Course Name: **MTech (CS) 2nd Semester**

Subject Code: **CS-6418**

Subject Name: **Advanced Database Management Systems**

Aim of the Subject

The aim of the course is to make students able to handle large database system (corporate database) and to be able to manipulate it efficiently.

Learning Outcomes

The students are expected to learn following after completion of the course:

- To build strong foundation of query languages through relational algebra, calculus & QBE
- Design conceptual, logical database model and physical model.
- Learn database design techniques through normalization
- Acquire necessary skills for NoSQL based database application development
- Exposure to graph, spatial and temporal databases

Unit 1

Introduction: Advantages of DBMS approach, Various views of data, data independence, schema & sub-schema, primary concept of data models, database languages, transaction management, database administrator &user, data dictionary, database architectures.

ER model: Basic concept, design issues, mapping constraint, keys, ER diagram, weak & strong entity-sets, specialization & generalization, aggregation, inheritance, design of ER schema, Reduction of ER Schema to tables. Domains, relation, kind of relation, Relational databases, Various types of keys: candidate, primary, alternate & foreign keys.

Unit 2

Relational Algebra and SQL: The structure, relational algebra with extended operations, modification of database, Idea of relational calculus, basic structure of SQL, Set operation, Aggregate functions, Null values, Nested Sub queries, derived relations, views, Modification of database, join relation, Domain, relation & keys, DDL in SQL.

Overview of Graph & Spatial Databases

Unit 3

Functional dependencies & Normalization: basic definitions, Trivial & non trivial dependencies, closure set of dependencies & of attributes, Irreducible set of dependencies, introduction to normalization, non loss decomposition, FD diagram, First, second and third normal forms, dependency preservation, BCNF, multivalue dependencies and fourth normal form, join dependencies and fifth normal form.

Database Integrity: general idea, integrity rules, Domain rules, Attributes rules, assertion, triggers, integrity & SQL.

Unit 4

Transaction, Concurrency & Recovery: basic concept, ACID properties, transaction state, Implementation of atomicity & durability, Concurrent execution, Basic idea of serializability, Basic idea of concurrency control, basic idea of deadlock, Failure Classification, storage structure-types, stable storage implementation, data access, recovery & Atomicity: log based recovery, deferred database modification, immediate

Unit 5

Query processing, optimisation & NOSQL

Text Book(s)

DBMS By Sudarshan & Korth

Reference Material(s)

Internet material & e books for advanced topics

Course Name: **MTech (CS) 2nd Semester**

Subject Code: **CS-6517**

Subject Name: **Advanced Compiler Design**

Aim of the Subject

To learn basic principles and advanced techniques of compiler design, and implement them at each phase of a compiler.

Learning Outcomes

The students are expected to learn following after completion of the course:

-

Unit 1

Compiler, Translator, Interpreter, Assembler definition, Types of compiler, Phases of compiler, one pass and multi pass compilers. Analysis of source program. Review of Finite automata, lexical analyzer, Input, buffering, Recognition of tokens, LEX: A lexical analyzer generator, Error handling.

Unit 2

Introduction to parsing. Bottom up and Top down parsing techniques- Shift reduce, Operator precedence, Recursive descent and predictive parsers. LL grammars and parsers, error handling in LL parser. LR parsers,Construction of SLR, .CanonicalLR and LALR parsing tables.

Unit 3

Syntax directed definitions and translation: Construction of syntax trees, L~attributed definitions, Intermediate code forms using postfix notation and three address code. Representing TAC using triples and quadruples, Translation of assignment statement. Boolean expression and control structures etc.

Unit 4

Definition of basic block control flow graphs, DAG representation of basic block. Advantages of DAG, Sources of optimization, Loop optimization, Idea about global data flow analysis, Loop invariant computation, Peephole optimization.

Unit 5

Issues in design of code generator, A simple code generator, Code generation from DAG. Code Optimization.

Text Book(s)

1. Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman (2007), Compilers Principles, Techniques and Tools, 2nd edition, Pearson Education, New Delhi, India.

2. Engineering a Compiler, Keith D. Cooper, Linda Torczon (2012), Second Edition, Elsevier.

Reference Material(s)

1. Alfred V. Aho, Jeffrey D. Ullman (2001), Principles of compiler design, Indian student edition, Pearson Education, New Delhi, India.

2. Kenneth C. Louden (1997), Compiler Construction– Principles and Practice, 1st edition, PWS Publishing.

3. Andrew

Course Name: **MTech (CS) 2nd Semester**

Subject Code: **CS-6518**

Subject Name: **Cloud Computing**

Aim of the Subject

Learning Outcomes

The students are expected to learn following after completion of the course:

- Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
- came about, the characteris□cs, adv
- Apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost.
- Identify resource management fundamentals, i.e. resource abstraction, sharing and sandboxing and outline their role in managing infrastructure in cloud computing.
- Analyze various cloud programming models and apply them to solve problems on the
- cloud.

Unit 1

Unit 2

Unit 3

Unit 4

Unit 5

Text Book(s)

Reference Material(s)

Course Name: **MTech (CS) 2nd Semester**

Subject Code: **CS-6711**

Subject Name: **Soft Computing**

Aim of the Subject

The aim of the course is to provide an introduction to the basic principles, techniques, and applications of soft computing.

Learning Outcomes

The students are expected to learn following after completion of the course:

- Student will understand soft computing, hard computing and different applications.
- Student will understand fuzzy sets, fuzzy logic and its applications.
- Student will learn about different advanced search techniques.
- MTech (
- Student will get exposure to advanced topics like genetic algorithms, hybrid systems.

Unit 1

Introduction to soft computing: Soft computing, difference between soft computing and hard computing, soft computing constituents, introduction to fuzzy logic and its applications, introduction to genetic algorithm and its applications, introduction to neural network and its applications, introduction to hybrid system and its applications.

Unit 2

Fuzzy Sets and Fuzzy Logic: Introduction to classical sets and fuzzy sets. Classical set and Fuzzy sets –Operations and Properties. FuzzyRelations – Equivalence and Tolerance, Membership Functions, Fuzzification, Membership Value Assignment. Fuzzy to Crisp Conversion, Lambda Cuts for Fuzzy Sets and Fuzzy Relations, Defuzzification Methods, Fuzzy Arithmetic, Fuzzy Logic and Approximate Reasoning, Rule Based Systems and Rough Sets.

Unit 3

Elementary Search techniques: Uninformed Search Techniques-Breadth First Search, Depth First Search, Depth first Iterative Deepening, Bidirectional Search. Heuristic Search Techniques: Best First Search, Hill Climbing Search,A*, AO*, Means-ends Analysis, Constraint Satisfaction. Genetic Algorithm (GA): Introduction to Genetic Algorithms (GA), Representation, Operators in GA, Fitness function, population, Multi-objective GA, Applications of GA.

Unit 4

Artificial Neural Networks: Basics of Neural Networks,Biological NeuralNetworks,McCulloch Pitt model,Supervised Learning algorithms:Perceptron (Single Layer, Multi-layer), Linear separability, Delta learning rule, Back Propagation algorithm, Un-Supervised Learning algorithms: Hebbian Learning.

Unit 5

Hybrid Systems: Integration of Neural Networks, Fuzzy Logic and Genetic Algorithms, GA Based Back propagation Networks, Fuzzy Back Propagation Networks, Fuzzy Associative Memories,ANFIS: Adaptive Neuro-Fuzzy Inference Systems.

Text Book(s)

1. Samir Roy, Udit Chakraborty,Soft Computing: Neuro-Fuzzy and Genetic Algorithms,Pearson India, 2013.

Reference Material(s)

1. S.N. Deepa, S.N. Sivanandam, Principles of Soft Computing (Second Edition), Wiley India Pvt. Ltd., 2011.