### FIRST SEMESTER

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Code</th>
<th>Subject</th>
<th>No. of Hr. / week</th>
<th>Duration of Exams</th>
<th>Sessional Marks</th>
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<tr>
<td>1.</td>
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### FOURTH SEMESTER

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### ELECTIVE LIST

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<tr>
<td>2K8IT 25.1</td>
<td>Web Engineering</td>
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<tr>
<td>2K8CI 25.1</td>
<td>Wireless Sensor Networks</td>
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<tr>
<td>2K8IT 25.2</td>
<td>Machine Learning</td>
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<td>2K8CI 25.2</td>
<td>Multimedia Computing</td>
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<td>2K8IT 25.3</td>
<td>Compiler Design</td>
</tr>
<tr>
<td>2K8CI 25.3</td>
<td>Bioinformatics</td>
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</table>

Any student of BE (CSE) or BE (ISE) or Equivalent [50%] and the remaining 50% of seats to other BE or Equivalent degree.
I Semester ME (CSE)

**2K8CI11 : Computational Combinatorics**

Number Theory – Divisibility and Euclidean Algorithms, Primes, Basic Properties of Congruences, Linear Congruences, Chinese Remainder Theorem, Fermat’s Little Theorem, Wilson’s Theorem, Greatest Integer Function, Phi Function, Euler’s Theorem, Moebius Inversion Formula, Lth Multiplication of Arithmetic Functions, Quadratic Residues, Quadratic Reciprocity, Jacobi Symbol.


References:
3. Chartrand Zhang, Introduction to Graph Theory, TMH.

**2K8IT12 : Data Structures and Algorithms**


Sorting Algorithms and Applications: Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort and Heap Sort.

Reference:

2K8CI13: Advanced Computer Architecture


Pipelining and Superscalar Techniques – Linear Pipeline Processors, Non Linear Pipeline Processors, Instruction Pipeline Design.


References:
1. Kai Hwang, Advanced Computer Architecture – Parallelism, Scalability, Programmability, McGraw Hill. (Selected Topics from Chapters 1, 2, 4, 5, 6, 7)
2. David E Culler, JP Singh, Anoop Gupta, Parallel Computer Architecture, Morgan Kaufmann. (Selected Topics from Chapter 7)

2K8CI14: Computer Networks


Packet Switching – Switching and Forwarding, Bridges and LAN Switches, Cell Switching(ATM), Implementation and Performance. Internetworking – Simple
Internetworking (IP), Routing, Global Internet, Multicast, Multiprotocol Label Switching (MPLS).

End to End Protocols – Simple Demultiplexer (UDP), Reliable Byte Stream (TCP).

Applications – DNS, Email, WWW, Real Time Transport Protocol, Session Control and Call Control, Overlay Networks. Network Management – Network Monitoring and Control, SNMP.

References:


2K8IT15 : Operating Systems

Introduction, Using the Operating System, OS Organization, Device Management, Implementing Processes, Threads and Resources, Scheduling, Basic Synchronization Principles, High Level Synchronization and Interprocess Communications, Deadlock.


References:


2K8ITL16 : Data Structures Lab

1. Single, Double, Circular Linked Lists
2. Queues
3. Stacks
4. Binary Trees, B Tree, B+ Tree
5. Sorting and Searching
6. Hashing
2K8C121 : Transaction Processing


A simple solution to Distributed Mutual Exclusion, Non token based Algorithms, Lamport’s algorithm, The Ricart Agrawala Algorithm, Maekawa’s Algorithm, Token based Algorithms, Suzuki Kasami’s Broadcast Algorithm, Raymond’s Tree based Algorithm.


Classification of Agreement Problems, Solutions to the Byzantine Agreement Problem, Applications of agreement algorithms. Distributed Scheduling - Issues in Load Distribution, components of a load distributing algorithm, stability, load distributing algorithms, performance comparison, selecting a suitable load sharing algorithm, requirements for load sharing policies.

Fault Tolerance - Atomic actions and committing, commit protocols, non blocking commit protocols, voting protocols, dynamic voting protocols, The majority based reassignment protocols.

Resource Security and Protection - Access and flow control : The access matrix model, implementations of access matrix, safety in the access matrix model, requirement of a database operating system, database systems, a concurrency control model of a database systems.

The problem of concurrency control, serializability theory. Concurrency Control Algorithms - Introduction, Basic Synchronization Primitives, Lock Based algorithms, timestamp based algorithms, optimistic algorithms, concurrency control algorithms, data replication.

References :

2K8IT22 : Database Systems

Overview of Relational Model, ER and EER Mapping, DBMS Internals.

Normalization: Functional Dependencies, Normal Forms, Lossless Decomposition and Dependency Preservation, Algorithms for conversion of 3NF to BCNF, Multi Valued Dependencies, Axioms for FDs and MVDs, Dependency Basis, Fourth Normal Form, Generalized Dependencies, PJ/NF and DKNF.


Distributed Databases: Architecture of a Distributed DBMS, Design Methodology for Distributed Databases, Query Processing in Distributed Databases.

References:
2. C Ceri and S Pelgatti, Distributed Databases, McGraw Hill.

2K8C123 : Embedded Systems

Introduction to Embedded Systems – An Embedded System, Processor in the System, Other Hardware Units, Software Embedded into a System, exemplary Embedded Systems, Embedded System on Chip (CoC) and in VLSI Circuit.


Programming Models for Event Controlled or Response Time constrained Real Time Programs, Modeling of Multiprocessor Systems. IPC and Synchronization - Multiple Process in an Application, Problem of Sharing Data by Multiple Tasks and Routines, IPC.
References:


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**2K8C124 : Object Technology**


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**2K8C131 : Software Development**


References:


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**2K8ITL34 : Project II**

Mini project relevant to Web Technologies, e-Commerce and Networking. Examination will be by demonstration and Viva Voce.

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**2K8IT 33 and 2K8IT 41**

Each student should separately carry out the Dissertation work for two semesters (III and IV). The Preliminary work relevant to the dissertation like Literature survey, design and development should be done in III Semester. The completed project should be submitted in the IV semester.
Elective I : 2K8IT25.1 : Web Engineering

Introduction: The need for Web Engg (WE), Web Applications vs. conventional software, web development vs. software development, categories and characteristics of web applications.


Web application architecture, components of generic web application architecture, layered architecture, data aspect architecture, web design: presentation design, interaction design, functional design. Model based web application development: OOHDM method, W2000 method.

Testing Web Applications - Fundamentals of testing in WE, Test approaches: conventional, agile etc. Testing schemes: three test dimensions, examples. Test methods and techniques: link testing, browser testing, usability testing, load, stress and continuous testing. Test driven development, automated testing.


References:

2K8CI25.2 : Machine Learning

Introduction, Concept Learning and the General to Specific Ordering, Decision Tree Learning, Introduction to Artificial Neural Networks, Evaluating Hypothesis, Bayesian Learning.

Computational Learning Theory, Instance Based Learning, Genetic Algorithms, Learning Set of Rules, Analytical Learning, Combining Inductive and Analytical Learning, Reinforcement Learning.

References:
2. Alpaydin, Introduction to Machine Learning, PHI.
**2K8IT25.3 : Compiler Design**


The role of the parser, Context-free grammer, Writing a grammer, Top-down parsing, Bottom-up parsing, Operator-precedence parsing, LR parsers, Parser generators.

Syntax-directed definitions, Construction of syntax trees, Bottom-up evaluation of s-attributed definitions, L-attributed definitions, top-down translations, Bottom-up evaluation of inherited attributes.

Storage organization, Storage-allocation strategies, Access to nonlocal names, Parameter passing, Symbol tables, Language facilities for dynamic storage allocation, Dynamic storage allocation techniques

Declarations, Assignment statements, Bolean expressions, Case statements. Issues in the design of a code generator, The target machine, Run-time storage management.

Basic blocks and flow graphs, Next-use information, A simple code generator, Register allocation and assignment, The dag representation of basic blocks. The principle source of optimization, Optimization of basic blocks, Loops in flow graphs.

References :
2. Herk Alblas, Albert Nymeyer, Practice and principles of Compiler Building with C, PHI

**2K8CI32.1 : Wireless Sensor Networks**

Introduction – Applications, Collaborative Processing.


driven sensor querying, Cluster leader based protocol, Sensor tasking in tracking relations, Joint Routing and Information Aggregation, Moving center of aggregation, Multi-step information-directed routing, Sensor group management.

Case study: sensing global phenomena. Sensor Network Databases, Sensor Database Challenges, Querying Probabilistic queries, Query propagation and aggregation, TinyDB query processing, Query processing scheduling and optimization, Data-Centric Storage, Data Indices and Range Queries, orthogonal range searching, Non-orthogonal range searching, Distributed Hierarchical Aggregation, Multi-resolution, Partitioning, Fractional cascading, Locality preserving hashing, Temporal Data, Data aging, Indexing motion data.


References:

2K8CI32.2 : Multimedia Computing

Introduction, Media and Data Streams, Audio Technology, Graphics and Images, Video Technology and Computer Based Animation, Data Compression, Optical Storage Media, Content Analysis, Data and File Format Standards, Multimedia Application Design.

References:
2. Prabhat K Andleigh, Kiran Thakrar, Multimedia Systems Design, PHI.

2K8CI32.3 : Bioinformatics

Introduction : Bioinformatics – Overview and Definitions, Applications, Major Databases in Bioinformatics, Data Management and Analysis, Molecular Biology and Bioinformatics, Central Dogma of Molecular Biology. Information Search and Data Retrieval - Introduction, Tools for Web Search, Data Retrieval Tools, Data Mining of Biological Databases.

Genome Analysis and Gene Mapping : Genome Analysis, Genome Mapping, The Sequence Assembly Problem, Genetic Mapping and Linkage Analysis, Physical Maps, Cloning the Entire Genome, Genome Sequencing. Alignment of Pairs of Sequences :

Gene Expression Microarrays: DNA Microarrays, Clustering Gene Expression Profiles, Data Sources and Tools for Microarray Analysis, Applications of Microarray Technology.

Protein Classification and Structure Visualization: Overview of Protein Structure, Visualization, Structure based Protein Classification, Protein Structure Databases, Tools, Protein Structure Alignment.


References:
1. S C Rastogi, N Mndiratta, P Rastogi, Bioinformatics Methods and Applications, Genomics, Proteomics and Drug Discovery, PHI.