India.
3. Haberman, A.N.: Introduction to Operating System Design Galgotia Publication, New Delhi.
4. Tanenbaum, A.S.: Operating Systems.
5. Hansen, P.B.: Architecture Of Concurrent Programs, PHI.
6. Shaw, A.C.: Logic Design of Operating Systems, PHI.

TCS 244 :-Statistical Modeling and Queuing Theory
B.Tech. Semester –IV (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective: To acquaint the students with the fundamental principles of basic theory of computer science and networks.

Prerequisite: Knowledge of mathematics is essential.

Outcomes:

- Give students knowledge about statistical modeling.
- To understand the details of probability models.
- To understand exceptions and various queuing models to solve real life problems.
- To enhance statistical and mathematical knowledge.
- To understand Markov models to solve various probabilistic and real life problems.

Unit 1: 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 2: Random variables, and their event spaces: Probability mass function, Distribution functions, some discrete distributions (Bernoulli, Binomial, Geometric, Poisson, uniform, Probability Generating Function, Discrete random vectors, Continuous random variables: pdf some continuous distributions (Gamma, Normal), Exponential functions of random variables, joint1y distributed random variables.

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

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

Unit 5: Markov Chains: Computation of n-step transition probabilities, State classification and limiting distributions, Irreducible finite chains with aperiodic states, M/G/l queuing system, Discrete parameter Birth-Death 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.

TCS 245: Theory of Computation
B.Tech. Semester –IV(Computer Science & Engg.)

L	T	P
3	1	0

Class Work	**:50 Marks**
Exam.	**:100 Marks**
Total	**:150 Marks**
Duration of Exam	**: 3 Hrs.**

Objective: To provide an understanding of the theoretical development of computer science, particularly for finite representation of languages and machines

Prerequisite: Knowledge of mathematics is essential.

Outcomes:

- To provide an understanding of theoretical development of computer science.
- To understand the concept of finite of languages .
- To understand various concepts of machines to solve problems.
- Introduce students to notions of algorithms, decidability, complexity, and computability.
- Introduce students to mathematical foundations of computation including automata theory.

Unit 1: Regular Languages: Context free grammars, Chomsky Hierarchy: Chomsky hierarchies of grammars, unrestricted grammar, Context sensitive Language, Relation between languages of classes.

Unit 2: Finite Automata: equivalence, minimization, Myhill-Nerode Theorem, introduction to nondeterminism.

Unit 3: Pushdown automata: Definitions equivalence and applications. Linear Bounded Automata

Unit 4: Turing machines: Recursive and Recursively enumerable sets, non-determinism, RAMs and equivalence, Universal Turing Machines, undecidability, Rice's theorems for RE sets, Post machines, Basics of Recursive function theory.

Unit 5: Equivalence: Church's thesis, computational complexity, space and time complexity of Turing Machines, Relationships, Savage's theorem, Complexity classes, Complete problems, NP-completeness, Cook-Levin theorem.

Books

1. J.E. Hopcroft and J.D. Ullman: Introduction to Automata Theory Languages and Computation, Narosa.
2. John C. Martin: Introduction to Languages and the Theory of Computation, MGH.
3. Theory of Computation, R. B. Patel and Prem Nath, 1st edition, 2010, Khanna Book Publishing
4. Lewis & Papadimitriou: Elements of the Theory of Computation, PHI.
5. Daniel I.A. Cohen: Introduction to Computer Theory: John Wiley Company PVT. LTD. Delhi, India, 1st edition, 2010, ISBN: 978-93-80016-52-8, pp. 1-438.
6. Introduction to Automata Theory, languages & computations –Hopcroaft & O. D. Ullman, R.Motwani.
7. Theory of Computer Sc. (Automata, Language & Computation): K.L.P.Mishra & N.Chandershekaran.
8. Introduction to formal language & Automata – Peter Linz.

PCS 241:Database Management Systems (Pr)
B.TECH Semester-IV (Computer Science & Engineering)

L	T	P
-	-	2

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

Prerequisite : Knowledge of Database is essential.

Outcomes:

- Make students able to understand and practice query databases for retrieval of data and make them usable in real life environment .
- Understand, analyze and apply common sql commands on databases.
- To learns various queries related to of relational database.
- To take practical knowledge regarding various databases and implement that databases.
- Install, configure and interact with relational database management system.

PCS 242: Object Oriented Programming & Design (Pr)
B.TECH Semester-IV (Computer Science & Engineering)

L	T	P
-	-	2

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

Prerequisites: Knowledge of C/C++ Programming is essential.
The experiments will be based on the following :- TCS 242 **Object Oriented Programming & Design**

Outcomes:

- Make Students able to implement object oriented concept to fulfill the requirement in real life application
- To implement oops programs.
- To use and implement concepts of classes and objects.
- To implement various object oriented concepts like encapsulation, inheritance, polymorphism.
- To enhance programming skills of students.

PCS 243: Operating Systems (Pr)
B.TECH Semester-IV (Computer Science & Engineering)

L	T	P
-	-	2

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

Prerequisites : Knowledge of C/C++ Programming is essential.
The experiments will be based on the following :- TCS 243 **OPERATING SYSTEMS**

Outcomes:

- Various program related to OS.
- Demonstrate the shell and kernel architecture.
- Make students familiar with basics operating systems functions
- To understand the designing and implementation of various hardware architecture.
- Students will be able to implement solutions to various real world problems using scheduling techniques .

PCS 244: Queuing Theory (Pr)
B.TECH Semester-IV (Computer Science & Engineering)

L	T	P
-	-	2

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

Prerequisites : Knowledge of C/C++ Programming is essential.
The experiments will be based on the following :- TCS 244 **Statistical Modeling and Queuing Theory**

Outcomes:

- Demonstrate the queuing theory programs.
- Student will learn the basic simulation techniques for real world population.
- Give programming knowledge about statistical modeling.
- To understand the details of probability models.
- To understand exceptions and various queuing models to solve real life problems.

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

L	T	P
3	1	0

Class Work	**:50 Marks**
Exam.	**:100 Marks**
Total	**:150 Marks**
Duration of Exam	**: 3 Hrs.**

Objective: To familiarize students with the design strategies and bounds on the performance of different computer algorithms.

Prerequisite: Knowledge of Data structures(TCS-231) is essential.

Course Outcome

- Solve recurrence equations by considering time and space complexity.
- Analyze the complexities of various problems in different domains.
- Solve the problems using dynamic and greedy algorithms and design techniques.
- Synthesize efficient algorithms in common engineering design situations.
- Students can enhance their ability to design and evaluate ADTs

Unit 1: Review of Elementary Data Structures: analyzing algorithms, asymptotic notation, recurrence relations, Hash tables, Binary search trees. Heapsort, Priority queues, sorting in linear time, median and order statistics, dynamic order statistics.

Unit 2: Advanced Data Structures: Operations in B- Trees, Binomial heaps, Fibonacci heaps, data structures for disjoint sets, strings.

Unit 3: Dynamic Programming : Elements, Matrix-chain multiplication, longest common subsequence, Greedy algorithms Elements, activity-selection problem, Huffman codes, task scheduling problem, Knapsack problems, Divide & Conquer strategy.

Unit 4: Review of Graph Algorithms: topological sort, strongly connected components, minimum spanning trees - Kruskal and Prim's, Single source shortest paths, Dijkstra's algorithm, Bellman-Ford algorithm, single source shortest paths for directed acyclic graphs, difference constraints and shortest paths, All pairs shortest paths - shortest paths and matrix multiplication, Floyd-Warshall algorithm.

Unit 5: Flow Networks: Ford-Fulkerson method, Maximum bipartite matching, Sorting Networks, Comparison network, the zero-one principle, Bitonic sorting network, merging network.

Books

1. Cormen, Leiserson and Rivest: Introduction to Algorithms, 2/e, PHI.
2. Horowitz, Ellis and Sahni, Sartaj; Fundamentals of Computer Algorithms, Universities Press.
3. Aho, Hopcroft, and Ullman: The Design and Analysis of Computer Algorithms, Addison Wesley.
4. R. B. Patel, Expert Data Structures With C, Khanna Publications, Delhi, India, 3nd Edition 2008, ISBN 81-87325-07-0.
5. R. B. Patel & M.M.S. Rauthan, Expert Data Structures With C++, Khanna Publications, Delhi, India, 2nd Edition 2004, ISBN: 87522-03-8, pp. 1-752.
6. C++ Plus Data Structures, Nell Dale, , 4th edition, Jones and Bartlett

TCS 352: Computer Architecture
B.Tech. Semester –III (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective: To expose students to basics to some advanced computer design such as pipelining, RISC vs. CISC, superscalar processors.

Prerequisite: Knowledge of computer organization is essential.

Outcomes

- Student can develop the operations of pipelines , dynamic scheduling branch predictions, caches.
- Student can develop the operations of virtual memory
- Student can develop architectures of RISC, Scalar, VLIW Multi core and multi CPU systems.
- Student can compare the performance of different CPU architecture.
- Develop the applications for high performance computing systems

Unit 1: Data representation: Number system, radix and radix-minus-one, complement representation. Fixed point and Floating point representation, error detecting and correcting codes.

Unit 2: Register transfer language and micro operation: Instruction sets, Instruction formats, Instruction cycles, addressing modes.

Unit 3: ALU Hardware: Processor Organization, micro programmed control unit, algorithms for addition, subtraction, multiplication and division for fixed and floating point arithmetic operations, instruction pipelining, RISC vs. CISC, superscalar processors,.

Unit 4: Memory hierarchy: main memory, auxiliary memory, associative memory, cache memory and virtual memory.

Unit 5: I/O Devices: I/O interfaces, asynchronous data transfer, programmed I/O, interrupt-driven I/O, priority interrupt, DMA, I/O channels and processors.

Books

1. John L. Hennessy & David A. Patterson, Computer Architecture, 3rd Edition, Morgan Kaufmann Pub, 2003.
2. J. P. Hayes, Computer Architecture and Organization, McGraw Hill.
3. Harvey G. Cragon, Memory Systems and Pipelined Processors, Narosa Publication.
4. V. Rajaraman & C.S.R. Murthy, Parallel Computers, PHI.
5. R. K. Ghose, Rajan Moona & Phalguni Gupta, Foundation of Parallel Processing, Narosa Publications.
6. Kai Hwang and Zu, Scalable Parallel Computers Architecture, McGraw Hill.
7. Stalling W., Computer Organization & Architecture, PHI.

TCS 353: Java Programming
B.Tech. Semester –V (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective : To give the knowledge of platform independent communication & computing models.

Prerequisite: Knowledge of C/C++ Programming is essential

Course Outcome

- Student shall develop purely object oriented approach to solve problems.
- Student can strengthen their ability of data abstraction and problem solving using computers.
- Students can express the solutions to real world problems graphically.
- Students can be able to design software's for customer relationship management firms.
- Students shall be able to participate in OCJP certified program

Unit 1: Introduction to Java: Importance and features of Java, Concepts of Java Virtual machine (JVM), Keywords, Constants, Variables and data types, operators and expressions, Control statements, Conditional statements, loops and iterations. Class definition, adding variables and methods, creating objects, constructors, defining methods, calling methods, method overloading. Creating an array, one and two dimensional array, string array and methods String and String Buffer classes, Wrapper classes.

Unit 2: Inheritance: Basic types, super classes, Multilevel hierarchy abstract and final classes, object class, Packages and interfaces, Access protection, extending Interfaces, Exception handling, Fundamental exception types, uncaught exception, throw, throws, final methods, creating own exceptions

Unit 3: Multithreaded programming: Review of fundamentals, Java thread model, synchronization, messaging, thread class, Run able interface, interthread communication, Monitors, Deadlock, Producer/ Consumer problems, Wait() and notify(), Performance issues.
Input/Output: Basics, Streams, Byte and Character Streams, predefined streams, reading and writing from console and files, using Java packages.

Unit 4: Networking in Java: Networking fundamentals, Client/server model, Internet addresses, Sockets, networking classes and interfaces, using Java.net package, TCP/IP and data gram programming, HTTP protocol and URLs

Unit 5: Event Handling: Different mechanism, the delegation event model, classes, Event Listener Interfaces, Adapter and Inner classes, Working with windows, graphics and text, using AWT controls, Layout managers and menus, handling Image, animation, sound and video Java Applet

Books

1. Core Java Volume-I and II 2nd edition-Sun MicroSystem
2. Java –2 The Complete Reference Patrick Naughton and Herbertz Schidt, second Edition
3. Programming with Java E. Balaguruswamy, Second edition, TMH

TEC 354: Microprocessors
B.Tech. Semester –III (Computer Science & Engg.)

L	T	P
3	1	0

Class Work	**:50 Marks**
Exam.	**:100 Marks**
Total	**:150 Marks**
Duration of Exam	**: 3 Hrs.**

Objective: To familiarize students with the architecture of a processor and machine level programming.

Prerequisite: Knowledge of Digital electronics(TEC-232) and computer organization is essential.

Outcome

- Student can learn about Programming using assembly language of 8085 and 8086 microprocessor.
- Student can learn about register organization I/O addressing and buses.
- Student can learn about Assembly language program development tools and different addressing modes.
- Student knows about Numeric processor 8087 and direct memory access.
- Student can learn about Introduction of microcontrollers and Pentium

UNIT 1: 8085 MICROPROCESSOR –Study of 8085 Microprocessor pin diagram, signals and bus timing, internal architecture, instruction set and programming.

UNIT 2: 8086 MICROPROCESSOR– 8086/8088 microprocessor pin diagram and signals, internal architecture and register organization, Execution unit, Bus Interface Unit, Signal description, Physical memory organization, General bus operation, I/O addressing capabilities, Minimum mode and maximum mode timing diagrams, Comparison of 8086 and 8088**.**

UNIT 3: 8086 PROGRAMMING – Addressing modes, Instruction set description, Assembler directives and operators, Procedures and Macros, Assembly language program development tools (editor, linker, loader, locator, Assembler, emulator and Debugger), Writing programs for use with an assembler, using assembly language, Basic Memory and I/O interfacing, 8086 Interrupts and Interrupt Programming.

UNIT 4: 8086 INTERFACING – Direct Memory Access and DMA controlled I/O, Interfacing 8086 with, 8255, 8254, 8251, 8279, Numeric processor 8087, I/O processor 8089.

UNIT 5: ADVANCE MICROPROCESSORS: Microprocessors Evolution and types (Intel 4004 – Pentium IV and road maps), 80286, 80386, 80486, Pentium processors and Microcontrollers.

Books:

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

TCS 354: Artificial Intelligence
B.Tech. Semester –VI (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective: To acquaint the students with the theoretical and computation techniques in Artificial Intelligence.

Prerequisite : Knowledge of C/C++ , mathematics, problem solving is essential.

Outcome

- The student will be able to solve problems by applying a suitable search method.
- The student will be able to compare minimax search and alpha-beta pruning in game playing.
- The student will be able to analyse and apply knowledge representation.
- The student will be able to describe and list the key aspects of planning in artificial intelligence.
- The student will be able to analyse and apply probability theorem and Bayesian networks

Unit 1: 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 2: 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 3: 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 4: 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 5: 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. A. 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.

PCS 351: Analysis and Design of Algorithms (Pr)
B.TECH Semester-V (Computer Science & Engineering)

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 351 **Analysis and Design of Algorithms**

Course outcome

- Students can learn and polish his/her basics of programming with emphasis on solving real world problems.
- Students will apply object oriented way approach for solving problems.
- Students shall deepen their skills to design and implement ADTs.
- Students shall be able to participate in various code
- Students shall be able to optimize or re- engineered the already existing solutions of various problems

PCS 352: COMPUTER ARCHITECTURE (Pr)
B.TECH Semester-V (Computer Science & Engineering)

L	T	P
-	-	2

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

Prerequisites : Knowledge of Assembly Language Programming.
The experiments will be based on the following:-TCS 352 **Computer Architecture**

Course outcomes

- Student can develop the operations of pipelines , dynamic scheduling branch predictions, caches.
- Student can develop the operations of virtual memory
- Student can develop architectures of RISC, Scalar, VLIW Multi core and multi CPU systems.
- Student can compare the performance of different CPU architecture.
- Develop the applications for high performance computing systems

PCS 353: JAVA PROGRAMMING (Pr)
B.TECH Semester-V (Computer Science & Engineering)

L	T	P
-	-	2

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

Prerequisite : Knowledge of basic Java Programming.

The experiments will be based on the following:-TCS 353 **Java Programming**

Course outcome

- Student shall develop purely object oriented approach to solve problems.
- Student can strengthen their ability of data abstraction and problem solving using computers.
- Students can express the solutions to real world problems graphically.
- Students can be able to design software's for customer relationship management firms.
- Students shall be able to participate in OCJP certified program

PEC 354: MICROPROCESSORS
B.TECH Semester-V (Computer Science & Engineering)

L	T	P
-	-	2

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

Prerequisite : Knowledge of basic assembly language Programming.

The experiments will be based on the following:- **: PEC-354 Microprocessors**

Course outcome

- Student can learn about adding and subtracting numbers using microprocessor 8085.
- Student can learn about finding the smallest and largest number from a given set of numbers using microprocessor 8085.
- Student can learn about converting Binary code into Gray code using 8086 microprocessor.
- Student can learn about microprocessor based traffic light control system using 8086 microprocessor
- Student can learn about conversion of data string to its 2's complement using 8086 microprocessor.

1. Write and implement a program for adding two 8- bit numbers using microprocessor.
2. Write and implement a program for subtracting two 8- bit numbers using microprocessor.
3. Write and implement a program for finding the smallest number from a given set of numbers using microprocessor.
4. Write and implement a program for finding the largest number from a given set of numbers using microprocessor.
5. Write and implement a program for arranging the numbers in ascending order of a set of the numbers.
6. Write and implement a program for converting Binary code into Gray code using 8086 microprocessor.
7. Write and implement a program for conversion of data string to its 2's complement using 8086 microprocessor.
8. Write and implement a program for multiplication of the given numbers.
9. Write and implement a program for division of the given numbers.
10. Design and test microprocessor based traffic light control system using 8086 microprocessor.
11. Write and implement a program for interfacing of keyboard controller with microprocessor.

TCS 361: Compiler Design
B.Tech. Semester –VI (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective: To introduce students to the techniques used in designing and writing compilers.

Prerequistie: Knowledge of Automata is essential.

Course Outcome:

- To make student familiar with compiler design.
- To understand the concept of parsing techniques.
- To understand the concept of automata.
- To implement the code optimization technique.
- Study of LEX tool using regular expression.

Unit 1: Compilers and Translators: the structure of a compiler, different states in the construction of a compiler, Design of lexical analyzer.

Unit 2: Basic Parsing Techniques: Parsers, shift-reduce parsing, operator- precedence parsing, top-down parsing predictive parsers, L.R. Parsers, the canonical collection of L R (O) items, construction of SLR parsing tables, construction canonical L.R. Parsing tables, Constructing LALR parsing tables using LR(1) items.

Unit 3: Syntax-Directed Translation: Syntax-directed translation schemes, implementation of syntax directed translators, intermediate code, postfix notation, three address code, quadruples, and triples, translation of assignment statements. Boolean expressions, control statements.
Symbol labels. The contents of a symbol table data structures for symbol tables representing scope information.

Unit 4: Run Time Storage Administration: Implementation of a simple stack allocation scheme, implementation of block structured languages, storage allocation in block structured languages.
Error Detection And Recovery: Error, Lexical-phase errors, syntactic-phase errors, semantic errors.

Unit 5: Code Optimization: The principle sources of optimization, loop optimization, the DAG representation of basic blocks, value number and algebraic laws, global dataflow analysis.
Code Generation: Object programs, problems in code generation, a machine model, a single code generator, register allocation and assignment, peephole optimization.

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

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective: To familiarize students with the layered design and protocols of computer networks, including the Internet.

Prerequistie: Knowledge of basic networking is essential.

Course Outcome:

- Know about the component of computer system, binary codes and different number system.
- Learn about the concepts of various types of operating system, services and features of operating system.
- Design programming involving decision control structures, loops, functions, pointer, and structure.
- Express the solutions to real world problems clearly and precisely in C language.
- Learn the basic components of internet, computer networks and network topologies.

Unit 1: Network Functions: Network Topology, Network Services, switching Approaches, Transmission media and systems, multiplexing and signaling techniques, Error detection and correction, ISDN and BISDN OSI Reference Model, Overview of TCP/IP architecture, Socket system calls, SNMP, Electronic Mail.

Unit 2: Protocols: Service Models and End-to-End requirements, ARQ, Sliding window, RTP, HDLC, PPP protocols, Statistical Multiplexing.

Unit 3: Multiple Access Communication: Random Access-ALOHA, Slotted ALOHA, CSMA, CSMA-CD, Channelization -: FDMA, TDMA, CDMA, Channelization in Cellular networks LAN Standards - 802.3, 802.4, 802.5, 802.6, FDDI, 802.11, LAN Bridges.

Unit 4: Packet Network Topology: Datagrams and Virtual Circuits - Structure of Switch / Router, Connectionless and Virtual Circuit packet Switching, X.25, Routing Algorithms, ATM Networks, Traffic management and QoS - FIFO, Priority Queues, Fair Queuing, Congestion Control techniques.

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Unit 5: Internet Protocols - IP packet, Addressing, Subnet addressing, IP routing, CDR, ARP, RARP, ICMP, Reassembly, IPv6, UDP, Transmission Control Protocol - TCP, Reliable stream service, operation, protocol, DHCP, Mobile IP, Internet Routing protocols, Multicast Routing.

Books

1. Larry L. Peterson and Bruce S. Davie, Computer Networks: A System Approach, 3rd Edition, Morgan Kaufmann Pub, 2003.
2. Leon Garcia and lndra Widjaja: Communication Networks - Fundamental Concepts and Key Architectures, TMH, 2000.
3. A.S. Tanenbaum: Computer Networks, 3/e, PHI, 1997.

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

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective: To introduce the concepts of software development, design and implementation.

Prerequistie: Knowledge of basic computer ,data structure is essential.

Course Outcome:

- Introduce the concepts of software development,design and implementation
- Software reliability and testing
- To understand Software configuration management.
- Structure and object oriented analysis.
- Know about software requirement specification

Unit 1: 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 2: Software Requirement Analysis: structured analysis, object oriented analysi, software requirement specification, validation.

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

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

Unit 5: Software Reliability: metric and specification, fault avoidance and tolerance, exception handling, defensive programming.Software Maintenance – maintenance characteristics, maintainability, maintenance tasks, maintenance side effects.CASE tools.

Books

1. Pressman S.Roger, Software Engineering, Tata McGraw-Hill
2. Jalote Pankaj, An integrated approach to software engineering , Narosa Publishing House
3. Sommerville lan, Software Engineering, 5th ed., Addison Wesley-2000
4. Fairley Richard, Software, Software Engineering Concepts, Tata McGraw-Hill

TCS 364: Distributed Systems
B.Tech. Semester –VI (Computer Science & Engg.)

L	T	P
3	1	0

Class Work	**:50 Marks**
Exam.	**:100 Marks**
Total	**:150 Marks**
Duration of Exam	**: 3 Hrs.**

Objective: To provide an understanding of the functioning and manipulation of distributed systems.

Prerequistie: Knowledge of operating system and computer networks is essential

Course Outcome:

- To understand the centralized and client/server architecture
- To gain the knowledge of asynchronous shared memory
- To study the basic concept of searching techniques
- Students will gain knowledge about the principles and techniques behind the designing and issue of distributed systems.
- To understand Advanced Synchronous Algorithms

Unit 1: Centralized & Client/Server Architecture: Server systems architectures, Models of synchronous and asynchronous distributed computing systems; parallel & distributed systems.

Unit 2: Synchronous Networks & Asynchronous Networks: Basic algorithms for synchronous and asynchronous networks;

Unit 3: Searching Technique: Breadth first search, depth first search, shortest path, minimum spanning tree.

Unit 4: Advanced Synchronous Algorithms: Distributed consensus with failures, commit protocols; leader election.

Unit 5: 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. 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.

TAH 361: Industrial Economics & Management
B.Tech. Semester –VI (Computer Science & Engg.)

L	T	P
3	1	0

Class Work	**:50 Marks**
Exam.	**:100 Marks**
Total	**:150 Marks**
Duration of Exam	**: 3 Hrs.**

Objective: To provide an understanding of the functioning and manipulation of Industrial Economics & Management.

Prerequistie: Knowledge of mathematics is essential.

Course Outcome:

- The student will be able to demonstrate the use, interpretation and application of an appropriate international engineering standard in a specific situation.
- The student will be able to analyze a given engineering problem, identify an appropriate problem solving methodology, implement the methodology and propose a meaningful solution.
- The student will be able to apply prior acquired knowledge in problem solving
- The student will be able to work in a team and take initiatives.
- The student will be able to work in actual working environment and utilize technical resources.
- The student will be able to write technical documents and give oral presentations related to the work completed.

PCS 361: Compiler Design (Pr)
B.TECH Semester-VI (Computer Science & Engineering)

L	T	P
-	-	2

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

Prerequistie: Knowledge of C/C++ Programming is essential.

Course Outcome:

- To make student capable of designing the compiler and lexical analyzer.
- To implement the different parsing techniques.
- The application of notation and boolean expressions.
- Implementation of regular expression..
- Implementation of regular grammer.

PCS 362: Computer Networks (Pr)
B.TECH Semester-VI (Computer Science & Engineering)

L	T	P
-	-	2

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

Prerequistie: Knowledge of C/C++ Programming is essential.

Course Outcome:

- To Implementation of various protocols.
- Socket programming
- Implement the TLI(Transport Layer Interface)
- Implementation of routing algorithms.
- Implementation of TCP/IP protocols

.

The experiments will be based on the following:- **: TCS- 362 Computer Networks**

PCS 363:Software Engineering (Pr)
B.TECH Semester-VI (Computer Science & Engineering)

L	T	P
-	-	2

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

Prerequistie: Knowledge of C/C++ Programming is essential.

Course Outcome:

- To make students capable working in disciplinary team and develop software efficiently
- Analysis of software matrices
- Study of software models.
- Implementation of UML diagrams.
- Implement the software testing techniques

The experiments will be based on the following:- **: TCS- 363 Software Engineering**

PCS-364: Seminar
B.Tech. Semester –VI(Computer Science & Engg.)

L	P		
-	2	**Class Work**	**:50 Marks**

Prerequistie: Knowledge of presenting project.

Course Outcome:

- To make students confident in presenting themselves in real world.
- The student inculcate zeal to enhance technological aspects
- Better communication Skill.
- Knowledge of presenting Project.
- Technical knowledge about the Project.

Concerned Teachers/Experts in the selected area must be identified by students for approval of the topic. A student is required to submit three copies of bound report of the seminar, one week before the presentation to office of Head/Concerned faculty/Examiner appointed by the Head.

TCS 471: COMPUTER GRAPHICS AND ANIMATION
B.Tech. Semester –VII (Computer Science & Engg.)

L	T	P
3	1	0

Class Work	**:50 Marks**
Exam.	**:100 Marks**
Total	**:150 Marks**
Duration of Exam	**: 3 Hrs.**

Objective : To prove the knowledge and implementation of tools and techniques of computer graphics and animation technology.

Prerequisite: Knowledge of C/C++ programming is essential.

Course Outcome :

- Recognize and evaluate critical and aesthetic issues within computer graphics and the mixed media.
- Apply aesthetic judgments and critical thinking skills to art and graphics related issues.
- Demonstrate mastery of specific technical, conceptual and critical abilities within computer graphics and the mixed media.
- Demonstrate proficiency with industrial applications to visual communication related technologies.
- Communicate effectively in written format on research and creative issues

Unit 1: Introduction and Line Generation: Types of computer graphics, Graphic Displays- Random scan displays, Raster scan displays, Frame buffer and video controller, Points and lines, Linedrawing algorithms, Circle generating algorithms, Mid point circle generating algorithm, and parallel version of these algorithms.

Unit 2: Transformations: Basic transformation, Matrix representations and homogenous coordinates,Composite transformations, Reflections and shearing.
Windowing and Clipping: Viewing pipeline, Viewing transformations, 2-D Clippingalgorithms- Line clipping algorithms such as Cohen Sutherland line clipping algorithm, LiangBarsky algorithm, Line clipping against non rectangular clip windows; Polygon clipping –Sutherland Hodgeman polygon clipping, Weiler and Atherton polygon clipping, Curve clipping,Text clipping.

Unit 3: Three Dimensional: 3-D geometric primitives, 3-D Object representation, 3-D Transformation,3-D viewing, projections, 3-D Clipping.

Unit 4 : Curves and Surfaces: Quadric surfaces, Spheres, Ellipsoid, Blobby objects, Introductoryconcepts of Spline, Bspline and Bezier curves and surfaces.
Hidden Lines and Surfaces: Back Face Detection algorithm, Depth buffer method, A- buffermethod, Scan line method, basic illumination models – Ambient light, Diffuse reflection,Specular reflection and Phong model, Combined approach, Warn model, Intensity Attenuation,Color consideration, Transparency and Shadows.

Unit 5: Computer Animations: Conventional and computer assisted animation, design of animationsequences, interpolation, simple animation effects, animation languages (Key Frame System,Parameterized systems), motion specifications, methods of controlling animation.

Books:

1. Donald Hearn and M Pauline Baker, “Computer Graphics C Version”, Pearson Education.
2. Amrendra N Sinha and Arun D Udai,” Computer Graphics”, TMH
3. Donald Hearn and M Pauline Baker, “ Computer Graphics with OpenGL”, Pearson Education.
4. Steven Harrington, “Computer Graphics: A Programming Approach”, PHI or TMH
5. James D Foley, A V Dam, S K Feiner and John f Hughes, “Computer Graphics Principlesand Practice” II Edition .

TCS 472: Advanced Computer Architecture
B.Tech. Semester –VII (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective: To expose students to advanced techniques of computer design such as pipelining, vector processing and multiprocessing.

Prerequisite: Knowledge of basic computer architecture(TCS-352) is essential.

Course Outcome:

- Measure and report performance of microprocessors
- Understand the principles of linear pipelining and distinguish between arithmetic pipelines, instruction pipelines and software pipelines
- Distinguish between static scheduling and dynamic scheduling
- Understand the principles, algorithms and interconnection networks of array processing
- Understand the architecture of multiprocessors and multicomputers

Unit 1: Fundamentals of computer design: measuring and reporting performance.Principles of linear pipelining; instruction level parallelism and instruction pipelines, speedup, data dependency hazards, remedial measures, branch handling; Arithmetic pipelines; Pipeline control methods; Job sequencing, collision prevention and pipelining chaining; case study of pipelined systems.
Loop unrolling, software pipelining and trace scheduling techniques for exposing instruction level parallelism.

Unit 2: Dynamic scheduling algorithms: Exploiting ILP using static scheduling and dynamic scheduling, hardware based speculation, multiple issues and speculation.Vector processing characteristics and requirements, pipelined vector processing, vectorization methods, examples of vector processing.
.
Unit 3: Array processing: SIMD array processors, Communication between PEs, SIMD interconnection networks, algorithms for array processing Data and control parallelism, concurrency, scalability, speedup and Amdahl's law, PRAM model of parallel computation, parallel algorithms.

Unit 4: Multiprocessors and multi-computers: Processor organizations: mesh, binary tree, hypercube; shared memory and message passing systems.

Unit 5: Mapping and scheduling: Embedding of task of task graphs in processor graphs, dilation and loading, load balancing, models for static and dynamic scheduling.
Overview of parallel programming using MPI and open MP.

Books

1. Hennessy, J.L. and patterson , D.A., "Computer Architecture", 4th Ed., Morgan Kaufmann.
2. Sima, D., Fountain, T. and kacsuk, P;" Advanced Computer architecture: A desing Space Apporach, Pearson Education.
3. Michel, J.Q., "parallel computing: Theory and practice", Tata McGraw-Hill.
4. Hwang, k., "advanced computer Architecure", Tata McGraw-Hill.

TCS 473 : Advanced Database Management Systems

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

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective: To introduce the design concepts of advanced database management systems- real tine, distributed databases, transaction processing, recovery, replication of databases and security.

Prerequisite: Knowledge of DBMS(TCS-241) is essential.

Course Outcome:

- Student will gain concept of basic processing and optimization techniques for high level query.
- Student will gain knowledge of different transaction processing concepts and use different concurrency control techniques.
- Student will discuss different types of databases such as object oriented and distributed databases.
- Student will identify different types of database failures and techniques to recover from such failures.
- Student will discuss advanced database technologies and products used in enterprise.

Unit 1: DISTRIBUTED DATABASE DESIGN: Design strategies, Distribution design issues, Fragmentation, Allocation, Oracle DDB design, Distributed database system architecture, Date's rule for DDBS.

Unit 2: DATA REPLICATION & QUERY PROCESSING IN DDBS : Classification of replica control strategies, Consistency & Request ordering, The Gossip Architecture, Process groups & ISIS, Replication in Oracle, Query optimization in Centralized system, Objective of query processing, Query decomposition, Distributed query optimization algorithms, Query optimization in Oracle.

Unit 3: TRANSACTION PROCESSING & RECOVERY : Distributed data storage, Transaction property, distributed transactions, commit protocols, concurrency control in distributed database, availability, heterogeneous distributed databases, Distributed deadlock management, recovery concepts, recovery techniques based on deferred update & on immediate update shadow paging, The ARIES Recovery Algorithm, Recovery in multi-database systems, database backup and recovery from catastrophic failures, Reliability concept & measure, Site failure & network portioning, directory systems, Database recovery in Oracle.

Unit 4: SECURITY MANAGEMENT & PL/SQL : Various aspect of database security, Basic model of database access control, TCSEC Policy identification, Security models, Identification-Authentication- Authorization, Statistical databases, Data encryption, Security in Oracle, JDBC, Purpose of PL/SQL, PL/SQL block, structure & type, PL/SQL syntax & programming.

Unit 5: DIFFERENT DATABASES: Parallel databases: Introduction, I/O parallelism. Interquery-intraquery-intraoperation -interoperation parallelism design of parallel systems. Client/Server DBS, Oracle DBMS, Distributed processing in Oracle, Oracle network protocols, Network administration in Oracle. Theory of OO databases, Multimedia databases, Real time databases.

Books

1. Database system concepts , 4th edition, Silberschatz-Korth-Sudarshan, MH
2. Fundamentals of database systems 3rd edition, Elmasri & Navathe, Pearson education
3. Database concepts & systems ,2nd edition , Ivan Bayross, SPD
4. Database Management System, Rajesh Narang, PHI.
5. An Introduction to database systems, 7th edition, C.J. Date , Pearson education

ECS 470: Digital Signal Processing & Applications
B.Tech. Semester –VII (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective: To acquaint the students with the concepts, algorithms and applications of adaptive signal processing in wireless communication systems.

Prerequisite: Knowledge of Mathematics, Digital logics(TEC-232) is essential.

Course Outcome:

- formulate engineering problems in terms of DSP tasks
- apply engineering problem solving strategies to DSP problems
- design and test DSP algorithms
- analyse digital and analog signals and systems
- recover information from signals

Unit 1: Introduction: Signals, Systems and signal processing, classifications of signals, concept of frequency in continuous time and discrete, time signals. Analog to digital and digital to analog conversion, Discrete time signals, Discrete time systems, LTI systems, difference equations, implementation of discrete time systems.

Unit 2: Z- transform and its Applications: Z Transform, properties of Z-transform, Inversion of Z transform, applications of Z transform. Discrete Fourier Transform(DFT), properties of DFT, Linear filtering methods based on the DFT, frequency analysis of signals using the DFT.

Unit 3: Fast Fourier transform and its applications: FFT algorithms (Radix 2 FFT) algorithm, Implementation of Discrete time systems.

Unit 4: Structures for FIR systems: Direct form structure, Cascade form structure, parallel form, structures for IIR systems, cascade, direct form and parallel form structures.

Unit 5: Design of Digital Filters: Design of IIR filters, Bilinear transformation and impulse invariance method, Matched Z transformation design of FIR filters with different methods.

Books

1. John G. Proakis and Dimitris G. Manolakis, Digital Signal Processing, PHI
2. Oppenheim & Schaffer, Digital Signal Processing, PHI.
3. Rabiner & Gold, Digital Signal Processing applications.
4. S.K., .Mitra, Digital Signal Processing, TMH.
5. S. Salivayhan, A Vallavraj, C. Gnanapriya, Digital Signal Processing , TMH.

ECS 471: Information & Communication Theory
B.Tech. Semester –VII (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective : To provide the adequate knowledge of information of communication theory and techniques.

Prerequisite: Knowledge of Basic Computer Networks(TCS-362) is essential.

Course Outcome:

- Demonstrate critical and innovative thinking.
- Display competence in oral, written, and visual communication.
- Apply communication theories.
- Show an understanding of opportunities in the field of communication.
- Use current technology related to the communication field

Unit 1: Introduction to detection and estimation problem in communication: The meaning and axioms of probability; Random variables; Examples of commonly used random variables and their density and distribution functions; Moments and characteristic functions.

Unit 2: Bivariate distributions and functions of two random variables: Joint moments and characteristic functions, conditional distributions and expected values. Binary hypothesis testing: Bayes, Neyman-Pearson, maximum likelihood, MAP and minimum probability of error criteria; Bayes, ML and MAP estimation.

Unit 3: Information, entropy, source coding theorem, Markov sources: Channel capacity theorems for discrete and continuous ensembles; Introduction to rate distortion function.

Unit 4: Correlation matrix and characteristic functions of sequences of random variables: jointly normal random variables; Mean square estimation, stochastic convergence and limit theorems; Random number generation.

Unit 5: Random processes, correlation function and power spectrum, random: Process through linear systems, KLT, ergodicity; Spectral factorization and innovation; Optimum linear filters and mean square estimation.

Books

1. Papoulis, A. and Pillai, S.U., Probability, Random Variables and Stochastic Processes, Tata McGraw-Hill. 2002
2. Cover, T.M. and Thomas, J.A., Elements of Information Theory, 2nd Ed., Wiley Interscience. 2006
3. Van Trees, H.L., Detection, Estimation and Modulation Theory, Part I, Wiley Interscience. 2001
4. Bose, R., Information Theory, Coding and Cryptography, Tata McGraw-Hill. 2003
5. Sayood, K., Data Compression, Harcourt India. 2000
6. Lafrance, P., Fundamental Concepts in Communication, Prentice-Hall of India. 1992

ECS 472: Mobile Computing
B.Tech. Semester –VIII (Computer Science & Engg.)

L	T	P
3	1	0

Class Work	**:50 Marks**
Exam.	**:100 Marks**
Total	**:150 Marks**
Duration of Exam	**: 3 Hrs.**

Objective: To impart knowledge of mobile and wireless computing systems and techniques.

Prerequisite: Knowledge of Computer Networks(TCS-362).

Course Outcome:

- Students will gain knowledge of concepts and technologies of mobile computing and wireless networks.
- Students will gain knowledge of adaptive clustering for mobile distributed computing with the clear specification of LEACH and TORA protocols
- Students will gain knowledge of system model, previous work, motivation and basic idea for distributed location management.
- Students will gain knowledge of mobile agents computing and transaction processing in mobile computing environments.
- Students will gain knowledge of the above protocols and comparison for the best fit implementation to the scenarios.

Unit 1: Introduction : Issues, Challenges, and benefits of Mobile Computing, IEEE 802.11 & Bluetooth, Wireless Multiple access protocols.

Unit 2: Data Management Issues: data replication for mobile computers, adaptive Clustering for Mobile Wireless networks, LEACH and TORA.

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

Unit 4: Mobile Agents Computing: Security and fault tolerance, transaction processing in Mobile computing environment. Mobile Agent Systems: Aglets, PMADE, Case Studies.

Unit 5: 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 473: Emerging Trends & Technologies
B.Tech. Semester –VIII (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective: To provide adequate knowledge of technology management, management of R&D, intellectual property rights.

Prerequisite: Knowledge of existing technologies and their re-engineering is essential.

Course Outcome:

- Identify the trends that will have the greatest impact on future business**.**
- Identify the technologies that will have the greatest impact on future business**.**
- Explain why understanding trends and new technologies can help an organization prepare for the future.
- describe and evaluate the impact of the implementation of new software, hardware, and networking technologies.
- research, summarize, and present trends that will have an effect on the computer industry

Unit 1

Introduction to Technology Management, Business Strategy for New Technologies: Adding value, gaining competitive advantage, timing and capability development, Technology Forecasting: Techniques of Forecasting, Technology Forecasting-Relevance, Strategic alliance and Practicality, and Technology Transfer.

Unit 2

Management of Research, Development and Innovation: Technology Mapping, Comparison of type of R&D Projects and development approaches- Radical platform and Incremental Projects, Innovation process.

Unit 3

Management of Intellectual Property Rights: Strategic value of patents, trade secrets and licensing.

Unit 4

Managing Scientists and Technologists: Identification, Recruitment, Retention, Team Work and Result orientation. Investment in Technology, Management Roles and Skills for New Technology

Unit 5

Technology for Managerial Productivity and Effectiveness, Just-in-Time, Venture Capital & Technology Development, Practice Tasks: Technology Forecasting and Technology Mapping, Technology Strategy Development ,Exercise on Just-in-time Cases on Venture Capital

Reference Books:

1. Technology and Management: By Cassell Educational Ltd., London
2. Management of High Technology Research and Development: by John Humbleton Elsevier
3. Strategic Management: by Charles W.L. Hill/Gareth R. Jones, Houghton Mifflin Co.
4. R&D Management: by S.A. Bergn, Basil Blackwell Inc.
5. Innovation and Entrepreneurship in Organisations: by Richard M. Burton & Borge Obel Elsevier.
6. Innovation and Entrepreneurship in Organisations: by Spyros Maksidakis & Steven C Wheelwright, John Wiley & Sons.
7. New Product Management: by C Marle Crawford, Irwin, USA.
8. Just-in-time: by David Hutchin, Gower, technical Press.
9. Management of Technology: Tarek M. Khalil, McGraw-Hill Book Co.
10. Managing Engineering and technology: Daniel L. Babcock, PHI.

ECS 474: Wireless Networks
B.Tech. Semester –VII (Computer Science & Engg.)

L	T	P
3	1	0

Class Work	**:50 Marks**
Exam.	**:100 Marks**
Total	**:150 Marks**
Duration of Exam	**: 3 Hrs.**

Objective : To provide the knowledge of wireless networks and their design and implementation.

Prerequisite: Knowledge of Computer Networks(TCS-362), Mobile Computing(TCS-472) is essential.

Course Outcome:

- demonstrate advanced knowledge of networking and wireless networking in particular
- compare different solutions for communications at each network layer
- demonstrate knowledge of protocols used in wireless communications
- demonstrate knowledge of programming for wireless network communications
- perform simulations of wireless networking

Unit 1: Introduction Liberalization of communications Industry, Digitalization of content, changes in spectrum management, cellular reuse, drive towards broadband, IEEE 802.11 networks

Unit 2: Wireless Network Systems Cellular networks: The GSM circuit switched network, GSM channel structure, Authentication and location updating, physical channels, TMN
GPRS Introduction to GPRS, contexts, PDP context, Mobility management context, MS-SGSN physical layer, MS-SGSN protocols, GPRS operations

Unit 3: Principles of access network planning Circuit voice networks: Introduction to CVN, coverage, capacity, planning for circuit multimedia services. Planning for packet multimedia services Planning approaches, buffer-pipe model, characterization of applications, practical modelling methodologies, multiuser packet transport configurations

Unit 4: Planning and design: RAN, GSM RAN, UMTS RAN, Cellular OFDM RAN, Mesh network

Unit 5 : Network operation and optimization: Enhanced telecom operations model (eTOM), wireless network life cycle – strategy, infrastructure and product, operations, enterprise management, GSM network performance optimization – principles and key performance indicators, coverage optimization, GPRS RAN optimization, UMTS network performance optimization

Books:

1. Deploying Wireless networks, Andy wilton, Tim charity, Cambridge university press
2. Fundamental of Wireless Networking, Ron Price, TMH
3. 3G Wireless Networks, Clint Smity, TMH
4. Essentials of UMTS, Christopher Cox, Cambridge University Press

ECS 475: E-Commerce
B.Tech. Semester –VIII (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Prerequisite: Knowledge of Basic Computers, Computer Network(TCS-362) is essential.

Course Outcome:

- Design and implement an e-commerce application with a shopping cart.
- Integrate the waterfall model in the development of e-commerce applications.
- Integrate user-cantered design guidelines in developing user-friendly websites.
- Evaluate the bullwhip effect in a supply chain, analyze the causes, and recommend possible solutions.
- Analyze different types of portal technologies and deployment methodologies commonly used in the industry

Unit 1: Electronic Commerce: Overview, Definitions, Advantages & Disadvantages of E-Commerce,Threats of E-Commerce, Managerial Prospective, Rules & Regulations for Controlling E-Commerce,Cyber Laws.
Technologies: Relationship Between E-Commerce & Networking, Different Types of Networking for E-Commerce, internet, Intranet, EDI Systems

Unit 2: Wireless Application Protocol: Definition, Hand Held Devices, Mobility & Commerce, MobileComputing, Wireless Web, Web Security, Infrastructure Requirement for E-Commerce.
Business Models of E-commerce; Model Based on Transaction Type, Model Based on TransactionParty - B2B, B2C, C2B, C2C, E-Governance.

Unit3: E-Strategy: Overview, Strategic Methods for developing E-Commerce. Four C's (Convergence,Collaborative Computing, Content Management & Call Centre).
Convergence: Technological Advances in Convergence - Types, Convergence and its implications,Convergence & Electronic Commerce.
Collaborative Computing: Collaborative product development, contract as per CAD, SimultaneousCollaboration, Security.
Content Management: Definition of content, Authoring Tools and Content Management, Content -partnership, repositories, convergence, providers, Web Traffic & Traffic management: ContentMarketing.

Unit 4 :Supply Chain Management: E-logistics, Supply Chain Portal, Sypply Chain planning Tools (SCPTools), Supply Chain Execution (SCE), SCE - Framework, Internet's effect on Supply Chain Power.
E-Payment Mechanism; Payment through card system, E-Cheque, E-Cash, E-Payment Threats &Protections. **E-Marketing:** Home - shopping, E-Marketing, Tele-marketing

Unit 5 : Electronic Data Interchange (EDI): Meaning, Benefits, Concepts, Application, EDI Model,protocols (UN EDI FACT / GTDI, ANSIX - 12, Data Encryption (DES / RSA)
Risk of E-Commerce: Overview, Security for E-Commerce, Security Standards, Firewall,Cryptography, Key Management, Password Systems, Digital Certificates, Digital Signatures.

Books:

1. Ward Hanson, "Principles of Internet Marketing," SouthWestern Publishing, 2000
2. Philip Evans and Thomas Wurster, "Blown to Bits: How the New Economics of Information Transforms Strategy," Harvard Business School Press, 2000.
3. Stephen Bradley and Richard Nolan, "Sense and Respond: Capturing Value in the Network Era,"Harvard Business School Press, 1998.
4. E-commerce. MM Oka, EPH
5. Kalakotia, Whinston : Frontiers of Electronic Commerce, Pearson Education.
6. Bhaskar Bharat ; Electronic Commerce - Technologies & Applications. TMH.

ECS 476: Cryptography & Network Security
B.Tech. Semester –VII (Computer Science & Engg.)

L	T	P
3	1	0

Class Work	**:50 Marks**
Exam.	**:100 Marks**
Total	**:150 Marks**
Duration of Exam	**: 3 Hrs.**

Objective : To provide the knowledge of system security and security attacks.

Prerequisite: Knowledge of Advance Mathematics is essential.

Course Outcome:

- Acquire knowledge in security attacks, services, and mechanisms.
- Understand number theory required for various cryptographic algorithms.
- Describe and analyze cryptographic algorithms.
- Describe and analyze authentication protocols.
- Understand the concept of e-mail security, IP security, and web security.

Unit 1: Introduction to security attacks: services and mechanism, introduction to cryptography.Conventional Encryption: Conventional encryption model, classical encryption techniquessubstitutionciphers and transposition ciphers, cryptanalysis, stereography, stream and blockciphers.Modern Block Ciphers: Block ciphers principals, Shannon's theory of confusion anddiffusion, fiestal structure, data encryption standard(DES), strength of DES, differential andlinear crypt analysis of DES, block cipher modes of operations, triple DES, IDEA encryptionand decryption, strength of IDEA, confidentiality using conventional encryption, traffic
confidentiality, key distribution, random number generation.

Unit 2: Introduction to graph, ring and field: Prime and relative prime numbers: modular arithmetic,Fermat's and Euler's theorem, primality testing, Euclid's Algorithm, Chinese Remaindertheorem, discrete logarithms. Principals of public key crypto systems, RSA algorithm,security of RSA, key management, Diffle-Hellman key exchange algorithm, introductoryidea of Elliptic curve cryptography, Elganel encryption.

Unit 3: Message Authentication and Hash Function: Authentication requirements, authenticationfunctions, message authentication code, hash functions, birthday attacks, security of hashfunctions and MACS, MD5 message digest algorithm, Secure hash algorithm(SHA).Digital Signatures: Digital Signatures, authentication protocols, digital signature standards (DSS), proof of digital signature algorithm.

Unit 4: Authentication Applications: Kerberos and X.509, directory authentication service, electronicmail security-pretty good privacy (PGP), S/MIME.

Unit 5: IP Security: Architecture, Authentication header, Encapsulating security payloads, combiningsecurity associations, key management.
Web Security: Secure socket layer and transport layer security, secure electronic transaction(SET).
System Security: Intruders, Viruses and related threads, firewall design principals, trustedsystems.

Books:

1. William Stallings, "Cryptography and Network Security: Principals and Practice", Prentice Hall, New Jersy.
2. Johannes A. Buchmann, "Introduction to Cryptography", Springer-Verlag.
3. B. Forouzan, "Cryptography and Network Security, TMH

ECS 477: Data Warehousing and Data Mining
B.Tech. Semester –VII (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective: To expose the students with the fundamentals of Data Warehousing and Data Mining techniques and principles.

Prerequisite: Knowledge of ADBMS(TCS-473) is essential.

Course Outcome:

- Discuss the role of data warehousing and enterprise intelligence in industry and government.
- Summaries the dominant data warehousing architectures and their support for quality attributes.
- Recognize and describe at least three computational approaches to data clustering, taking cognizance of the contribution of paradigms from the fields of Artificial Intelligence and Machine learning.
- Compare and contrast the dominant data mining algorithms.
- Construct a lightweight prototype or simulation that supports the concept of data mining

Unit 1: Overview: History, definition, Delivery Process, difference between Database system and Data warehouse, ETL(Extraction Transformation and loading Multi dimensional Data model, data cubes, Stars, Snow Flakes schemas, Fact Constellations ,Concept Hierarchy ,Process architecture, Data Marting, Metadata, Types of data warehouse Aggregation, Historical information, Query Facility OLAP function and Tools .OLAP Servers ROLAP, MOLAP, HOLAP (a Mining interface, Security, Backup and Recovery, Design and Construction of Data Warehouse, tuning Data warehouse and Testing Data warehouse.

Unit 2: Data Mining : Overview, Motivation(for Data Mining),Data mining-Definition & Functionalities, Major issues in data mining ,application Data processing form of Data Preprocessing,(Data Cleaning: Missing Values, Noisy Data,(Binning, Clustering Regression, computer and Human inspection), Inconsistent Data and data integration and Transformation. Data Reduction: Data cube, aggregation, dimensionality reduction, data compression, Numerosity Reduction, Clustering, Discretization and Concept' hierarchy generation, OLAM architecture Web Mining, Temporal and Spatial Mining.

Unit 3: Concept Description:- Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean: Association rules from Transactional Databases- Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi –Dimensional Association rules from Relational Data bases.

Unit 4: Classification and Predictions: What is Classification & Prediction Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed¬ forward Neural Network, Back propagation Algorithm, Classification methods Knearest neighbor classifiers. Cluster analysis : Data types in cluster analysis, Categories of clustering methods, Partitioning methods.

Unit 5: Hierarchical Clustering: CURE and Chameleon. Density Based Methods¬: DBSCAN, OPTICS. Grid Based Methods-STING, CLIQUE Knowledge discovery through statistics, Knowledge discovery through Genetic Algorithm. Knowledge discovery through Fuzzy logic

Books:

1. M.H.Dunham, "Data Mining: Introductory and Advanced Topics" Pearson Education
2. Jiawei Ilan, Micheline Kamber, "Data Mining Concepts & Techniques" Elsevier
3. Sam Anahary, Dennis Murray, "Data Warehousing in the Real World: A Practical Guide for Building Decision Support Systems, lie" Pearson Education Mallach," Data Warehousing System", McGraw --Hill.
4. Building the Data Warehouse by William H Inmon
5. Data Warehousing and Data mining and OLAP by Alex Berson and Stephen J Smith
6. Data Mining Techniques by Arun K Pujari

ECS 478: Digital Image Processing
B.Tech. Semester –VII (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective : To give the exposure of digital image and its processing (editing, optimization and filtering).

Prerequisite: Knowledge of Digital signal Processing(ECS-470) is essential.

Course Outcome:

- The fundamentals of digital image processing
- Image transform used in digital image processing
- Image enhancement techniques used in digital image processing
- Image restoration techniques and methods used in digital image processing
- Image compression and Segmentation used in digital image processing

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

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

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

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

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

Books:

1. Digital Image Processing 2nd Edition, Rafael C. Gonzalvez and Richard E. Woods. Published by: PHI
2. B. Chanda, D.D. Majumder, "Digital Image Processing & Analysis", PHI
3. Digital Image Processing and Computer Vision, R.J. Schalkoff. Published by: John Wiley and Sons, NY.
4. Fundamentals of Digital Image Processing, A.K. Jain. Published by Prentice Hall, Upper Saddle River, NJ.

ECS 479: Distributed Operating Systems
B.Tech. Semester –VII (Computer Science & Engg.)

L	T	P
3	1	0

Class Work	**:50 Marks**
Exam.	**:100 Marks**
Total	**:150 Marks**
Duration of Exam	**: 3 Hrs.**

Objective: To provide an understanding of the functions and modules of distributed operating system and study the concepts underlying design and implementation.

Prerequisite: Knowledge of Operating System(TCS-243) is essential.

Course Outcome:

- Students will gain knowledge about the principles and techniques behind the designing and issues of distributed operating systems.
- Students will be able to implement different algorithm in mutual exclusion in distributed operating system in real world.
- Students will be able to express the solutions to real world problems of various scheduling techniques and load balancing components.
- Students will be able to deadlock detection and resolution in distributed operating system.
- Students will be able to implement the file system in distributed system.

Unit 1: Architecture of distributed operating system: Introduction, motivation, system architecture type, issues in distributed operating system, Communication primitive.

Unit 2: Distributed Scheduling: Introduction, motivation, issues in load distribution, component of load algorithm, stabilizing load distribution algorithm, performance comparison, selection of a suitable load sharing algorithm, requirement for load distribution, task migration, issues in task migration.

Unit 3: Distributed mutual Inclusion: Introduction: classification preliminaries simple solution, non token based algorithm, Lamport algorithm, Ricart algorithm, Mackawa's algorithm, A generalized non token based algorithm, token based algorithm, Broad cast algorithm, Heuristic algorithm, tree based algorithm, comparative performance analysis.

Unit 4: Distributed dead lock detection: Introduction, dead lock handling, strategies, issues in deadlock detection & resolution, Control organization, centralized, distributed & hierarchical detection algorithm.

Unit 5: Distributed file system: Introduction, architecture mechanism for building, design issues, log structured file system.

Books

1. Mukesh Singhal & N.G. Shivaratri: Advanced concepts in operating systems, TMH 2001.
2. A S Tanenbaum : Modern Operating Systems ,PHI.
3. A. Silberschatz, P. Galving, G. Gahne : Applied operating system concepts, Wiley.

PCS 471: Computer Graphics and Animation (Pr)
B.TECH Semester-VII (Computer Science & Engineering)

L	T	P
-	-	2

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

Prerequisite: Knowledge of C/C++ Programming is essential.

Course Outcome:

- Recognize and evaluate critical and aesthetic issues within computer graphics and the mixed media.
- Apply aesthetic judgments and critical thinking skills to art and graphics related issues.
- Demonstrate mastery of specific technical, conceptual and critical abilities within computer graphics and the mixed media.
- Demonstrate proficiency with industrial applications to visual communication related technologies.
- Communicate effectively in written format on research and creative issues

The experiments will be based on the following:- **: TCS- 471 Computer Graphics and Animation**

TCS 481: AD HOC NETWORKS
B.Tech. Semester –VIII (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Prerequisite : To impart the knowledge of wireless communication technologies, Routing Adhoc Networks **,**
Course outcome :

- are able to understand and explain the concept of ad-hoc and sensor networks, their applications and typical node and network architectures.
- are able to critique protocol designs in terms of their energy-efficiency
- are able to set up and evaluate measurements of protocol performance in wireless sensor networks.

Unit 1: Introduction: Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio Propagation Mechanisms – Characteristics of the Wireless Channel – IEEE 802.11a–b Standard – Origin of Ad hoc Packet Radio Networks – Technical Challenges – Architecture of PRNETs – Components of Packet Radios – Ad hoc Wireless Networks – What is an Ad Hoc Network Heterogeneity in Mobile Devices – Wireless Sensor Networks – Traffic Profiles – Types of Ad hoc Mobile Communications – Types of Mobile Host Movements – Challenges Facing Ad hoc Mobile Networks Ad hoc,wireless,Internet.

Unit 2: Introduction Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks : Classifications of Routing Protocols – Table–Driven Routing Protocols – Destination Sequenced Distance Vector (DSDV) – Wireless Routing Protocol (WRP) – Cluster Switch Gateway Routing (CSGR) – Source–Initiated On–Demand Approaches – Ad hoc On–Demand Distance Vector Routing (AODV) – Dynamic Source Routing (DSR) –Temporally Ordered Routing Algorithm (TORA) – Signal Stability Routing (SSR) –Location–Aided Routing (LAR) – Power–Aware Routing (PAR) – Zone Routing Protocol (ZRP).

Unit 3: MULTICASTROUTING IN ADHOC NETWORKS: Introduction – Issues in Designing a Multicast Routing Protocol – Operation of Multicast Routing Protocols – An Architecture Reference Model for Multicast Routing Protocols –Classifications of Multicast Routing Protocols – Tree–Based Multicast Routing Protocols– Mesh–Based Multicast Routing Protocols – Summary of Tree and Mesh based Protocols – Energy–Efficient Multicasting – Multicasting with Quality of Service Guarantees – Application – Dependent Multicast Routing – Comparisons of Multicast Routing Protocols.

Unit 4: TRANSPORT LAYER– SECURITY PROTOCOLS: Introduction – Issues in Designing a Transport Layer Protocol for Ad hoc Wireless Networks – Design Goals of a Transport Layer Protocol for Ad hoc Wireless Networks –Classification of Transport Layer Solutions – TCP over Ad hoc Wireless Networks – Other Transport Layer Protocols for Ad hoc Wireless Networks – Security in Ad Hoc Wireless Networks – Network Security Requirements – Issues and Challenges in Security Provisioning – Network Security Attacks–Key Management– Secure Routing in Adhoc Wireless Networks.

Unit 5: QoS AND ENERGY MANAGEMENT Introduction – Issues and Challenges in Providing QoS in Ad hoc Wireless Networks –Classifications of QoS Solutions – MAC Layer Solutions – Network Layer Solutions – QoS Frameworks for Ad hoc Wireless Networks Energy Management in Ad hoc Wireless Networks– Introduction– Need for Energy Management in Ad hoc Wireless Networks – Classification of Energy Management Schemes – Battery Management Schemes – Transmission Power Management Schemes– System Power Management Schemes.

Books

1. C. Siva Ram Murthy and B. S. Manoj, "Ad Hoc Wireless Networks Architectures and Protocols", Prentice Hall, PTR, 2004.

TCS 482 : Embedded Systems
B.Tech. Semester –VIII (Computer Science & Engg.)

L	T	P
3	1	0

Class Work	**:50 Marks**
Exam.	**:100 Marks**
Total	**:150 Marks**
Duration of Exam	**: 3 Hrs.**

Prerequisite : To impart knowledge of Embedded Microcomputer Systems (hardware and software).
Course outcome :

- Describe the differences between the general computing system and the embedded system, also recognize the classification of embedded systems..
- Become aware of the architecture of the ATOM processor and its programming aspects (assembly Level)
- Design real time embedded systems using the concepts of RTOS.

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

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

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

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

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

Books

1. David E Simon, "An embedded software primer", Pearson Education Asia, 2001
2. John B Pitman, "Design with PIC Micro controllers", Pearson Education Asia, 1998
3. Jonartthan W. Valvano, "Embedded Micro computer Systems, Real time Interfacing", Thomson learning 2001.
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 480: Cloud Computing
B.Tech. Semester –VIII (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Prequisite : To impart the knowledge cloud computing and technologies, issues in cloud computing etc.
Course outcome :

- articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing
- attempt to generate new ideas and innovations in cloud computing.
- explain the core issues of cloud computing such as security, privacy, and interoperability.

Unit 1: Introduction to Cloud Computing: Definition, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS and Others, Organizational scenarios of clouds, Administering & Monitoring cloud services, benefits and limitations, Deploy application over cloud, 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 2: 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 3: 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 4: 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 5: 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. Cloud Computing for Dummies by Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper (Wiley India Edition)
2. Enterprise Cloud Computing by Gautam Shroff,Cambridge
3. Cloud Security by Ronald Krutz and Russell Dean Vines, Wiley-India

ECS 481: Distributed Databases
B.Tech. Semester –VIII (Computer Science & Engg.)

L	T	P
3	1	0

Class Work	**:50 Marks**
Exam.	**:100 Marks**
Total	**:150 Marks**
Duration of Exam	**: 3 Hrs.**

Prerequisite : To impart the knowledge of distributed databases and its applications and comparison with centralized databases.

Course outcome :

- Explain the techniques used for data fragmentation, replication, and allocation during the distributed database design process.
- Evaluate simple strategies for executing a distributed query to select the strategy that minimizes the amount of data transfer.

Unit 1: Distributed and parallel databases concepts: Autonomy, distribution, and heterogeneity.Client/server, parallel and distributed architectures.

Unit 2: Design strategies: Horizontal, vertical and hybrid fragmentation.

Unit 3: Resource allocation: Transaction model, serialization and recovery.

Unit 4: Concurrency control & Dead Lock: Concurrency control, Deadlock management and Distributed deadlock, reliability and availability, load balancing.

Unit 5: Schema translation & Integration: Multi databases and multi-dimensional indices.

Reference Books:

1. Silberschatz, Abraham, Henry F. Korth, and S. Sudarshan.”Database Systems Concepts, 4/e.,” McGraw-Hill Publishers. Copyright 2001. ISBN 0-07-228363-7.
2. Ozsu, M. Tamer and Patrick Valduriez’ “Principles of Distributed Database Systems, 2/e,” Prentice Hall Publishers. Copyright 1999. ISBN 0-13-659707-6.

ECS 482: Fault Tolerant Systems
B.Tech. Semester –VIII (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Prerequisite : To acquaint the students with the Fault tolerance systems, tools and techniques.

Course outcome :

- to create understanding of the fundamental concepts of fault-tolerance
- to learn basic techniques for achieving fault-tolerance in electronic,communication and software systems
- to understand merits and limitations of fault-tolerant design

Unit 1: Introduction : Fault Prevention -Fault tolerance – anticipated and unanticipated Faults- Test generation for digital systems- Combinational logic. Network Boolean difference method test generation for sequential circuits-fault simulation.

Unit 2: Error Model: General coding scheme – Parity checking code- arithmetic code – code for computer memories –checking errors in logical operation – communication coding.

Unit 3: Fault Tolerance: Coding technique-fault tolerant self checking and fail safe circuits-fault tolerant in combinatorial and sequential circuits- synchronous and asynchronous fail safe circuits.

Unit 4: Architecture: Fault tolerant computers - general purpose commercial systems-fault tolerant multiprocessor and VLSI based communication architecture.

Unit 5: Fault Tolerant Software: Design-N-version programming recovery block -acceptance tests-fault trees-validation of fault tolerant systems.

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 483: Real Time System
B.Tech. Semester –VIII (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective : To impart the knowledge of real time operating systems and its comparison with traditional operating systems.

Course outcome :

- An ability to understand advanced concepts in theory of computer science;
- An ability to learn emerging concepts in theory and applications of computer science
- An ability to function in teams and to communicate effectively

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

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

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

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

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

Books:

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

ECS 484: Software Project Management
B.Tech. Semester –VIII (Computer Science & Engg.)

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

Prequisite: To introduce the concepts of software management, Disciplines and control.

Course outcome :

- you will have good knowledge of the issues and challenges faced while doing the Software project Management
- Be familiar with the different methods and techniques used for project management
- Will be able to do the Project Scheduling, tracking, Risk analysis, Quality management and Project Cost estimation using different techniques

Unit 1: Conventional Software management: Evolution of software economics. Improving software economics: reducing product size, software processes, team effectiveness, automation through. Software environments. Principles of modem software management.

Unit 2: Software management Process: Framework,: Life cycle phases- inception, elaboration, construction and training phase.

Unit 3: Artifacts of the process: artifact sets, management artifacts, engineering artifacts, and pragmatics artifacts. Model based software architectures. Workflows of the process. Checkpoints of the process.

Unit 4: Software Management Disciplines: Iterative process planning. Project organizations and responsibilities. Process automation.

Unit 5: Project control and process instrumentation: core metrics, management indicators, life cycle expectations. Process discriminants.

Books

1. Software Project management, Walker Royce, Addison Wesley, 1998.
2. Project management 2/e, Maylor.
3. Managing the Software Process, Humphrey.
4. Managing global software Projects, Ramesh, TMfH,2001.

ECS 485: Advanced Computer Networks
B.Tech. Semester –VIII (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Perquisites: To provide to the students an in –depth understanding of networking.

Course Outcome :

- Apply knowledge of the TCP/IP layering model to intelligently debug networking problems.
- Use Linux commands to understand how a PC is configured.
- Write networking code that uses TCP and UDP in client-server applications.

Unit 1: Review: Computer networks and layered architecture.

Unit 2: Asynchronous transfer mode: ATM layered model, switching and switching fabrics, network layer in ATM , QOS , LAN Emulation. Transport layer :elements of transport protocol; internet transport protocols: TCP and UDP, TCP connection management, Congestion control,

Unit 3:Application Layer: Network application architectures: Client-server, P2P and hybrid; Application layer protocols: DNS, FTP, TFTP,TELNET,HTTP and WWW, SMTP and electronic mail; Network management and SNMP.

Unit 4: Wireless and Mobile Networks: Wireless links and network characteristics, 802.11 wireless LANs, mobility management, addressing and routing, mobile IP, WAP, mobility and celluler networks.

Unit 5: Multimedia networking: Streaming audio and video, RTSP, jitter removel and recovery from lost packets; protocols for real-time interactive applications: RTP,RTCP,SIP, H.323; content distribution networks; integrated and differentiated service, RSVP.

Books

1. Tanenbaum, A.S., "Computer Networks", 4th Ed., Pearson Education.
2. Forouzan, B.A., "Data communication and networking", 4th Ed., Tata McGraw-Hill.
3. Kurose, J.F. and Ross, R.W.," Computer networking" 3rd Ed., Pearson Education.
4. Stallings., W., "Network Security and Cryptography", 4th Ed., Prentice-Hall of India.
5. Comer, D.E. and Droms, R.E., "Computer Networks and internets". 4th Ed., Prentice-Hall
6. Stevens, W. R., "TCP/IP illustrated , Vol. I", Pearson.
7. Walrand, J. and variya, P., "Higjh performance communication networks", 2nd Ed., Morgan Kaufmann

ECS 486: Distributed Algorithms
B.Tech. Semester –VIII (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Objective: To impart the knowledge of synchronous and asynchronous distributed systems.
Perquisites: Knowledge of Computer Network is essential.
Course Outcome:

- understand and account for models, limitations, and fundamental concepts in the area of message passing and shared memory concurrency
- apply this understanding to design systems and algorithms,
- Adapt, and design algorithms for execution in parallel and distributed settings.
- Analyze the algorithms for correctness, reliability, security, and performance.

Unit 1: Models of synchronous and asynchronous distributed computing systems;

Unit 2: synchronous networks, asynchronous shared memory, asynchronous networks etc;

Unit 3: Basic algorithms for synchronous networks; leader election, breadth first search, shortest path, minimum spanning tree etc.;

Unit 4: Advanced synchronous algorithms; distributed consensus with failures, commit protocols; asynchronous shared memory algorithms;

Unit 5: Mutual exclusion and consensus; relationship between shared memory and network models; asynchronous networks with failures

1. Cormen, Leiserson and Rivest: Introduction to Algorithms, 2/e, PHI.
2. Horowitz, Ellis and Sahni, Sartaj; Fundamentals of Computer Algorithms, Universities Press.
3. Aho, Hopcroft, and Ullman: The Design and Analysis of Computer Algorithms, Addison Wesley.

ECS 487: Grid Computing
B.Tech. Semester –VIII (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Prequisite : To impart the knowledge of architecture, monitoring, security and resource management of Grid computing.

Course outcome :

- understand the need for and evolution of Grids in the context of processor- and data-intensive applications
- be able to design and implement Grid computing applications using Globus or similar toolkits
- be able to justify the applicability, or non-applicability, of Grid technologies for a specific application

Unit 1: Concepts And Architecture: Introduction-Parallel and Distributed Computing-Cluster Computing-Grid Computing-Anatomy and Physiology of Grid-Review of Web Services-OGSA-WSRF.

Unit 2: Grid Monitoring: Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems- Grid ICE – JAMM -MDS-Network Weather Service-R-GMA-Other Monitoring Systems-Ganglia and GridMon

Unit 3: Grid Security And Resource Management: Grid Security-A Brief Security Primer-PKI-X509 Certificates-Grid Security-Grid Scheduling and Resource Management-Scheduling Paradigms- Working principles of Scheduling -A Review of Condor, SGE, PBS and LSF-Grid Scheduling with QoS.

Unit 4: Data Management And Grid Portals: Data Management-Categories and Origins of Structured Data-Data Management Challenges-Architectural Approaches-Collective Data Management Services-Federation Services-Grid Portals-First-Generation Grid Portals-Second-Generation Grid Portals.

Unit 5: Grid Middleware: List of globally available Middlewares - Case Studies-Recent version of Globus Toolkit and GLite - Architecture, Components and Features.

Book

1. Maozhen Li, Mark Baker, The Grid Core Technologies, John Wiley & Sons ,2005.
REFERENCES:
2. Ian Foster & Carl Kesselman,The Grid 2 – Blueprint for a New Computing Infrascture Morgan Kaufman – 2004.
3. Joshy Joseph & Craig Fellenstein, "Grid Computing", Pearson Education 2004.
4. Fran Berman,Geoffrey Fox, Anthony J.G.Hey, "Grid Computing: Making the Global Infrastructure a reality", John Wiley and sons, 2003.

ECS 488: Query & Transaction Processing
B.Tech. Semester –VIII (Computer Science & Engg.)

L T P		
3 1 0	**Class Work**	**:50 Marks**
	Exam.	**:100 Marks**
	Total	**:150 Marks**
	Duration of Exam	**: 3 Hrs.**

Prerequisite : To impart the knowledge of object oriented and object relational databases and implementation of concurrency and recovery in different kind of databases.

Course outcome :

- Master the basics of SQL and construct queries using SQL.
- Master the basic concepts and appreciate the applications of database systems.
- Be familiar with the basic issues of transaction processing and concurrency control

Unit 1: Objected Oriented and Object Relational Databases: Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity and its implementation, Clustering, Equality and Object Reference, Architecture of Object Oriented and Object Relational databases, Persistent Programming Languages, Cache Coherence. Case Studies: Gemstone, O2, Object Store, SQL3, Oracle xxi, DB2.

Unit 2: Deductive Databases: Data log and Recursion, Evaluation of Data log program, Recursive queries with negation .Parallel and Distributed Databases Parallel architectures, shared nothing/shared disk/shared memory based architectures, Data partitioning, Intra-operator parallelism, pipelining. Distributed Data Storage – Fragmentation & Replication, Location and Fragment Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, and Parallel Query Evaluation.

Unit 3: Advanced Transaction Processing: Advanced transaction models: Savepoints, Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors, Shared disk systems.

Unit 4: Active Databases and Real Time Databases: Triggers in SQL, Event Constraint and Action, ECA Rules, Query Processing and Concurrency Control, Recursive query processing, Compensation and Databases Recovery, multi-level recovery.

Unit 5: Image and Multimedia Databases: Modeling and Storage of Image and Multimedia Data, Data Structures – R-tree, k-d tree, Quad trees, Content Based Retrieval: Color Histograms, Textures, etc., Image Features, Spatial and Topological Relationships, Multimedia Data Formats, Video Data Model, Audio & Handwritten Data, Geographic Information Systems (GIS). WEB Database Accessing Databases through WEB, WEB Servers, XML Databases, Commercial Systems – Oracle xxi, DB2.

Books

1. Elmarsi, "Fundamentals of Database Systems", 4 th Edition, Pearson Education
2. R. Ramakrishnan, "Database Management Systems", 1998, McGraw Hill International Editions
3. Elmagarmid.A.K. "Database transaction models for advanced applications", Morgan Kaufman.
4. Transaction Processing, Concepts and Techniques, J. Gray and A. Reuter, Morgan Kauffman..
5. S. Abiteboul, R. hull and V. Vianu, "Foundations of Databases", 1995, Addison – Wesley Publishing Co., Reading Massachusetts
6. W. Kim, "Modern Database Systems", 1995, ACM Press, Addison – Wesley.
7. D. Maier, "The Theory of Relational Databases", 1993, Computer Science Press, Rockville, Maryland

ECS 489 : Soft Computing
B.Tech. Semester –VIII (Computer Science & Engg.)

L	T	P
3	1	0

Class Work	**:50 Marks**
Exam.	**:100 Marks**
Total	**:150 Marks**
Duration of Exam	**: 3 Hrs.**

Prerequisite: Soft Computing refers to a collection of computational techniques in computer science, artificial intelligence and engineering disciplines which attempt to study, model and analyze complex problems - those for which more conventional methods have not yielded low cost, analytic and complete solutions.

Course outcome :

- Implement numerical methods in soft computing.
- Discuss the neural networks and supervised and unsupervised learning networks.
- Demonstrate some applications of computational intelligence.

Unit 1: Introduction to Genetic Algorithm: Genetic Operators and Parameters, Genetic Algorithms in Problem Solving, Theoretical Foundations of Genetic Algorithms, Implementation Issues.

Unit 2: Artificial Neural Networks & Learning : Neural Model and Network Architectures, Perceptron Learning, Supervised Hebbian Learning, Backpropagation, Associative Learning.

Unit 3: Competitive Networks: Hopfield Network, Computing with Neural Nets and applications of Neural Network.

Unit 4: 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 5: 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. Vijayalakshmi Pai, 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.

PCS 481: Ad hoc Networks (Pr)
B.TECH Semester-VI (Computer Science & Engineering)

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- 481 Ad hoc Networks**