

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES,  
RAJAMPET  
(AN AUTONOMOUS INSTITUTION)**

*Affiliated To*  
**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
ANANTAPUR, ANANTAPUR.**

**ACADAMIC REGULATIONS COURSE STRUCTURE  
AND DETAILED SYLLABI**

**MASTER OF TECHNOLOGY  
COMPUTER SCIENCE & ENGINEERING**



**M.Tech Regular Two Year P.G. Degree Course  
Applicable for students admitted from 2011-12**

## ACADEMIC REGULATIONS

### Applicable for students admitted into M.Tech. programme from 2011-12

The Jawaharlal Nehru Technological University Anantapur shall confer M.Tech.Post graduate degree to candidates who are admitted to the Master of Technology Programmes and fulfill all the requirements for the award of the degree.

#### 1.0 ELIGIBILITY FOR ADMISSIONS:

Admission to the above programme shall be made subject to the eligibility, qualifications and specialization prescribed by the competent authority for each programme, from time to time.

Admissions shall be made either on the basis of merit rank obtained by the qualifying candidates at an Entrance Test conducted by the University or on the basis of GATE/PGECET score, subject to reservations or policies framed by the Government of Andhra Pradesh policies from time to time.

#### 2.0 ADMISSION PROCEDURE:

As per the existing stipulations of AP State Council for Higher Education (APSCHE), Government of Andhra Pradesh, admissions are made into the first year as follows

- a) Category-A seats are to be filled by Convenor through PGECET/GATE score.
- b) Category-B seats are to be filled by Management as per the norms stipulated by Government of A P.

#### 3.0 SPECIALIZATION:

The following specializations are offered at present for the M.Tech. programme.

Sl. No.	Specialization
1.	CAD/CAM
2.	Digital Electronics and Communication Systems
3.	Embedded Systems
4.	VLSI System Design
5.	Computer Science and Engineering
6.	Electrical Power Engineering
7.	Electrical Power Systems

and any other specialization as approved by the concerned authorities from time to time.

#### **4.0 COURSE WORK:**

- 4.1 A Candidate after securing admission must pursue the M.Tech. programme of study for four semesters duration.
- 4.2 Each semester shall be of 20 weeks duration including all examinations.
- 4.3 A candidate admitted in to the programme should complete it within a period equal to twice the prescribed duration of the programme from the date of admission.

#### **5.0 ATTENDANCE**

- 5.1 A candidate shall be deemed to have eligibility to write end semester examinations if he has put in at least 75% of attendance aggregate in all subjects/courses in the semester.
- 5.2 Condonation of shortage of attendance up to 10% i.e., between 65% and above and less than 75% may be granted by the Institute Academic committee.
- 5.3 Shortage of attendance below 65% in aggregate shall in no case be condoned.
- 5.4 Condonation of shortage of attendance shall be granted only on genuine and valid reasons on representation by the candidate with supporting evidence.
- 5.5 A stipulated fee shall be payable towards condonation of shortage of attendance to the institute.
- 5.6 Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled for that semester.
- 5.7 A student will not be promoted to the next semester unless he satisfies the attendance requirements of the current semester, as applicable.
- 5.8 A student detained due to shortage of attendance, will have to repeat that semester when offered next.

#### **6.0. CREDIT SYSTEM NORMS:**

	<b>Period(s)/week</b>	<b>Credits</b>
Theory	01	01
Practical	03	02
Seminar	01	01
Project	-	16

TABLE 1

## 7.0. EVALUATION:

### 7.1 Distribution of marks

S. No	Examination	Marks	Examination and Evaluation		Scheme of Evaluation
1.	Theory	60	Semester-end examination (External evaluation)		The question paper shall be of descriptive type with <u>8</u> questions out of which 5 are to be answered in 3 hours duration of the examination.
		40	Mid - Examination of 120 Min. duration (Internal evaluation).  5 descriptive questions out of which 4 are to be answered and evaluated for 30 marks, and the remaining 10 marks are to be allotted for 3-5 assignments (2 marks each) to be submitted by the student. The assignment marks are to be awarded based on the completeness of the assignment, correctness of the assignment and in-time submission, evaluated for 10 marks and average of the total assignment marks are rounded to the next integer.		Two mid-exams 30 marks each are to be conducted. One best to be considered.  <b>Mid-I:</b> After first spell of instructions (I-IV Units).  <b>Mid-II:</b> After second spell of instructions (V - VII Units).
2	Laboratory	60	Semester-end Lab Examination (External evaluation)		<b>For laboratory courses: 3</b> hours duration. One External and One Internal examiners.
		40	30	Day to Day evaluation (Internal evaluation)	Performance in laboratory experiments.

S. No	Examination	Marks	Examination and Evaluation		Scheme of Evaluation
			10	Internal evaluation	Practical Tests (one best out of two tests includes viva-voce)
3	Seminar In each of the semesters. 2 hours /week	100	Internal Evaluation 20 Marks for Report 20 Marks for subject content 40 Marks for presentation 20 Marks for Question and Answers		Continuous evaluation during a semester by the Departmental Committee (DC)
4	Project work	100	60	External evaluation	Semester-end Project Viva-Voce Examination by Committee as detailed under 6.2
			40	Internal evaluation 20 Marks by Supervisor	Continuous evaluation by the DC 20 Marks by D.C. as detailed under 6.2.1

7.2A candidate shall be deemed to have secured the minimum academic requirement in a subject/practical if he secures a minimum of 40% of marks in the End Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.

7.3A candidate has to secure a minimum of 50% to be declared successful.

7.4 In case the candidate does not secure the minimum academic requirement in any of the subjects/practical, he has to reappear for the Examination either supplementary or regular in that subject/practical along with the next batch students. A separate supplementary examinations will be conducted for the I semester students at the end of II semester.

**7.5 Revaluation / Recounting:** Students shall be permitted to request for recounting/ revaluation of the end theory examination answer scripts within a stipulated period after payment of prescribed fee. After recounting or revaluation, records are updated with changes if any and the student will be issued a revised memorandum of marks. If there *are* no changes, the student shall be intimated the same through a letter or a notice.

- 8.0. RE-REGISTRATION FOR IMPROVEMENT OF INTERNAL EVALUATION MARKS(for theory subjects only):**Out of the subjects the candidate has failed in the examination due to Internal evaluation marks secured being less than 50%, the candidate shall be given one chance for each Theory subject and for a maximum of Three Theory subjects for Improvement of Internal evaluation marks.
- 8.2 The candidate can re-register for the chosen subjects and fulfill the academic requirements. Re-registration shall not be permitted after the commencement of class work for that semester.
- 8.3 For each subject re-registered, the candidate has to pay a fee equivalent to one third of the semester tuition fee.
- 8.4 In the event of re-registration, the internal evaluation marks as well as the End Examinations marks secured in the previous attempt(s) for those subjects stand cancelled.

## **9.0 EVALUATION OF PROJECT WORK:**

Every candidate shall be required to submit thesis/dissertation after taking up a Topic approved by the Departmental Committee.

- 9.1 The Departmental Committee (DC) consisting of HOD, Supervisor and two internal senior experts shall monitor the progress of the project work. A Project Review Committee (PRC) shall be constituted with Principal as Chair Person, Heads of the departments of the M.Tech Programs and Two other senior faculty members, as members of the PRC. PRC will come into action when the DC is not able to resolve the issues.
- 9.2 Registration of Project work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the courses (theory, practical and seminar of I & II Semesters).
- 9.3 After satisfying 9.2, a candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work to the DC for approval. Only after obtaining the approval of DC, the student can initiate the project work.
- 9.4 The work on the project shall be initiated in the penultimate semester and continued in the final semester. The duration of the project is for two semesters. The candidate can submit Project thesis with the approval of DC after 36 weeks from the date of registration at the earliest but not later than one calendar year from the date of registration for the project work. Extension of time within the total permissible limit for completing the programme is to be obtained from the Head of the Institution.
- 9.5 The student must submit status report at least in two different phases during the project work period. These reports must be approved by the DC before submission of the Project Report.

- 9.6 A candidate shall be allowed to submit the thesis / dissertation only after passing all the prescribed subjects (theory, practical and seminar).
- 9.7 A candidate has to prepare four copies of the thesis/dissertation certified in the prescribed form by the supervisor & HOD. Three copies shall be submitted in the examination section.

## **10.0 CREDIT POINT AVERAGE AND CUMULATIVE CREDIT POINT AVERAGE:**

### **10.1. CREDIT POINT AVERAGE(CPA):**

$$\text{CPA} = \frac{\sum_i C_i T_i}{10 \sum_i C_i}$$

Where  $C_i$ = Credits earned for Course  $i$  in any semester/year.

$T_i$ = Total marks obtained for course  $i$  in any semester/year.

### **10.2. CUMULATIVE CREDIT POINT AVERAGE (CCPA):**

$$\text{CCPA} = \frac{\sum_n \sum_i C_{ni} T_{ni}}{10 \sum_n \sum_i C_{ni}}$$

Where  $n$  refers to the semester in which such courses were credited.

The CCPA is awarded only when a student earns all the credits prescribed for the programme.

### **10.3. OVERALL PERFORMANCE:**

<b>Cumulative Grade Point Average</b>	<b>Classification of Final Results</b>
7.0 and above	First Class with Distinction
6.0 and above but below 7.0	First Class
5.0 and above but below 6.0	Second Class

### **10.4. TRANSCRIPTS:**

After successful completion of the entire programme of study/a transcript containing performance of all the academic years will be issued as a final record. Duplicate transcripts will be issued if required, after payment of requisite fee. Partial transcript will also be issued up to any point of study to a student on request.

## **11.0. ELIGIBILITY:**

A student shall be eligible for the award of M.Tech Degree if he fulfills all the following conditions:

- Registered and successfully completed all the components prescribed in the programme of study to which he was admitted.
- Successfully acquired all the credits as specified in the curriculum corresponding to the branch of his study within the stipulated time.
- No disciplinary action is pending against him.

## **12.0 AWARD OF DEGREE:**

The Degree will be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Anantapur on the recommendations of the Principal, AITS (Autonomous) based on the eligibility as mentioned in clause 11.

## **13.0 WITHHOLDING OF RESULTS:**

If the candidate has any dues to the Institute or if any case of in-discipline is pending against him, the result of the candidate shall be withheld and he will not be allowed/promoted into the next higher semester. The issue of degree is liable to be withheld in such cases.

## **14.0 TRANSITORY REGULATIONS:**

Candidates who have discontinued or have been detained for want of attendance or who have failed after having undergone the course in earlier regulations and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered. Whereas he continues to be in the academic regulations he was first admitted.

## **15.0 AMENDMENTS OF REGULATIONS:**

The Chairman, Academic Council of Annamacharya Institute of Technology and Sciences, Rajampet (Autonomous) reserves the right to revise, amend, or change the Regulations, Scheme of Examinations and/or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.

## **16.0 GENERAL:**

Where the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.

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<b>Annamacharya Institute of Technology and Sciences, Rajampet.</b>	
Curriculum for the Programmes under Autonomous Scheme	
Regulation	R 2011
Department	Department of Computer Science and Engineering
Programme Code & Name	M.Tech. Computer Science and Engineering

### Semester I

Course Code	Course Name	Hours/Week		Credits	Maximum marks		
		L	P		C	Internal	External
1P3111	Foundation of computing	4	0	4	40	60	100
1P3112	Advanced data structures and Algorithms	4	0	4	40	60	100
1P3113	Advanced Databases	4	0	4	40	60	100
1P3114	Advanced Computer Networks	4	0	4	40	60	100
1P3115	Advanced Software Engineering	4	0	4	40	60	100
1P3116	Advanced Computer Architecture	4	0	4	40	60	100
1P3117	Seminar – I	0	0	2	100	00	100
1P3118	Software Laboratory-1	0	3	4	40	60	100
Total		24	3	30	800		

### Semester II

Course Code	Course Name	Hours/Week		Credits	Maximum marks		
		L	P		C	Internal	External
1P3121	Data warehousing and Mining	4	0	4	40	60	100
1P3122	Software Architecture and Design Patterns	4	0	4	40	60	100
1P3123	Open Systems for Web Technologies	4	0	4	40	60	100
1P3124	Distributed Operating System	4	0	4	40	60	100
	Elective – I	4	0	4	40	60	100
	Elective – II	4	0	4	40	60	100
1P312B	Seminar – II	0	0	2	100	00	100
1P312C	Software Laboratory-2	0	3	4	40	60	100
Total		24	3	30	800		

**Semester III & IV**

<b>Course Code</b>	<b>Course Name</b>	<b>Credits</b>	<b>Maximum Marks</b>		
		<b>C</b>	<b>Internal</b>	<b>External</b>	<b>Total</b>
1P3131	Project	16	40	60	100

<b>List of Electives</b>		<b>Course code</b>
<b>Elective I</b>	– Artificial Intelligence and Neural Networks	1P3125
	– Grid and Cluster Computing	1P3126
	– Cloud Computing	1P3127
<b>Elective II</b>	– Network Management Systems	1P3128
	– Mobile Computing	1P3129
	– Information Security	1P312A

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES,  
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M.Tech (CSE) I Semester**

**FOUNDATION OF COMPUTING**

**UNIT-I**

**Mathematical Logic:** Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms.

**Predicates:** Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

**UNIT-II**

**Set Theory :** Properties of binary Relations, equivalence, compatibility and partial ordering relations, Hasse diagram. Functions: Inverse Function comports of functions, recursive Functions, Lattice and its Properties, Pigeon hole principles and its application.

**UNIT-III**

**Graph Theory :** Representation of Graph, Basic Concepts Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers, DFS, BFS, Spanning Trees, planar Graphs

**UNIT IV**

**Fundamentals :** Strings, Alphabet, Language, Operations, Finite state machine, definitions, finite automaton model, acceptance of strings, and languages, deterministic finite automaton and non-deterministic finite automaton, transition diagrams and Language recognizers, NFA with  $\hat{\Lambda}$  transitions - Significance, acceptance of languages. Conversions and Equivalence.

**UNIT V**

Equivalence between NFA with and without  $\hat{\Lambda}$  transitions, NFA to DFA conversion, minimization of FSM.

**Regular Languages :**Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Pumping lemma of regular sets, closure properties of regular sets (proofs not required).

**UNIT VI**

**Grammar Formalism: Regular** grammars-right linear and left linear grammars, equivalence between regular linear grammar and FA, inter conversion, Context free grammar, derivation trees, sentential forms. Right most and leftmost derivation of strings. Ambiguity in context free grammars.Minimizationof Context Free Grammars. Chomsky normal form,

Greiback normal form, Pumping Lemma for Context Free Languages. Enumeration of properties of CFL (proofs omitted).

#### **UNIT VII :**

**Push Down Automata :** Push down automata, definition, model, acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA, interconversion. (Proofs not required).

#### **UNIT VIII :**

**Turing Machine :** Turing Machine, definition, model, design of TM, Computable functions.

**Computability Theory :** Chomsky hierarchy of languages, linear bounded automata and context sensitive language, LR(0) grammar.

#### **TEXT BOOKS :**

1. Discrete and Combinational Mathematics- An Applied Introduction-5th Edition – Ralph. P.Grimaldi.Pearson Education
2. Discrete Mathematical Structures with applications to computer science Trembly J.P. &Manohar .P, TMH
3. Discrete Mathematics and its Applications, Kenneth H. Rosen, Fifth Edition.TMH.
4. “Introduction to Automata Theory Languages and Computation”. Hopcroft H.E. and Ullman J. D.Pearson Education
5. Introduction to Theory of Computation –Sipser 2nd edition Thomson

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M.Tech (CSE) I Semester**

**ADVANCED DATA STRUCTURES AND ALGORITHMS**

**UNIT I:**

C++ Class Overview- Class Definition, Objects, Class Members, Access Control, Class Scope, Constructors and destructors, parameter passing methods, Inline functions, static class members, this pointer, friend functions, dynamic memory allocation and deallocation (new and delete), exception handling.

**UNIT II :**

Function Over Loading, Operator Overloading, Generic Programming- Function and class templates, Inheritance basics, base and derived classes, inheritance types, base class access control, runtime polymorphism using virtual functions, abstract classes, streams I/O.

**UNIT III :**

Algorithms, performance analysis-time complexity and space complexity, O-notation, Omega notation And Theta notation, little o notation, probabilistic analysis, Amortized analysis. Review of basic data structures- The list ADT, Stack ADT, Queue ADT, Implementation using template classes in C++.

**UNIT IV :**

Dictionaries, linear list representation, skip list representation, operations insertion, deletion and searching, hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing, comparison of hashing and skip lists.

Priority Queues – Definition, ADT, Realizing a Priority Queue using Heaps, Definition, insertion, Deletion,.

**UNIT V :**

**Search Trees (Part1):-** Binary Search Trees, Definition, ADT, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching

**Search trees (prt II) :**Introduction to Red –Black and Splay Trees, B-Trees, B-Tree of order m, height of a B-Tree, insertion, deletion and searching, Comparison of Search Trees

**UNIT VI :**

Divide and Conquer, Searching and Traversal techniques: General method, merge sort, quick sort, Efficient non recursive tree traversal algorithms, DFS, BFS of Graphs, AND/OR graphs, game tree, Bi-connected components.

**UNIT VII :**

Greedy method and Dynamic programming : General method (Greedy), Minimum cost spanning trees, Job sequencing with deadlines, General method (Dynamic Programming), Optimal binary search trees, 0/1 knapsack problem, Travelling sales person problem.

**UNIT VIII :**

Backtracking: General Method, applications-8-Queens problem, Sum of subsets, graph coloring.

Branch and Bound: General method Applications-Travelling sales person(\*),LC Branch and Bound solution, FIFO Branch and Bound Solution

**TEXT BOOKS :**

1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.
2. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.
3. Fundamentals of Computer Algorithms Ellis Horowitz,S.Sahni, Galgotia publications

**REFERENCES :**

1. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
2. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
4. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES,  
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M.Tech (CSE) I Semester**

**ADVANCED DATABASES**

**UNIT-I**

Introduction; Distributed Data Processing, Distributed Database System, Promises of DDBS, Problem areas. Overview of Relational DBMS: Relational Database Concepts, Normalization, Integrity rules, Relational data languages.

**UNIT-II**

Distributed DBMS Architecture: Architectural Models for Distributed DBMS, DDBS Architecture. Distributed Database Design: Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation.

**UNIT-III**

Query Processing and decomposition: Query Processing Objectives, Characterization of query processors, layers of query processing, query decomposition, Localization of distributed data.

**UNIT-IV**

Distributed query Optimization: Query optimization, centralized query optimization, Distributed query optimization algorithms.

**UNIT-V**

Transaction Management: Definition, properties of transaction, types of transactions.

Distributed concurrency control: Serializability, concurrency control Mechanisms & Algorithms, Time stamped & Optimistic concurrency control Algorithms, Deadlock Management.

**UNIT-VI**

Distributed DBMS Reliability: Reliability concepts and Measures, fault-tolerance in Distributed systems, failures in Distributed DBMS, local & Distributed Reliability Protocols, site failures and Network partitioning. Parallel Database Systems: Database Series, Parallel Architecture, Parallel DBMS Techniques, Parallel exception problems, Parallel Execution for Hierarchical architecture.

**UNIT-VII**

Distributed object Database Management Systems: Fundamental object concepts and Models, Object Distributed Design, Architectural Issues, Object Management, Distributed Object storage, Object query Processing.

## **UNIT-VIII**

Object Oriented Data Model : Inheritance, Object identity, persistent programming languages, persistence of objects, comparing OODBMS and ORDBMS

### **TextBooks:**

1. M.Tamer OZSU and PatuckValduriez: Principles of Distributed Database Systems,PearsonEdn.Asia,2001.
2. StefanoCeriandWillipsePelagatti: Distributed Databases, McGraw Hill.
3. Henry F Korth, A Silberchatz and Sudershan : Database System Concepts, MGH
4. Raghuramakrishnan and JohhanesGehrke: Database Management Systems,MGH



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M.Tech (CSE) I Semester**

**ADVANCED COMPUTER ARCHITECTURE**

**UNIT-I**

**Parallel Computer Models:** - The state of computing-Multiprocessors and Multi computers- Multivector and SIMD Computers-PRAM and VLSI Models-Architectural Development tracks.

**Program and Networks Properties:** - Conditions of Parallelism- Program Partitioning and Scheduling- Program Flow Mechanisms-System Interconnect Architectures.

**UNIT-II**

**Principles of Scalable Performance:** - Performance Metrics and Measures-Parallel Processing Applications-Speedup Performance Laws-Scalability Analysis and Approaches.

**Processors and Memory Hierarchy:** - Advanced Processor Technology-Superscalar and Vector Processors- Memory Hierarchy Technology.

**UNIT-III**

**Bus, Cache and Shared Memory:** - Bus Systems-Cache Memory Organizations-Shared-Memory Organizations.

**Pipelining and Super Scalar Techniques:** - Linear Pipeline Processors-Nonlinear Pipeline Processors-Instruction Pipeline Design-Arithmetic Pipeline Design.

**UNIT-IV**

**Multiprocessors and Multicomputers:** - Multiprocessor System Interconnects-Cache Coherence and Synchronization Mechanisms-Three Generations of Multicomputers – Message-Passing Mechanisms.

**UNIT-V**

**Multivector and SIMD Computers:** - Vector Processing Principles-Multivector MultiProcessors-Compound Vector Processing-SIMD Computer Organizations-The Connection Machine CM-5.

**UNIT-VI**

**Scalable, Multithreaded, and Dataflow Architectures:** - Latency –Hiding Techniques-Principles of Multithreading-Fine-Grain Multicomputers-Scalable and Multithreaded Architectures- Dataflow and Hybrid Architectures.

## **UNIT-VII**

**Instruction Level Parallelism:-** Introduction-Basic Design Issues-Problem Definition-Model of a Typical Processor- Operand Forwarding-Reorder Buffer-Register Renaming-Tomasulo's Algorithm- Branch Prediction- Limitations in Exploiting Instruction Level Parallelism-Thread Level Parallelism.

## **UNIT-VIII**

**Trends in Parallel Systems:** - Brief Overview of Technology-Forms of Parallelism-Case Studies

## **TEXT BOOK**

1. Advanced Computer Architecture- by Kai Hwang & Jotwani, 2nd Edition, McGraw-Hill Publications.

## **REFERENCES**

1. Advanced Computer Architecture, D.Sima, T.Fountain, P.Kacsuk, Pearson Education.
2. Computer Architecture A quantitative approach 3<sup>rd</sup> edition john L.Hennessy& David A. Patterson, Morgan Kufmann(An Imprint of Elsevier).
3. Computer Architecture and parallel processing by Hwang and Briggs.

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M.Tech (CSE) I Semester**

**ADVANCED SOFTWARE ENGINEERING**

**UNIT-I**

**Software and Software Engineering**

The Nature of Software, Software characteristics, The Unique Nature of WebApps, Software Engineering, The Software Process, Software Engineering Practice, Software Myths.

**Software Paradigms:** Prespective Process Models, Specialized Process Models.

**UNIT- II**

**Unified Process Model**

The Unified Process, Personal and Team Process Models, Process Technology, Product and Process.

**Agile Development**

What is Agility? Agility and the Cost of Change, What is an Agile Process? Extreme Programming (XP), Other Agile Process Models, A Tool set for the Agile Process.

**UNIT-III**

**Critical Systems**

A simple safety-critical system, System dependability, Availability and reliability, Safety, Security.

**Critical systems specification**

Risk-driven specification, Safety specification, Security specification Software reliability specification.

**Formal Specification**

Formal specification in the software process, Sub-system interface specification, Behavioral specification.

**UNIT- IV**

**Software Reuse**

The reuse landscape, Design patterns, Generator-based reuse, Application frameworks, Application system reuse.

**Component-based Software Engineering**

Components and component models, The CBSE process, Component composition.

**UNIT-V**

**Software Testing**

System testing, Component testing, Test case design, Test automation.

**Software Evolution**

Program evolution dynamics, Software maintenance, Evolution Processes, Legacy system evolution.

## **UNIT-VI**

**Aspect oriented software engineering:** The separation of concerns, Aspects, Join points and pointcuts, Software engineering with aspect.

**Service oriented software engineering:** Service-based concepts, modeling and documentation, Service discovery and composition, Service-oriented architecture, Services as reusable components, Software development with services.

## **UNIT-VII**

### **Quality Management**

Process and product quality, Quality assurance and standards, Quality Planning, Quality control, Software Measurement and metrics.

### **Process Improvement**

Process and product quality, process classification, Process measurement, Process analysis and modeling, Process change, The CMMI process improvement framework.

## **UNIT-VIII**

### **Emerging Trends in Software Engineering**

Technology Evolution, Observing Software engineering Trends, Identifying “Soft trends”, Technology directions, Tools -Related trends-Tools that respond to soft trends, Tools that address Technology Trends

## **TEXT BOOKS;**

1. Object oriented software engineering by Timothy c. Leth Bridge, Robertlagniere-TATA McGrawhill
2. Object oriented software engineering by Ivar Jacobson
3. Software Engineering Principles By Roger S.PressMan 6<sup>th</sup> edition.
4. GradyBooch, James Rumbaugh, IvarJacobson : The Unified Modeling
5. Language User Guide, Pearson Education.

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M.Tech (CSE) I Semester**

**ADVANCED COMPUTER NETWORKS**

**UNIT I**

**Review of Computer Networks and the Internet:** What is the Internet, The Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks, History of Computer Networking and the Internet - **Foundation of Networking Protocols:** 5-layer TCP/IP Model, 7-Layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM

**UNIT II**

**Networking Devices:** Multiplexers, Modems and Internet Access Devices, Switching and Routing Devices, Router Structure. **The Link Layer and Local Area Networks:** Link Layer: Introduction and Services, Error-Detection and Error-Correction techniques, Multiple Access Protocols, Link Layer Addressing, Ethernet, Interconnections: Hubs and Switches, PPP: The Point-to-Point Protocol, Link Virtualization

**UNIT III**

**Routing and Internetworking:** Network-Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Path algorithms, Intradomain Routing Protocols, Interdomain Routing Protocols, Congestion Control at Network Layer. **Logical Addressing:** IPv4 Addresses, IPv6 Addresses - **Internet Protocol:** Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6 – **Multicasting Techniques and Protocols:** Basic Definitions and Techniques, Intradomain Multicast Protocols, Interdomain Multicast Protocols, Node-Level Multicast algorithms

**UNIT IV**

**Transport and End-to-End Protocols:** Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control **Application Layer:** Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS), P2P File Sharing, Socket Programming with TCP and UDP, Building a Simple Web Server

## **UNIT V**

**Wireless Networks and Mobile IP:** Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standard, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs)

## **UNIT VI**

**Optical Networks and WDM Systems:** Overview of Optical Networks, Basic Optical Networking Devices, Large-Scale Optical Switches, Optical Routers, Wavelength Allocation in Networks, Case Study: An All-Optical Switch

## **UNIT VII**

**VPNs, Tunneling and Overlay Networks:** Virtual Private Networks (VPNs), Multiprotocol Label Switching (MPLS), Overlay Networks – **VoIP and Multimedia Networking:** Overview of IP Telephony, VoIP Signaling Protocols, Real-Time Media Transport Protocols, Distributed Multimedia Networking, Stream Control Transmission Protocol

## **UNIT VIII**

**Mobile Ad-Hoc Networks:** Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks – **Wireless Sensor Networks:** Sensor Networks and Protocol Structures, Communication Energy Model, Clustering Protocols, Routing Protocols

## **TEXT BOOKS:**

1. Computer Networking: A Top-Down Approach Featuring the Internet, *James F. Kurose, Keith W. Ross*, Third Edition, Pearson Education, 2007
2. Computer and Communication Networks, *Nader F. Mir*, Pearson Education, 2007

## **REFERENCE BOOKS:**

1. Data Communications and Networking, *Behrouz A. Forouzan*, Fourth Edition, Tata McGraw Hill, 2007
2. Guide to Networking Essentials, *Greg Tomsho, Ed Tittel, David Johnson*, Fifth Edition, Thomson.
3. An Engineering Approach to Computer Networking, *S. Keshav*, Pearson Education.
4. Campus Network Design Fundamentals, *Diane Teare, Catherine Paquet*, Pearson
5. Education (CISCO Press)
6. Computer Networks, *Andrew S. Tanenbaum*, Fourth Edition, Prentice Hall.
7. The Internet and Its Protocols, *A. Farrel*, Elsevier.

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**DATA WAREHOUSING AND MINING**

**UNIT I:**

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining.

Data Preprocessing: Needs Preprocessing the Data, Data Cleaning, Data Integration and

Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

**UNIT II:**

Ware housing: Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining.

**UNIT III:**

Data Mining Primitives, Languages, and System Architectures: Data Mining Primitives, Data Mining Query Languages, Designing Graphical User Interfaces Based on a Data Mining Query Language Architectures of Data Mining Systems.

**UNIT IV:**

Concepts Description, Characterization and Comparison: Data Generalization and Summarization- Based Characterization, Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between Different Classes, Mining Descriptive Statistical Measures in Large Databases.

**UNIT V:**

Mining Association Rules in Large Databases: Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

**UNIT VI:**

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification,

Classification by Back propagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy.

**UNIT VII:**

Cluster Analysis Introduction: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.

**UNIT VIII:**

Mining Complex Types of Data: Multidimensional Analysis and Descriptive Mining of Complex, Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Time-Series and Sequence Data, Mining Text Databases, Mining the World Wide Web.

**TEXT BOOKS :**

1. Data Mining, Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER Harcourt India.

**REFERENCES :**

1. Data Mining Introductory and advanced topics, MARGARET H DUNHAM, PEARSON EDUCATION
2. Data Mining Techniques, ARUN K PUJARI, University Press.
3. Data Warehousing in the Real World, SAM ANAHORY & DENNIS MURRAY. Pearson Edn Asia.
4. Data Warehousing Fundamentals, PAULRAJ PONNAIAH WILEY STUDENT EDITION.
5. The Data Warehouse Life cycle Tool kit, RALPH KIMBALL WILEY STUDENT EDITION.



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**OPEN SYSTEM FOR WEB TECHNOLOGIES**

**UNIT I:**

**Introduction to web technology:-**Web pages-types and issues, tiers, the concept of a tier, web pages, static web pages, plug-ins, introduction to HTML, common tags, the need for dynamic web pages. Cascading Style sheets;

**UNIT II**

**Java Script:** Introduction to scripting, Control Structures-I, Control Structures-II, Functions, Arrays, Objects.

**DHTML:** Cascading style sheets, Object model and collections, Event Model, Filters and Transitions.

**UNIT III**

**Extensible Markup Language:-**Introduction to Standard generalized markup language (SGML)

**XML:** Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

**UNIT IV**

**Web Servers:** PWS, IIS, Tomcat, Apache, Jigsaw Web Servers.

**Java based Web Technologies(part-1):** JAVA Servlets: Introduction to Java Servlets, Servlet Life Cycle, Http Servlet Class, Http Servlet Request & Response interfaces, Deploying a web application, Session Tracking, Cookies.

**UNIT V**

**Java based Web Technologies(part-2):** Java Server Pages(JSP).Introduction to JSP The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing., JSP elements, JSP Directives: Page Directive, Include Directive, Introduction to Java Beans, Action Elements: Use Bean Element, Custom Tag Libraries, Accessing database from a JSP Page.

**UNIT VI**

**JSP Application Development:** Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data

Between JSP pages, Requests, and Users Passing Control and Data between Pages – Sharing Session and Application Data – Memory Usage Considerations

## **UNIT VII**

**Database Access :** Database Programming using JDBC, Studying Javax.sql.\* package, Using JDBC from a Servlet, Accessing a Database from a JSP Page, Application – Specific Database Actions, Deploying JAVA Beans in a JSP Page, Introduction to struts framework..

## **UNIT VIII**

**ASP:** Common gateway interface(CGI), Microsoft ASP, Basics of ASP technology, ASP example, ASP trends. **Content Management Systems:** Introduction to content Management Systems, need and benefits of CMS, Case study using CMS Tools: Silver light, Joomla. Introduction to web development tools:

### **Text Book:**

1. Dietel and Nieto, *Internet & World wide Web How to Program* 4ed.: PHI/Pearson Education Asia.

### **Reference Books:**

1. H. Schild, *The Complete Reference JAVA2*, 5 ed.: Tata McGraw Hill.
2. B. Boiko, *Content Management Bible*.
3. S. M. Grath, *XML by Example*, 5 ed.: Prentice Hall of India/Pearson Education.
4. C. Bates, *Web Programming building Internet Applications*, 2 ed.: WILLEY Dream Tech.

### **Web Resources:**

1. XML in 10 point. <http://www.w3.org/XML/1999/XML-in-10-points>
2. Cascading Style Sheets from W3. <http://www.w3.org/Style/CSS/>
3. Java Programming <http://www.apl.jhu.edu/~hall/java/>

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**SOFTWARE ARCHITECTURE AND DESIGN PATTERNS**

**UNIT I:**

**Introduction:** Architectural to Software Design Patterns, What Is a Design Pattern? More about Design Patterns, design patterns to solve design problems, selecting a design pattern, Use of a design pattern

**UNIT II:**

**BASIC PATTERNS:** Interface, Abstract Parent Class, Private Methods, Accessor Methods, Constant Data Manager, Immutable Object, Monitor

**UNIT III:**

**CREATIONAL PATTERNS:** Factory Method, Singleton, Abstract Factory, Prototype, Builder

**UNIT IV:**

**COLLECTIONAL PATTERNS:** Composite, Iterator, Flyweight, Visitor

**UNIT V:**

**STRUCTURAL PATTERNS:** Decorator, Adapter, Chain of Responsibility, Facade, Proxy, Bridge, Virtual Proxy, Counting Proxy, Aggregate Enforcer, Explicit Object Release, Object Cache

**UNIT VI:**

**BEHAVIORAL PATTERNS-1:** Command, Mediator, Memento, Observer, Interpreter, State, Strategy, Null Object.

**UNIT VII:**

**BEHAVIORAL PATTERNS-2:** Template Method, Object Authenticator, Common Attribute Registry

**UNIT VIII:**

**CONCURRENCY PATTERNS:** Critical Section, Consistent Lock Order, Guarded Suspension, Read-Write Lock

**Text Books:**

1. Software Architecture Design Patterns in Java, ParthaKuchana
2. Design Patterns: Elements of Reusable Object-Oriented Software, Erich Gamma, Richard Helm et al, PEA

**REFERENCE BOOKS:**

1. Beyond Software architecture, Luke Hohmann, Addison wesley, 2003.
2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR,2001

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**DISTRIBUTED OPERATING SYSTEMS**

**UNIT-I**

**Introduction to Distributed Systems:** Distributed systems: Goals Hardware Concepts Software – design

**UNIT-II**

**Communication distributed systems:** Layered Protocol: ATM Networks client server model - remote procedure call – group communication.

**UNIT-III**

**Synchronization:** Clock synchronization - mutual exclusion - election atomic transactions - dead locks.

**UNIT-IV**

**Process and Processors:** Threads - System models processor allocation - scheduling fault tolerance - real time distributed systems.

**UNIT-V**

**Distributed file systems:** File system design and implementation - trends in distributed file systems.

**UNIT-VI**

**Shared Memory:** Introduction - bus based multi processors ring based multiprocessors switched multiprocessors - NUMA comparison of shared memory systems –

**UNIT-VII**

**consistency models** - page based distributed shared memory - shared variable distributed shared memory - object based distributed shared memory.

**UNIT-VIII**

**Case studies:** MACH and CHORUS

**Text Book:**

1. Andrew S.Tanenbaum: Distributed Operating System, Prentice Hall International Inc.

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**ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS  
( ELECTIVE-I )**

**UNIT - I**

Introduction : AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

**UNIT - II**

**Searching** :Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Greedy best first search, A\* search Game Playing: Adversial search, Games, minimax, algorithm, optimal decisions in multiplayer games, Alpha-Beta pruning, Evaluation functions, cutting of search.

**UNIT - III**

Knowledge Representation & Reasons logical Agents, Knowledge – Based Agents, the Wumpus world, logic, propositional logic, Resolution patterns in proposional logic, Resolution, Forward & Backward. Chaining.

**UNIT - IV**

First order logic. Inference in first order logic, propositional Vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution.

**UNIT - V**

**Characteristics of Neural Networks**, Historical Development of Neural Networks Principles, Artificial Neural Networks: Terminology, Models of Neuron, Topology, Basic Learning Laws, Pattern Recognition Problem, Basic Functional Units, Pattern Recognition Tasks by the Functional Units.

**UNIT - VI**

**Feed forward Neural Networks:**

Introduction, Analysis of pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of pattern storage Networks. Analysis of Pattern Mapping Networks.

**UNIT - VII**

**Feedback Neural Networks**

Introduction, Analysis of Linear Auto associative FF Networks, Analysis of Pattern Storage Networks.

## **UNIT - VIII**

### **Competitive Learning Neural Networks & Complex pattern Recognition**

Introduction, Analysis of Pattern Clustering Networks, Analysis of Feature Mapping Networks, Associative Memory.

#### **TEXT BOOKS :**

1. Artificial Intelligence – A Modern Approach. Second Edition, Stuart Russel, Peter Norvig, PHI/ Pearson Education.
2. Artificial Neural Networks B. YagnaNarayana, PHI

#### **REFERENCES :**

1. Artificial Intelligence, 2nd Edition, E.Rich and K.Knight (TMH).
2. Artificial Intelligence and Expert Systems – Patterson PHI.
3. Expert Systems: Principles and Programming- Fourth Edn, Giarrantana/ Riley, Thomson.
4. PROLOG Programming for Artificial Intelligence. Ivan Bratka- Third Edition – Pearson Education.
5. Neural Networks Simon Haykin PHI
6. Artificial Intelligence, 3rd Edition, Patrick Henry Winston., Pearson Edition.

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**GRID AND CLUSTER COMPUTING  
( ELECTIVE-1 )**

**UNIT I:**

**Grid Computing:** Data & Computational Grids, Grid Architectures and its relations to various Distributed Technologies

**UNIT II:**

**Autonomic Computing:** Autonomic Computing, Examples of the Grid Computing Efforts (IBM)

**UNIT III:**

**Cluster Computing 1:** Cluster setup & its Administration, Performance Models & Simulations, Networking, Protocols & I/O, Lightweight Messaging systems, Active Messages

**UNIT IV:**

**Cluster Computing 2:** Distributed shared memory, parallel I/O Clusters, Jib and Resource management system, scheduling parallel jobs on clusters

**UNIT V:**

**Cluster Computing 3:** Load sharing and Fault tolerance manager, parallel programming scheduling techniques, Dynamic load balancing Example Cluster System, Beowlf, COMPaS and NanOS

**UNIT VI:**

**Pervasive Computing:** Pervasive Computing concepts & Scenarios, Hardware & Software, Human - machine interface Device connectivity, Java for Pervasive devices, Application examples

**UNIT VII:**

**Cloud Computing:** History, Working of cloud computers, pros and cons of cloud computing, developing cloud services, cloud computer web based applications

**UNIT VIII:**

**Quantum Computing:** Introduction to Quantum Computing, Qubits, Quantum Mechanics, Quantum gates, Applications of quantum computing.



**TEXT BOOKS:**

1. Grid Computing, J. Joseph & C. Fellenstein, PEA.
2. High performance cluster computing, Raj Kumar Buyya, PEA.
3. Pervasive computing, J.Burkhardt et al, PEA.
4. Quantum computing, Vishal Sahni, TMH.

**REFERENCE BOOKS:**

1. Approaching quantum computing, Marivesar, PEA.
2. Quantum computing and Quantum Information, Nielsen & Chung L, Cambridge University Press.
3. A Networking approach to Grid Computing, Minoli, Wiley.

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**CLOUD COMPUTING  
(ELECTIVE-1)**

**UNIT I**

Introductory concepts and overview: Distributed systems, Parallel computing architectures: Vector processing, Symmetric multi processing and Massively parallel processing systems, High performance Cluster computing, Grid computing, Service Oriented Architecture overview, Virtualization.

**UNIT II**

Overview of Cloud Computing: Meaning of the terms cloud and cloud computing, cloud based service offerings, Grid computing vs Cloud computing, Benefits of cloud model, limitations, legal issues, Key characteristics of cloud computing, Challenges for the cloud, The evolution of cloud computing.

**UNIT III**

Web services delivered from the cloud: Infrastructure as a service, Platform-as-a-service, Software-as-a-service. Building Cloud networks: Evolution from the MSP model to cloud computing and software-as-a-service, The cloud data center, SOA as step toward cloud computing, Basic approach to a data center based SOA.

**UNIT IV**

Federation Presence, Identity and Privacy in the cloud: Federation in the cloud, Presence in the cloud, Privacy and its relation to cloud based information system. Security in the Cloud: Cloud security challenges, Software-as-a-service security.

**UNIT V**

Common Standards in Cloud computing: The open cloud consortium, The distributed management task force, standards for application developers, standards for messaging, standards for security.

**UNIT VI**

End user access to cloud computing: youtube, zimbra, Facebook, Zoho, DimDim Collaboration

Mobile internet devices and the cloud: Smartphone, mobile operating systems for smart phones, Mobile Platform virtualization, Collaboration applications for mobile platforms, Future trends.

## **UNIT VII**

Virtualization: Adding guest Operating system. Cloud computing case studies1: Amazon EC2, Amazon simple DB, Amazon S3, Amazon Cloud Front, Amazon SQS.

## **UNIT VIII**

Cloud computing case studies2: Google App Engine, Google web tool kit, Microsoft Azure Services platform, Windows live, Exchange on line, Sharepoint services, Microsoft dynamic CRM – salesforce.com, CRM – App Exchange

### **TEXT BOOKS:**

1. Cloud Computing implementation, management and security by John W. Rittinghouse, James F. Ransome, CRC Press, Taylor & Francis group, 2010.
2. Cloud Computing: A practical approach by Anthony T. velte, Toby J. velte, Robert Elsenpeter, Tata Mc Graw Hill edition, 2010.

### **REFERENCES:**

1. Cloud Application Architectures by George Reese, Oreilly publishers.
2. Cloud Computing and SOA convergence in your enterprise, by David S. Linthicum, Addison- Wesley.

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**MOBILE COMPUTING  
(ELECTIVE – II)**

**UNIT- I**

Introduction to Mobile Communications and Computing: Mobile Computing (MC): Introduction to MC, novel applications, limitations, and architecture  
GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

**UNIT- II**

(Wireless) Medium Access Control: Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

**UNIT- III**

Mobile Network Layer: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

**UNIT- IV**

Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

**UNIT- V**

Database Issues: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

**UNIT- VI**

Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

**UNIT- VII**

Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

## **UNIT- VIII**

Protocols and Tools: Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

### **Text Books:**

1. Jochen Schiller, "Mobile Communications", Addison-Wesley. (Chapters 4, 7, 9, 10, 11), second edition, 2004.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028. (Chapters 11, 15, 17, 26 and 27)

### **Reference Books:**

1. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, October 2004,
2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden, Schwiebert, Loren, "Fundamentals of Mobile and Pervasive Computing", ISBN: 0071412379, McGraw-Hill Professional, 2005.
3. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", Springer, second edition, 2003.
4. Martyn Mallick, "Mobile and Wireless Design Essentials", Wiley DreamTech, 2003

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**INFORMATION SECURITY  
(ELECTIVE-II)**

**UNIT I**

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

**UNIT II**

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

**UNIT III**

Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

**UNIT IV**

Email privacy: Pretty Good Privacy (PGP) and S/MIME.

**UNIT V**

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management

**UNIT VI**

Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)

**UNIT VII**

Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3, Intruders, Viruses and related threats

**UNIT VIII**

Firewall Design principles, Trusted Systems, Intrusion Detection Systems

### **Text Books**

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn IdoDubrawsky, Steve W.Manzuik and Ryan Permech, wileyDreamtech,

### **Reference Books :**

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Principles of Information Security, Whitman, Thomson.
4. Cryptography and network Security, Third edition, Stallings, PHI/Pearson
5. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
6. Introduction to Cryptography, Buchmann, Springer.

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**NETWORK MANAGEMENT SYSTEMS  
( (ELECTIVE – II)**

**UNIT I**

Data Communications and Network Management Overview: Analogy of Telephone Network Management, Communications Protocols and Standards, Case Histories on Networking and Management, Network Management Functions, Network and System Management.

**UNIT II**

Basic Foundations: Standards, Models, and Language, Network Management Standards, Network Management Models, Organization Model, Information Model, Communication Model, Functional Model, Network Management Applications, Abstract Syntax Notation One: ASN.1, Encoding Structure.

**UNIT III**

SNMPv1 Network Management: History of SNMP Management, Internet Organizations and Standards, SNMP Model, Organization and Information Models, Communication and Functional Models.

**UNIT IV**

SNMP Management: SNMPv2, Major Changes in SNMPv2, SNMPv2 System Architecture, SNMPv2 Structure of Management Information, SNMPv2 Management Information Base, SNMPv2 Protocol.

**UNIT V**

SNMP Management: SNMPv3, SNMPv3 Key Features, SNMPv3 Documentation Architecture, SNMPv3 Applications, SNMPv3 Management Information Base, SNMPv3 User-based Security Model, Access Control.

**UNIT VI**

SNMP Management: RMON, Remote Monitoring, RMON SMI and MIB, RMON1, RMON2, A Case Study on Internet Traffic.

**UNIT VII**

Some Current Network Management Topics: Web-Based Management, XML-Based Network Management.



## **UNIT VIII**

Additional topics in Networks Management, Distributed Network Management, Reliable and Fault Tolerant Network Management.

### **TEXT BOOKS:**

1. Network Management – Principles and Practice, Mani Subramanian, Addison- Wesley Pub Co, First Edition, 2000.
2. SNMP, SNMPv2, SNMPv3, AND RMON 1 and 2, William Stallings, Addison- Wesley, Third Edition, 1999.

### **REFERENCES:**

1. Practical Guide to SNMPv3 and Network Management, David Zeltserman, PHI.
2. Network Security and Management, Second Edition, Brijendra Singh, PHI.
3. Network management, Morris, Pearson Education.
4. Principles of Network System Administration, Mark Burges, Wiley Dreamtech.
5. Distributed Network Management, Paul, John Wiley.