INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES
DEVI AHILYA UNIVERSITY, INDORE

MCA (6 Years)

VIII SEMESTER

Jan.- 2020 – Jun.- 2020

Sub. Code	Sub. Name	L	T	P	C
IC-802	Design & Analysis of Algorithms	3	1	0	4
IC-802A	Optimization Techniques	3	1	0	4
IC-804B	Advanced Database Management System	3	1	0	4
IC-811	Software Engineering	3	1	0	4
IC-812	Theory of Computation	3	1	0	4
IC-810A	ADBMS Lab	0	0	4	2
IC-807	Comprehensive Viva	0	0	0	4
					26

INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE
MCA (6 Years) VIII SEMESTER
IC-802: Design & Analysis of Algorithms

Aim of Course: Aim of Course: This course aims to introduce the classic algorithms in various domains, and techniques for designing efficient algorithms.

Objectives:

The course is designed to make students:

- Learn to analyze the running time of the algorithms
- Understand the application of algorithms and design techniques to solve problems.
- Learn to analyze the complexities of various problems in different domains and design efficient algorithms.
- Understand asymptotic notation to provide a rough classification of algorithms
- Study algorithms for fundamental problems in computer science and engineering work and compare with one another.
- Understand the problems for which it is unknown whether there exist efficient algorithms or even algorithm

Units 1.

Introduction to Algorithms, What is an Algorithm, Algorithm Specification, Performance analysis., Review of Data Structures, Stacks and Queues, Trees ,Graphs

Units 2.

Divide and Conquer, General Method, Binary Search, Finding the Maximum and Minimum , Merge Sort , Strassen's Matrix Multiplication ,

Units 3.

The Greedy Method , General Method , Knapsack Problem , Job Sequencing with deadlines , Minimum Cost Spanning Trees , Prim's Algorithm, Kruskal's Algorithm

Units 4.

Dynamic Programming, The General Method, Multistage Graphs, All Pairs Shortest Paths, Single Source Shortest Paths, 0/1 Knapsack, Traveling Salesperson Problem

Units 5.

Basic Traversal and Search Techniques, Techniques for Binary Trees, Techniques for Graphs , Back Tracking, The General Method , The 8-Queens Problem , Sum of Sub sets , NP-Hard and NP-Complete Problems, The Basic Concepts , Non-Deterministic Algorithms , The Classes NP-Hard & NP-Complete.

RECOMMENDED BOOKS

[1] T.H. Coreman, C.E. Leiserson and R.L. Rivest, Introduction to Algorithms, Prentice Hall of India, 1990.
[2] E. Horowitz, S. Sahni, S Rajasekaran, Computer Algorithms, Galgotia Publications.
[3] Saara Base, Computer Algorithms: Introduction to Design and Analysis, Addision Wesley, 2/e, 1988.
[4] Knuth, D, The art of computer programming, Vols. 1-2-3, Addision Wesley 1968-73.
[5] A V Aho, J E Hopcroft & J D Ullman, The Design and Analysis of Computer Algorithms, Addison Wesley, 1974.

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IC-802A: Optimization Techniques

Aim of Course: The principle aim of this course is to make the students aware of organizational behavior of management-process and importance of decision-making in real life situations.

Objectives:

The course is designed to make students:

- Understand different techniques of optimization, which help in analyzing the process of decision-making.
- To learn problem formulation of optimization.
- To realize the methods of optimization.
- To know the applications of optimization.
- Understand basic concepts of Linear programming and Dynamic Programming

Course Contents:

UNIT I

Organizational behavior and management. Introduction to O.R. Techniques. Models: - Meaning and classifications.

UNIT II

Linear Programming Problems (L.P.P.), Graphical solutions, Simplex algorithm, Principle of Duality, post optimality analysis. Transportation problem, Initial basic feasible solutions, MODI'S optimality analysis, Degeneracy.

UNIT III

Assignment Problem, traveling Salesmen problem, Branch and Berend techniques. Integer program: - Necessity of Integer programming, use of Branch and Berend Technology for solving Integer Programming problem.

UNIT IV

Queue-theory: - Importance of waiting-line in networking Q-models. Dynamic programming problems.

UNIT V

Theory of Games: - Introduction, pay-off matrix, Minimum-Maximum principle, Saddle-point principle of Dominance. Introduction to Inventory Analysis

Reference Books:

1. Dr. S.D. Sharma, Text Book of Operations Research.
2. N.D. Vora, Quantitative Techniques in management.
3. Kanti Swarup, P.K. Gupta and M.M. Singh , Operations Research..
4. H.A. Taha, Introduction to Operations Research.

IC-804B: Advanced Database Management System

Aim of Course: To learn advanced features of DBMS and build capacity to implement and maintain an efficient database system using emerging trends.

Objectives:

The course is designed to make students:

- Be able to master the concepts and design with proficiency databases under the relational model.
- Proficiency in the choice of DBMS platform to use for specific requirements
- Be proficient with a broad range of data management issues including data integrity and security, transaction processing and others.
- Be familiar with the fundamentals of distributed DBMS and object database management, data warehousing and data mining

Course Contents:

UNIT I

Introduction with DBMS and ER Model : Advantage of DBMS approach, various view of data, data independence, schema and sub-schema, primary concepts of data models, Database languages, transaction management, Storage management Database administrator and users, overall system architecture.

Basic concepts of ER model, design issues, mapping constraint, keys, ER diagram, weak and strong entity sets, specialization and generalization, aggregation, inheritance, design of ER schema.

UNIT II

Functional Dependencies and Normalization: Domains, relations, keys, super key, candidate, primary, alternate and foreign keys, Functional dependence, Full Functional dependence, trivial dependencies, transitive dependencies, Mutual independence, closure set of dependencies, non loss decomposition, FD diagram. Introduction to normalization, first, second, third Normal forms, dependency preservation, BCNF, Multi valued dependencies and fourth normal form.

UNIT III

PL/SQL fundamentals: Variables, reserve words, identifiers, anchored data types, blocks, labels, use of DML in PL/SQL, commits, rollback, save point, conditional control: if, case, nullif, coalesce, iterative processing with loops: Loop basics , simple loops, while, for loop.

UNIT IV

Database Integrity, Transaction, concurrency and Recovery: Basic idea of Database Integrity, Integrity rules, assertions, integrity Constraints, triggers.

Basic concepts of Transaction, ACID properties, Transaction states, implementation of atomicity and durability, concurrent executions, Serializability, Conflict serializability, View serializability, basic idea of concurrency control, Concept of locking, types of locks, basic idea of deadlock, deadlock handling.

UNIT V

Distributed Database and Emerging Fields in DBMS: Basic idea of Distributed database, distributed data storage, data replication, data fragmentation- horizontal vertical and mixed fragmentation.

Object oriented Databases-basic idea and the model, object structure, object class, inheritance, multiple inheritance, object identity.

Data warehousing- terminology, definitions, characteristics, data mining and it’s overview, Database on www, multimedia Databases- introduction, similarity based retrieval, continuous media data, multimedia data formats, video servers.

Reference Books:

1. A Silberschatz, H.F Korth, Sudersan “Database System Concepts” , MGH Publication.
2. Modern Database Management (5th Edition) (Hardcover) by Fred R. McFadden, Jeffrey A. Hoffer, Mary B. Prescott
3. Elmasri & Navathe “Fundamentals of Database systems” – III ed.
4. B.C. Desai. “An introduction to Database systems” BPB.

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IC-811: Software Engineering

Aim of Course: To gain a broad understanding of the discipline of software engineering and its application to the development of and management of software systems.

Objectives:

The course is designed to make students:

- Understand the various activities undertaken for a software development project.
- Develop and write a software project proposal
- Develop and write a Software Requirements Specification and design document.
- Learn to work within a team and understand team dynamics
- Be able to effectively communicate the work (Presentation skills)

Course Contents:

UNIT I

Introduction to Software Engineering: Software problem, Software engineering problem, Software engineering approach, Software characteristics and Applications.

Software Processes: Software processes and its components, characteristics of software processes, Software development processes: Linear Sequential model, Prototyping model, RAD model, Iterative Enhancement model, Spiral model, Component based development, Comparative study of various development models

UNIT II

Project management process: The people, product, process and project, Phases of project management process, the W5HH principle. Software configuration management process, Process management process: Capability Maturity Model (CMM).

UNIT III

Software Requirement Analysis and Specification: Software requirements, Problem analysis, Requirements specifications, Validation and Verification, Metrics.

Project Planning: Project estimation (Size & Cost), Project Scheduling, Staffing and personnel planning, Software configuration management plans, Quality assurance plans, Project monitoring plans, Risk management.

UNIT IV

Software Design: Design principles: Problem partitioning and hierarchy, Abstraction, Modularity, Top-down and Bottom-up strategies. Effective Modular design: functional independency, Cohesion, Coupling. Structured design methodology.

UNIT V

Software Quality Assurance: Quality concept, Quality management system, movements and assurance, Software reviews: formal and technical, Formal approaches to SQA, Statistical software quality assurance, Software reliability, ISO 9000, SQA plan.

Software Testing: Software testing techniques: Testing fundamentals, White box testing, Black box testing, testing for specialized environments, architectures and applications. Software testing strategies: A strategic approach to software testing, Strategic issues, Unit testing, Integration testing, Validation testing and system testing, the art of debugging

Text Books:- Lan Somerville,Software Engineering. Ninth Edition, Pearson publication

Reference Books:

1. Pankaj jalote, an integrated to software engineering, Narosa publication house
2. R.S.Pressenman,Software Engineering-A practitioner approach,Tata McGraw Hill International edition, New York

3. Richard E.Fairly, Software Engineering Concepts, Tata McGraw Hill International edition, New York

4. W.S.Jawadekar,software Engineering, Principal & Practice, Tata McGraw Hill International edition, New York

5. Dr. Ugrasen Suman, Software Engineering: Concepts and Practices, Published by Cengage Learning.

House.

4. R. S. Pressman, Software Engineering-A practitioner's approach, Tata McGraw-Hill International Editions, New York.
5. Richard E. Fairly, Software Engineering Concepts, Tata McGraw Hill Inc. New York.
6. W. S. Jawadekar, Software Engineering: Principle & Practice, Tata McGraw-Hill, New York

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IC-812: Theory of Computation

Aim of Course: To make students know about the basic concepts of Computation and learn to work with mathematical abstractions of computers called a model of computation.

Objectives:

The course is designed to make students:

- Understand regular expressions, which are used to specify string patterns in many contexts, from office productivity software to programming languages.
- Study finite automata, another formalism mathematically equivalent to regular expressions, Finite automata are used in circuit design and in some kinds of problem-solving.
- Learn Context-free grammars that is used to specify programming language syntax.
- Understand computability theory and decision problems.

Course Contents:

UNIT I

Formal languages: Introduction to Computation & Languages: Natural Languages, Computer Programming Languages and Formal Languages. Language Concepts: alphabet, strings, properties of Strings, kleene closure. Properties of Formal Languages.
Grammar: Chomsky Hierarchy of grammar, languages represented by type 0,1,2,3 grammars.

UNIT II

Regular languages and finite automata-recursive definition, regular expression and corresponding languages, Pumping Lemma for non-regular languages. Finite automata, kleene's theorem, non-deterministic finite automata. Equivalence of FAs and NFAs. Minimal state finite automata, Mealy machine and Moore machine, Regular grammar and their equivalence to finite automata.

UNIT III

Context free languages Parsing, ambiguity, parse trees, parsing methods: Bottom up and top down, Simplification of grammar. Normal form of CFGs: Chomsky Normal Form and Greibach Normal Form, CKY algorithm, Closure Properties of CFLs

UNIT IV

Push Down Automata: definition, examples, deterministic PDA, non-deterministic PDA, Parsing and PDAs, PDA and Context Free Languages

UNIT V

Turing machines – models of computations, definition, Representation of Turing Machines, TMs as language acceptors, Techniques for TM construction, Church - Turing thesis, Universal Turing machines, Variants of Turing machine.
Unsolvable Decision Problems- Decidability, Decidable Languages, Undecidable Languages Halting Problem of Turing Machine.

Reference Books:

1. Hopcraft and Ullman, Introduction to Automata Theory, Languages and Computation, Narosa Publishing House.
2. K.L.P. Mishra, N. Chandrasekaran, Theory of Computer Science (Automata, Languages and Computation), Prentice Hall of India.
3. Peter Linz, An Introduction to Formal Languages and Automata, Narosa Publishing House.
4. Cohen Daniel I.A., Introdution to Computer Theory, John Weley and Sons , inc New York

5. Martyn John C, Introduction to Languages and Theory of Computation, McGraw Hill, N.Y. (Internal Edition McGraw Hill)
6. Mandrioli Dino, Ghezzio Carlo, Theoretical Fundamentals of Computer Science, John Weley and Sons, Inc , New York.