**SHIVAJI UNIVERISTY, KOLHAPUR-416 004. MAHARASHTRA**
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शिवाजी विद्यापीठ, कोल्हापूर - ४१६ ००४.
दुरध्वनी : (ईपीएबीएक्स) २६०९००० (अभ्यास मंडळे विभाग- २६०९०९४) तार : युनिशिवाजी
फॅक्स : ००९१-०२३१-२६९१५३३ व २६९२३३३.e-mail:bos@unishivaji.ac.in

★★★★★B+
Accredited By NAAC

जा.क्र./एसयु/बीओएस/इंजि/786 दिनांक: 30.4.2007

प्रति,
मा. को-ऑडीनेटर,
कॉम्प्युटर सायन्स ॲण्ड टेक्नॉलॉजी विभाग,
शिवाजी विद्यापीठ,
कोल्हापूर.

**विषय :- अभियांत्रिकी व तंत्रज्ञान विद्याशाखेखलील एम.टेक इन कॉम्प्युटर सायन्स ॲण्ड टेक्नॉलॉजी सेमिस्टर 1 व 2 स्ट्क्चर मधील टर्मवर्क गुणातील दुरुस्ती व सेमिस्टर 2 च्या अभ्यासक्रमातील अपु-याबाबी व काही अभ्यासक्रातील दुरुस्ती बाबत...**

महोदय,

उपरोक्त विषयासंदर्भात आपणांस विद्यापीठ अधिकार मंडळाच्या मान्यतेस अनुसरून कळविणेत येते की, अभियांत्रिकी व तंत्रज्ञान विद्याशाखेखलील एम.टेक इन कॉम्प्युटर सायन्स ॲण्ड टेक्नॉलॉजी सेमिस्टर 1 व 2 स्ट्क्चर मधील टर्मवर्क गुणातील दुरुस्ती व सेमिस्टर 2 च्या अभ्यासक्रमातील अपु-याबाबी व काही अभ्यासक्रातील दुरुस्तीस मान्यता दिलेली आहे. सुधारित स्ट्क्चर व अभ्यासक्रम **http://www.unishivaji.ac.in** या संकेत स्थळावर उपलब्ध आहे.

उपरोक्त बाब संबधित शिक्षक व विद्यार्थ्याच्या निदर्शनास आणावी.
कळावे,

आपला विश्वासू,

उपकुलसचिव
अभ्यास मंडळे विभाग

प्रति,
1. डॉ.सी.आर.राव
   अधिष्ठाता, अभियांत्रिकी व तंत्रज्ञान विद्याशाखा,
2. डॉ.जे.एस.सामंत
   अध्यक्ष, टेक्नॉलॉजी अस्थायी मंडळ यांना माहितीसाठी

प्रत:
1. परिक्षक नियुक्ती विभाग
2. इतर परीक्षा विभाग 4
3. संलग्नता विभाग
4. एम.टेक प्रशासकीय कक्ष यांना माहितीसाठी व पुढील योग्य त्या कार्यवाहीसाठी

# M.Tech. (Computer Science and Technology)
# Course Structure and Scheme of Evaluation

## Semester I

| Sr. No. | Subject | Teaching (hours/week) | | | Evaluation (Marks) | | |
|---|---|---|---|---|---|---|---|
| | | Lecture | Tutorial | Practical | Theory | Term Work | Total |
| CST 11 | Theory of Computer Science | 3 | 1 | - | 100 | 25 | 125 |
| CST 12 | Advanced Operating System | 3 | 1 | - | 100 | 25 | 125 |
| CST 13 | Design and Analysis of Algorithms | 3 | 1 | - | 100 | 25 | 125 |
| CST 14 | Elective – I | 3 | 1 | - | 100 | 25 | 125 |
| CST 15 | Elective – II | 3 | 1 | - | 100 | 25 | 125 |
| CST 16 | Comprehensive Lab – I | - | - | 6 | - | 50 | 50 |
| CST 17 | Seminar – I | - | - | 2 | - | 25 | 25 |
| | **Total** | **15** | **05** | **08** | **500** | **200** | **700** |

## Semester II

| Sr. No. | Subject | Teaching (hours/week) | | | Evaluation (Marks) | | |
|---|---|---|---|---|---|---|---|
| | | Lecture | Tutorial | Practical | Theory | Term Work | Total |
| CST 21 | Computer Network Administration | 3 | 1 | - | 100 | 25 | 125 |
| CST 22 | Advanced Computer Architecture | 3 | 1 | - | 100 | 25 | 125 |
| CST 23 | Advanced Database Design | 3 | 1 | - | 100 | 25 | 125 |
| CST 24 | Elective – III | 3 | 1 | - | 100 | 25 | 125 |
| CST 25 | Elective – IV | 3 | 1 | - | 100 | 25 | 125 |
| CST 26 | Comprehensive Lab – II | - | - | 6 | - | 50 | 50 |
| CST 27 | Seminar – II | - | - | 2 | - | 25 | 25 |
| | **Total** | **15** | **05** | **08** | **500** | **200** | **700** |

## Semester III

| Sr. No. | Subject | Teaching (hours/week) | | | Evaluation (Marks) | | |
|---|---|---|---|---|---|---|---|
| | | Lecture | Tutorial | Practical | Term Work | Oral | Total |
| CST 31 | Software Development | - | - | - | 50 | 50 | 100 |
| CST 32 | Dissertation Phase – I | - | - | 8 | 100 | 100 | 200 |
| | **Total** | **-** | **-** | **08** | **150** | **150** | **300** |

## Semester IV

| Sr. No. | Subject | Teaching (hours/week) | | | Evaluation (Marks) | | |
|---|---|---|---|---|---|---|---|
| | | Lecture | Tutorial | Practical | Term Work | Oral | Total |
| CST 41 | Dissertation Phase – II | - | - | 12 | 100 | 200 | 300 |
| | **Total** | **-** | **-** | **12** | **100** | **200** | **300** |

**Elective I and II (Any two from the list)**

1. Computer Vision and image processing
2. Artificial Neural Network
3. Real Time Operating System
4. Data Mining
5. Human Computer Interaction
6. Computer Modelling and Simulation

**Elective III and IV (Any two from the list)**

1. Digital Security
2. Quantum Computing
3. Grid Computing
4. Bio Informatics
5. Network protocols
6. Mobile Computing

**Syllabus**

**M. Tech. Semester I - (Computer Science and Technology)**

Paper-I- **Theory of Computer Science**

Lectures: 3 Hrs/Week, Tutorials: 1 Hrs/Week, Theory: 100 Marks, Term Work: 25 Marks

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Section – I

1. Introduction: Mathematical notions and terminology of sets, sequences and tuples, functions and relations, graphs, strings and languages. Boolean logic properties and representation. Definition. Theorems and types of proofs formal proofs, deductive, reduction to definition, proof by construction, contradiction, induction, counter-examples.

2. Regular languages: Finite automata, DFA, NFA. Equivalence of DFA and NFA. An application, Regular expressions and languages, applications.

3. Context-free languages: CFGs, Applications, Ambiguity removal, Pushdown automata and Equivalence with CFGs.

4. Turing machine: Turing machines, variants of TMs, programming techniques for TMs, TMs and computers.

Section – II

5. Decidability: Decidable languages, decidable problems concerning Context-free languages. The halting problem – Diagonalization method, halting problem is undecidable.

6. Reducibility: Undecidable problems from language theory. Regular expressions, Turing machines, Reduction, A simple undecidable problem (PCP), mapping reducibility and other undecidable problems.

7. Computability: Primitive recursive functions, more examples, the recursion theorem.

8. Computational complexity: Tractable and Interact able problems, Growth rates of functions, Time complexity of TM of TM, Tractable decision problems, Theory of Optimization.

Books:

1) Introduction to Theory of Computation
Michael Spicer (Thomson Brools Cole )
2) Introduction to Automata Theory, Languages and Computation
- J. E. Hoperoft, Rajeev Motawani and J.D. Ullman( Pearson Education Asia) 2nd Edition.

References:

1) Discrete Mathematical structures with applications to computer science
- J. P. Thembloy and R. Manohar.
**2)** Theory of Computer Science – E. V. Krishnamoorthy

**Syllabus**

**M. Tech. Semester I - (Computer Science and Technology)**

Paper-II- **Advanced Operating System**

Lectures: 3 Hrs/Week, Tutorials: 1 Hrs/Week, Theory: 100 Marks, Term Work: 25 Marks

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1. Distributed computing systems fundamentals: Introduction to Distributed computing systems, Models, Popularity. Distributed computing system. Design issues of Distributed operating system. Distributed computing environment.

2. Message Passing: Features of a good Message Passing System. Issues in IPC by Message Passing Synchronization, Bullring, Multidatagram Messages, Encoding and Decoding of Message Data, Process Addressing, Failure handling, Group Communication.

3. Remote Procedure Calls: RPC Model, Implementing RPC Mechanism. Stub Generation. RPC Messages, Marshaling Arguments and Results. Server Management, Parameter-Passing semantics, call semantics, Communication protocols for RPCs, Client-Server Building, Exception handling, Security RPC in Heterogeneous Environments, Lightweight RPC.

4. Distributed Shared Memory: General Architecture of DSM systems. Design and implementation Issues of DSM, Granularity, Structure of Shared Memory Space. Consistency models, Replacement strategy, Thrashing.
   Synchronization: Clock Synchronization. Event Ordering, Mutual Exclusion, Deadlock, Election Algorithms.

5. Resource Management: Features of global scheduling algorithm. Task assignment approach, Load-Balancing and Load approach.

6. Process Management: Introduction, Process Migration, Treads.
7. Distributed File Systems: Features of good DFS, File models, File Accessing models. File-Sharing Semantics, File-Caching schemes, File Replication, Fault Tolerance, Automatic Transactions, Design Principles, Case study: DCE Distributed File Service.

8. Security: Potential Attacks to Computer systems, Cryptography, Authentication, Access Control, Design Principles, Case study : DCE Security service.

9. Case Study: Case study of Chorus.

Text book:

1. Distributed Operating Systems concepts and design- .K. Sinha (PHI).
2. Modern Operating System-Singhal

Reference Books:

1. Distributed Systems concepts and design-G.Coulouris, J.Dollimore & T. Kindberg
2. Modern Operating System-A.S. Tanenbaum(PHI).

**Syllabus**
**M. Tech. Semester I - (Computer Science and Technology)**
Paper-III- **Design and Analysis of Algorithms**
Lectures: 3 Hrs/Week, Tutorials: 1 Hrs/Week, Theory: 100 Marks, Term Work: 25 Marks

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**Section-I**

1. Introduction: Algorithm definition and specification, Performance analysis randomized algorithms, Divide and Conquer method, Binary search, Merge sort Quick sort and convex hull.

2. Greedy method and Dynamic Programming : General methods ,Job sequencing with deadlines ,Minimum cost spanning trees, Optimal merge patterns, All pairs shortest paths, Optimal binary search trees, Reliability design, Traveling salesman problem and flow shop scheduling.

3. Lower bound Theory: Comparison trees, Oracles and adversary arguments, lower bounds through reductions.

**Section-II**

4. NP-Hard and NP- complete problems: Basic concepts, cook's theorem. NP –hard graph problems, NP-hard scheduling problems. NP-Hard code generation's problems.

5. PARAM Algorithms: Introduction, computational model, Fundamental techniques and algorithms, Merging, lower bounds.

6. Mesh Algorithms: computational model packet routing fundamental algorithms, merging, computing the convex hull.

7. Hypercube Algorithms: Computational model, PPR routing fundamental algorithms, merging, computing the convex hull.

Books:

a. Fundamentals of computer algorithms –Ellis horowitz, sartaj sahani and Sanguthewar Rajasekaran

b. Design and analysis of algorithms- Aho Hoperraft &Ullman

c. Introduction to algorithms- Thomas H. cormen, charles S.Leiserson

d. Randomized algorithms-Rajeev Motwan and Prabhakar Raghwan

**Syllabus**
**M. Tech. Semester I - (Computer Science and Technology)**
Elective – I and II
Paper-IV- **DATA MINING**
Lectures: 3 Hrs/Week, Tutorials: 1 Hrs/Week, Theory: 100 Marks, Term Work: 25 Marks

1. Data Warehousing and Introduction to data mining basic elements of data warehousing, Data warehousing and OLAP

2. Data model development for Data, Warehousing: business model, selection of the data of interest, creation and maintaining keys, modeling transaction, data warehousing optimization.

3. Data warehousing methodologies, type and comparisons.

4. Data Mining techniques, data mining algorithms, classification, Decision- Tree based Classifiers clustering, association Association-Rule Mining Information Extraction using Neural Networks.

5. Knowledge discovery, KDD environment,.

6. Visualization: data generalization and summarization-based characterization, Analytical characterization: analysis of attribute relevance, mining class Comparison, Discriminating between classes, mining descriptive statistical measures in large database.

7. Data mining primitives, languages & system architectures: data mining primitives, Query language, designing GUI based on a data mining query language, architectures of data mining systems.

8. Advanced topics: spatial mining, temporal mining.

9. Web mining: web content mining, web structure mining, web usage mining

10. Application and trends in data mining : Applications, systems products and research prototypes, multimedia data mining, indexing of multimedia material, compression, space modeling.

Text books:

1. Paulraj ponniah, "Web warehousing fundamentals" – John Wiley.

2. M. H. Dunham, "Data mining introductory and advanced topics" – Pearson education

3. Han, Kamber, "Data mining concepts and techniques", Morgan Kaufmann

4. Imhoff, Galemmo, Geiger, "Mastering data warehouse design", Wiley dreamtech

**Syllabus**
**M. Tech. Semester I - (Computer Science and Technology)**
Elective –I and II
Paper-V- **Artificial Neural Networks**
Lectures: 3 Hrs/Week, Tutorials: 1 Hrs/Week, Theory: 100 Marks, Term Work: 25 Marks

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1. Introduction: Inspiration from Neuroscience, History, Issues.

2. Hopfield model: Associative memory problem, model, stochastic networks capacity of stochastic n/w.

3. Optimization problems: Weighed matching problem, Traveling salesman problem, Graph bipartioning, optimization problems in image processing.

4. Simple perceptions: feed forward n/w, Threshold units, linear units, nonlinear units stochastic units, capacity of simple perception.

5. Multi-layer n/w:Back propagation, examples and applications performance of multilayer feed forward n/w Kohoanen self organizing n/w cognition & neocognutron.

6. Recurrent n/w: Boltzmann n/w, Recurrent Back propagation, Learning time sequence, Reinforcement learning.

7. Learning: Supervised, Unsupervised (Hebbian competitive), adaptive resonance theory, Traveling salesman problem.

8. Application of artificial Neural Network.

**Reference Books**

1. Introduction to the theory of neural Computation-Hertz Keogh, Palmer

2. Artificial Neural Networks- B. Yegnanarayana (PHI)

3. Genetic Algorithms-David E. Goldberg (Addison Wesley)

**Syllabus**
**M. Tech. Semester I - (Computer Science and Technology)**
Elective –I and II
Paper - **Real Time Operating Systems**
Lectures: 3 Hrs/Week, Tutorials: 1 Hrs/Week, Theory: 100 Marks, Term Work: 25 Marks

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Unit 1
Basic Real Time Concepts: Terminology, Real time design issues, Example Real-time systems, Brief history, Language issues: Language features, commonly used programming languages, Software life cycle: Phases of the software life cycle, non temporal transition in the software life cycle, spiral model.

Unit2
Real time specification and design techniques: Natural languages , Mathematical specification , flow chart, structure chart, pseudo code, programming designing languages, finite state automata , data flow diagrams, Petri nets, warnier-orr notations, state charts, Sanity in using graphical techniques

Unit 3
Real time kernels: Polled loop system, phase state driven code, co routine interrupt driven systems, foreground/background systems, full feature real time operating system

Unit 4
Inter-Task Communicating and Synchronization: Buffering Data, Mailboxes, Critical Regions, Semaphores, Event flags and signals, Deadlock.

Unit 5
Real time Memory Management: Process Stack Management, Dynamic Allocation, Static Schemes.

Unit 6
System performance Analysis and optimization: Response Time calculation, Interrupt Latency, Time- Loading and its Measurement, Scheduling is NP-Complete, Reducing Response Times and Time-loading, Analysis of memory Requirements, Reducing Memory loading I/O performance.

Unit 7
Queuing Models: Probability functions, discrete, Basic Buffer size calculation, Classical Queuing theory, Little's law, Erlang's Formula.

Unit 8
Reliability, Testing and Fault tolerance: Faults, Failures, Bugs and effects, Reliability, testing fault tolerance.

Unit 9
Multiprocessing System: Classification of architecture, Distributed systems Non-Von Neumann Architectures.

Unit 10
Hardware, Software Integration: Goals of real time system integration tools, Methodology, The software Heisenberg Uncertainty Principle.

Unit 11
Real time Applications: Real time systems as complex system, first Real time application, Real time databases Real time Image processing , Real time Unix Building Real time Applications with real time programming languages.

**Books:**

1. Real Time Systems Design and Analysis : An Engineer's Handbook
Phillp A. Laplante, 2nd Edition, PHI

**Reference Books:**

1. Real Time system Design – Levi Shem Tov and Ashok K. Agrawala
(New York McGraw Hill)
2. Proceedings of IEEE Special Issue on Real Time Systems (Jan 1994)

3. Real Time Systems and their Programming Language Burns, Alan and Andy Welling
(New York, Addison Wesley)

4. The design of Real time Applications: M. Blackman (New York John Wiley & Sons).

5. Real time systems: C.M. Krishna, K.G. Shin (TMGh)

**Syllabus**

**M. Tech. Semester I - (Computer Science and Technology)**

Elective – I and II

Paper - **COMPUTER VISION AND IMAGE PROCESSING**

Lectures: 3 Hrs/Week, Tutorials: 1 Hrs/Week, Theory: 100 Marks, Term Work: 25 Marks

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UNIT – I

Digital Image Fundamentals: - Digital image Representation – Functional Units of an Image processing system. Visual perception – Image Model _ Image sampling and Quantization – grayscale resolution – pixel relationship – image geometry. Image Transforms – Unitary Transform, Discrete Fourier Transform, Cosine Transform, Sine Transform, Hadamard Transform, Slant and KL Transform.

UNIT – II

Image Enhancement – Histogram processing – Spatial operations – Image smoothing –Image Sharpening – Color Image Processing methods- Color Image Models

UNIT –III

Image restoration and compression Degradation Model – Discrete Formulation – Circulant matrices – Constrained and Unconstrained restoration geometric transformations fundamentals – Compression Models – Error Free Compression – Lossy Compression – International Image Compression Standards.

UNIT – IV

Image Analysis and Computer Vision: Spatial feature Extraction – Transform feature –Edge detection-Boundary Representation-Region Representation-Moment Representation-Structure-Shape Features-Texture-Scene Matching and Detection-Image Segmentation-Classification techniques-Morphology-Interpolation.

UNIT –V

Sensing 3D shape: how the 3rd dimension changes the problem. Stereo 3D description, 3Dmodel, matching, TINA. Direct 3D sensing-structured light, range finders, range image segmentation.

Emerging IT applications: Recognition of characters, Fingerprints and faces-Image databases.

Reference Books

1. Fundamentals of Digital Image Processing-A.K.Jain

2. Image Processing and machine vision-Milan Sonka,Vaclav Hlavae

3. Pattern Recognition Principles-J.T. Tou and R.C.Gonzalez

4. Syntactic Pattern Recognition and applications.-King Sun Fun

5. Computer vision-Fairhurst (PHI).

**Syllabus**
**M. Tech. Semester II - (Computer Science and Technology)**
Paper-I- **Computer Network Administration**
Lectures: 3 Hrs/Week, Tutorials: 1 Hrs/Week, Theory: 100 Marks, Term Work: 25 Marks

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1. Data Communication and network management overview:
   Analogy of telephone network management, Data and telecommunication network, distributed computing environment, TCP/IP based networks – Internet and intranet, communication protocols and standards, challenges of information technology manager Network management – goals, organization and functions, network and system management, network management system platform, current status and future of network management.

2. Basic foundation: Standards, models and languages:
   Network management standards, network management model, organization model, information model, communication model, ASN.1, Encoding structure, macros, and functional model.

3. SNMP 1 network management: Organization and information models:
   Managed network, International organization and standard SNMP model, organization model, system overview, information models

4. SNMP v1 network management:
   Communication and functional models, SNMP model, functional model, Major changes in SNMP v2 and v3

5. SNMP Management:
   RMON – Remote monitoring, RMON, SMI & MIB, RMON1, RMOPN2, ATM Remote monitoring, case study of internet traffic using RMON.

6. Network management tools and systems:
   network management tools, network statistics measurement systems, network management systems, commercial network management systems, System management, Enterprise management solutions.

Books:

1. Network Management principles and practice – Mani Subramanian (Pearson Edition)
2. SNMP – SNMPv2 , SNMPv3 & RMON 1 – William Stalling (Pearson Edition)
3. Network Administration – Steve Wisniewski.

**Syllabus**

**M. Tech. Semester - II (Computer Science and Technology)**

Paper II- **Advanced Computer Architecture**

Lectures: 3 Hrs/Week, Tutorials: 1 Hrs/Week, Theory: 100 Marks, Term Work: 25 Marks

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1. **Computation Models:- Concept**
   Relationships between concepts of CM, Programming language and architecture. Basic computation models von- Newman computation model key concepts relating to CM.
2. **Concepts of Computer Architecture**
   - Evolution and concept
   - Abstraction
   - Multi level hierarchical framework and extensions
3. **Parallel Processing**
   - Basic concepts
   - Types and level of parallelism
   - Classification
   - Basic parallel techniques
   - Relationship between languages and parallel architecture.
4. **- Instruction level parallel processors**
   - Evolution and overview of ILP processors
   - Dependencies between instructions
   - Instruction scheduling
   - Preserving sequential consistency
   - Speed up potential of ILP processing
5. **Pipelined processors**
   - Concepts
   - Design space of pipelines
   - Pipelined instruction processing
   - Pipelined execution of integers and Boolean instructions
   - Pipelined processing of load and stores
6. **VLIW architectures**
   - Basic principals
   - VLIW architectures
   - Case study- Trace 200 family
7. **Superscalar processor**
   - Introduction
   - Parallel decoding
   - Superscalar instruction issue
   - Shelving
   - Register naming
   - Parallel execution
   - Preserving the sequential consistency of instruction execution and exception processing.
   - Implementation of super scalar CISC processor using a superscalar RISC care
   - Case studies: - R10000, power PC 620 and Pentium Pro

**Books**

1. Advanced Computer Architecture a design space approach.
- Sima, Fauntain, Kscucle, Pearson Edition
2. Parallel Computer Architecture – David Culler and J. Palsingh, Morgan Kauf mann Pub.
3. Introduction to parallel Algorithms - Joseph J.A. , Addison Wesley
4. Parallel programming - Barry Wilkinson, C.Michael Allen

**Syllabus**
**M. Tech. Semester - II (Computer Science and Technology)**
Paper-III-**Advanced Database Design**
Lectures: 3 Hrs/Week, Tutorials: 1 Hrs/Week, Theory: 100 Marks, Term Work: 25 Marks

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1. Distributed database management system:
   Features of DDS, Distribution transparency, DDB design, Query translation, Optimization

2. Distributed Transaction:
   Management of distributed transaction, concurrency control, reliability, agents, homogeneous DDS, DDS administration.

3. Object database management system
   Fundamentals of ODS, Design issues, Object management, Encapsulation inheritance, ORDBMS, Implementation challenges, object query processing, Transaction management, Query optimization. O-O Query languages and interfaces.

4. Multimedia database system
   multimedia database management system, image and text database techniques, Audio and Video Database Techniques Physical Storage and Retrieval. Data structure, Operation, indexing, segmentation.

5. Advanced Topics:
   Mobile databases, xml, data web interfaces.

**Books**

1. Database management system
   - Ramakrishna Gherkin (McGraw Hill)
2. Principals of distributed Database system (2nd edition)
   - M. Tamer Ozsu. Patrick valduriez (Pearson)
3. Distributed Database Principals and systems
   - Stephan ceri, Giuseppe Pelagatti. (McGraw Hill)
4. Object Oriented Interface and Databases
   - Rajesh Narang, Prentic Hall of India.
5. Database system concepts
   - Silberschatz, Korti, Sudershan, McGraw Hill International

**Syllabus**

**M. Tech. Semester – II (Computer Science and Technology)**

Elective –III and IV

Paper-IV - **Digital Security**

Lectures: 3 Hrs/Week, Tutorials: 1 Hrs/Week, Theory: 100 Marks, Term Work: 25 Marks

1. Introduction to cryptography :-
   Concepts, approaches and principles of digital information security, types of attacks, security model, cryptographic techniques – substitution and transposition techniques, steganography techniques.

2. Symmetric Key cryptography :-
   Algorithm types and modes block cipher design principals and criteria, DES, IDEA, AES, RCS, Blowfish, Differential and liner cryptography.

3. Asymmetric key cryptography.
   Principal of public key crypto systems RSA algorithm, key management, Diffi-Hellman key exchange elliptic curve arithmetic, elliptic curve cryptography, Zero knowledge proof systems.

4. Message Authentication and Hash functions:
   Authentication function message authentication codes, Hash functions and their security, MD5 secure hash algorithms, HMAC.

5. Digital signature, authentication protocols and applications digital signature, authentication protocols, Digital signature standards, Kerberos, X.509 authentication service, PGP and S/MIME.

6. IP Security :-
   Architecture, IP and IPV6, Authentication header, Encapsulating security payload, combines security associations, key management.

7. Web Security:-
   Web Security consideration, secure socket layer, transport layer security, and secure electronic transaction, secured VPN.

8. Security Systems – Case Studies – Lotus Notes, Novel Netware, MS Windows, clipper.

9. Legal, Privacy and Ethical issues in digital security
   Program and data Protection by patents, copyrights and trademarks, information and the law, computer crime, privacy, ethical issues in digital security and codes of professional ethics.

**Books**

1. Cryptography and network security- principal and practice
   – William Stallings (3rd Edition, Person Prentice Hall) .
2. Network Security private communication in a practice
   – char tic Kaufman, Radio Perl man, Mike spicier (2nd Edition Pearson Print ice Hall)
3. Cryptography and network security – Atul Kahate (TMGH)

**Syllabus**

**M. Tech. Semester – II (Computer Science and Technology)**

Elective –III & IV

Paper –V - **Mobile Computing**

Lectures: 3 Hrs/Week, Tutorials: 1 Hrs/Week, Theory: 100 Marks, Term Work: 25 Marks

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**Unit- 1**

Introduction to wireless communication, Wireless data technologies, Frequencies for radio signals, antennas and signal propagation, need and types of multiplexing techniques, modulation types, use of spread spectrum, cellular systems.

**Unit- 2**

Medium Access Control: Need for MAC algorithm, medium access methods and comparison of these methods

**Unit- 3**

Digital mobile Phone Systems –GSM :, mobile services, system architecture, radio interference, protocols, localization = and calling , hand over, security, new data services, other digital cellular networks, comparison with GSM.

**Unit- 4**

Wireless LAN: Introduction, advantages and design goals for wireless LAN, Infrastructure, ad-hoc networks, IEEE 802.11: system and protocol architecture, physical layer, HIPERLAN protocol architecture and physical layer and MAC, Blue tooth physical and MAC layer. Wireless ad-hoc networks.

**Unit- 5**

Protocols for mobile computing: mobile network layer, mobile IP, Snooping TCP, Mobile TCP, Fast and selective retransmission and recovery, Transaction oriented TCP.

**Unit- 6**

Wireless Application Protocol. WAP architecture wireless datagram protocol, transport layer security, WML, script.

**Unit- 7**

Palm OS: - Architecture, features of kernel, memory, system managers, Symbian OS: Architecture, hardware interface, memory, management, Window CE : features and architecture,

**Books**

1. Mobile Communications – Jachen Schiller (Addison- Wesley)
2. Mobile Computing – Asoke K Talukder, Roopa R Yavgal, (TMH Publishing)