

ADIKAVI NANNAYA UNIVERSITY
Master of Computer Applications(MCA)
Course Structure and Scheme of Valuation w.e.f. 2016-17 Admitted Batch

II Semester

Code	Name of the subject	Periods/week		Max Marks		Total Marks	Credits
		Theory	Practical	External	Internal		
MCA 2.1	Probability, Statistics & Queuing Theory	4	-	75	25	100	4
MCA 2.2	Database Management Systems	4	-	75	25	100	4
MCA 2.3	Object Oriented Programming With C++ & JAVA	4	-	75	25	100	4
MCA 2.4	Formal Languages & Automata Theory	4	-	75	25	100	4
MCA 2.5	Information Systems & Organizational Behavior	4	-	75	25	100	4
MCA 2.6	Database Management Systems Lab	-	3	50	50	100	2
MCA 2.7	Object Oriented Programming Lab	-	3	50	50	100	2
Total						700	24

MCA 2.1 PROBABILITY, STATISTICS & QUEUING THEORY

Instruction: 4 Periods/week
Internal: 25 Marks

Time: 3 Hours
External: 75 Marks

Credits: 4
Total: 100 Marks

UNIT I:

Probability: Definitions of probability, Addition theorem, Conditional probability, Multiplication theorem, Bayes' Theorem of Probability.

Random variables and their properties: Discrete Random Variable, Continuous Random Variable, Probability Distribution, Joint Probability Distributions their Properties, Transformation Variables, Mathematical Expectations, Probability Generating Functions.

UNIT II:

Probability Distributions: Discrete Distributions: Binomial, Poisson and Their Properties; Continuous Distributions: Uniform, Normal, Exponential Distributions and Their Properties.

Multivariate Analysis: Correlation, Correlation Coefficient, Rank Correlation, Regression Analysis, Attributes, Coefficient of Association, Chisquare – Test For Goodness Of Fit, Test For Independence.

UNIT III:

Estimation: Sample, Populations, Statistic, Parameter, Sampling Distribution, Standard Error, Un-biasedness, Efficiency, Maximum Likelihood Estimator, Notion & Interval Estimation.

Testing of Hypothesis: Formulation of Null hypothesis, critical region, level of significance, power of the test;

UNIT IV:

Sample Tests: Small Sample Tests: Testing equality of means, testing equality of variances, Large Sample tests: Tests based on normal distribution

Queuing Theory: Queue description, characteristics of a queuing model, study state solutions of M/M/1: ∞ Model, M/M/1 : N Model,

Text Books:

1. Probability & Statistics for Engineers and Scientists, Walpole, Myers, Myers, Ye. Pearson Education.
2. Probability, Statistics and Random Processes T.Veerarajan Tata McGraw – Hill

Reference Book:

1. Probability & Statistics with Reliability, Queuing and Computer Applications, Kishor S. Trivedi, Prentice Hall of India, 1999

MCA 2.2 DATABASE MANAGEMENT SYSTEMS

Instruction:4 Periods/week
Internal:25 Marks

Time: 3 Hours
External: 75 Marks

Credits:4
Total: 100 Marks

UNIT I

Database and Database Users: Data models, schemas, and instances, three-schemas architecture and data independence, database languages and interfaces, the database system environment, Centralized and client/server architectures for DBMSs, Classification of database management system.

Data Modeling Using the Entity-Relationship Model: Using High—Level Conceptual data model, Entity types, entity sets Attributes and keys, Relationships types, relationship sets, roles and structural constraints, Weak Entity types, ER diagrams Meaning conventions and design issues, Enhance Entity Relationship model,

Relational data model and relational database constraints: Relational model constraints and relational schemas, update operations.

UNIT II

Relational Algebra and Relational Calculus: Unary Relational operations, Relational Algebra operations, Binary Relational operation, Additional Relational operation, Examples of Queries in Relational Algebra, Domain Relational Calculus.

Relational database design by ER and EER Relational Mapping: Relational database design using ER to Relational Mapping, Mapping EER Model Construct to Relations,

Schema Definition, Basic Constraints and Queries: SQL Data definition, Specifying basic constraints in SQL, Schema change Statements in SQL, Basic queries in SQL, More complex SQL queries, INSERT DELETE UPDATE queries in SQL, Views in SQL, Data base stored Procedures,

UNIT III

Relational Database Design: Informal design Guide lines for Relation Schema, Functional Dependences, Normal forms based on Primary keys, General definitions of Second and Third Normal form, BOYCE-CODE Normal form, Algorithm for Relational database schema design, Multi-valued dependencies and fourth Normal forms,

File Organization and Indexes: Introduction, Secondary Storage Devices, Buffering Blocks, Placing file records on disk, Operations on Files, Hashing Techniques, Parallelizing Disk Access using RAID Technology, Indexing Structures for files.

UNIT IV

Algorithm for query processing and Optimization: Translating SQL Queries into Relational Algebra, Algorithms for SELECT and JOIN Operations, Algorithms for PROJECT and SET Operations,

Introduction to Transaction Processing Concepts and Theory: Introduction to Transaction Process, Transaction and System Concepts, Characterizing Schedules, Concurrency Control Techniques, Database Recovery Concepts, Recovery Techniques.

Text Book:

1. Fundamentals of Database System , Elmasri, Navathe, Pearson Educaiton.

References Books:

1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw-Hill.
2. Database Concepts, Abraham Silberschatz, Henry F Korth, S Sudarshan, McGraw-Hill

MCA 2.3 OBJECT ORIENTED PROGRAMMING WITH C++ & JAVA

Instruction: 4 Periods/week
Internal: 25 Marks

Time: 3 Hours
External: 75 Marks

Credits: 4
Total: 100 Marks

UNIT-I

Fundamentals of Object Oriented Programming: Introduction to Object Oriented Paradigm, Evolution of Programming Paradigms, Benefits of OOP, An Overview of Classes, Objects and Methods, Encapsulation and Data abstraction, Inheritance and Polymorphism

Basics of C++: Structure of a C++ Program, Data Types And Sizes, Variable Definition and Initialization, Type conversion, Expressions and Operator Precedence, Scope Resolution Operator, Inline Functions, Function Overloading, Default Arguments, Dynamic Allocation New and Delete Operators, Control Flow Statements: if, if-else, nested if-else, for, while, do.while, break, switch, continue.

UNIT-II

Classes & Objects: Class Specification, Accessing Class Members, Defining Member Functions, Empty Classes, Friend Functions and Friend Classes, Static Data and Member Functions, Constructors and Destructors, Copy Constructor, Constructor Overloading, Copy Constructor, Pointers, Pointers to Objects, this Pointer.

Inheritance, Polymorphism & Exception handling: Forms of Inheritance, Inheritance and Member Accessibility, Derived Classes, Syntax of Derived Classes, Abstract Classes, Single, Multilevel, Multiple, Hierarchical, Hybrid Inheritance, Polymorphism, Operator Over loading, Function Over loading , Pointers to Derived Classes, Virtual and Pure Virtual Functions, Function Templates, Class Templates, Introduction to Exception Handling.

UNIT-III

Introduction to Java: Overview of Java language, Constants, Variables & Data types, Decision Making , Branching , Looping, Classes, Objects & Methods, Arrays, Strings and Vectors.

Managing I/O files in Java: Introduction, Concept of Streams, Byte & Character Stream Classes, Using Streams & File Classes, File Creation, Reading/Writing Characters & Bytes, Handling Primitive Data Types.

UNIT-IV

Interfaces, Packages, Multi-Threading: Defining, Extending and Implementing Interfaces; Creating, Accessing & Using Packages; Multithreading- Creating, Extending, Stopping, Blocking Threads, Life Cycle of a Thread, Thread Methods, Exceptions, Priority in Threads, Synchronization, Runnable Interface.

Exception Handling & Applet programming: Exception Handling-Syntax of Exception Handling Code, Multiple Catch Statements, Finally, Throwing Our Own exceptions, Applets-Introduction, How Applets Differ from Applications, Building Applet Code, Life Cycle, Designing a Webpage, Adding Applet to HTML file, Running the Applet, Passing Parameters to Applets.

Text Books:

1. Mastering C++ K R Venu Gopal, Raj Kumar, T Ravi Shankar, Tata McGraw Hill
2. Programming with Java-A primer: E. Balagurusamy, PHI

Reference Books:

1. Object Oriented Programming in C++, Robert Lafore, SAMS
2. Object Oriented Programming Using C++,Ira Pohl, Pearson Education
3. Head First Java, Kathy Sierra & Bert Bates, Second Edition, Oreilly
4. Java: The Complete Reference, Herbert Schildt, Ninth Edition, Oracle Press
5. Java How to Program, Paul Deitel and Harvey Deitel.

MCA 2.4 FORMAL LANGUAGES & AUTOMATA THEORY

Instruction: 4 Periods/week
Internal: 25 Marks

Time: 3 Hours
External: 75 Marks

Credits: 4
Total: 100 Marks

UNIT-I

Finite Automata and Regular Expressions: Basic Concepts of Finite State Systems, Chomsky Hierarchy of Languages, Deterministic and Non-Deterministic Finite Automata, Finite Automata with ϵ -moves, Regular Expressions.

Regular sets & Regular Grammars: Basic Definitions of Formal Languages and Grammars, Regular Sets and Regular Grammars, Closure Properties of Regular Sets, Pumping Lemma for Regular Sets, Decision Algorithm for Regular Sets, Minimization of Finite Automata.

UNIT-II

Context Free Grammars and Languages: Context Free Grammars and Languages, Derivation Trees, simplification of Context Free Grammars, Normal Forms, Pumping Lemma for CFL, Closure properties of CFL's.

Push down Automata: Informal Description, Definitions, Push-Down Automata and Context free Languages, Parsing and Push-Down Automata.

UNIT-III

Turing Machines: The Definition of Turing Machine, Design and Techniques for Construction of Turing Machines, Combining Turing Machines.

Universal Turing Machines and Undecidability: Universal Turing Machines. The Halting Problem, Decidable & Undecidable Problems - Post Correspondence Problem.

UNIT-IV

The Propositional calculus: The Propositional Calculus : Introduction – Syntax of the Propositional Calculus – Truth-Assignments – Validity and Satisfiability – Equivalence and Normal Forms – resolution in Propositional Calculus.

The Predicate calculus: Syntax of the Predicate Calculus – Structures and Satisfiability – Equivalence – Un-solvability and NP-Completeness.

Text books:

1. Introduction to Automata Theory, Languages and Computations – J.E. Hopcroft, & J.D. Ullman , Pearson Education Asia.
2. Elements of The Theory Of Computation, Harry R Lewis, Cristos h. Papadimitriou, Pearson Education / Prentice-Hall of India Private Limited.

Reference books:

1. Introduction to languages and theory of computation – John C. Martin (MGH)
2. Theory of Computation, KLP Mishra and N. Chandra Sekhar, IV th Edition, PHI
3. Introduction to Theory of Computation – Michael Sipser (Thomson Nrools/Cole)

MCA 2.5 INFORMATION SYSTEMS & ORGANIZATIONAL BEHAVIOUR

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 4

Internal: 25 Marks

External: 75 Marks

Total: 100 Marks

UNIT I

Organization Structure: Features of Good Organization Structures, Designing of Organization Structure, Types of Organization Structures-Functional, Product, Geographic and Matrix Organization Structures

UNIT II

Motivation: Nature and importance of motivation, Theories of motivation – Maslow's, Herzberg's and Mc Gregor's X and Y Theories of Motivation. **Leadership:** Meaning and definition, Importance of Leadership, Leadership styles, **Communication:** Process of Communication, Importance, Forms of Communication and Barriers in Communication.

UNIT III

Group Dynamics: Types of Groups, Stages of Group Development, Group Behavior and Group Performance Factors. **Organizational Conflicts:** Reasons for Conflicts, Consequences of Conflicts in Organizations, Types of Conflict, Strategies for Managing Conflicts, Organizational Climate and Culture.

UNIT IV

Management Information System: Nature and Scope, Characteristics and Functions. Classification of MIS - Transaction Processing System, Management Information System, Decision Support System, Executive Support System, Office Automation System and Business Expert System.

Text Books:

1. Elements of Organizational Behavior, Robbins, 7th Edition, Pearson Education
2. Management Information Systems – D.P.Goyal, Macmillan Publishers India Ltd.

Reference Books:

1. Organizational Behaviour – L.M.Prasad, Sultan Chand and sons
2. Management Information Systems - L.M.Prasad, Usha Prasad , Sultan Chand and sons
3. Management Information Systems – Kanter Jerma , PHI

MCA 2.6: DATABASE MANAGEMENT SYSTEMS LAB

Practical: 3 Periods /week

Time: 3 Hours

Credits: 2

Internal: 50 Marks

External: 50 Marks

Total: 100 Marks

SQL

- 1) Simple queries to understand DDL, DML and DCL commands
- 2) Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.
- 3) Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOT EXISTS, UNION, INTERSET, Constraints.
- 4) Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
- 5) Queries using Conversion functions like (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions like (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)

PL/SQL

- 1) Simple programs to understand PL/SQL
- 2) Write a PL/SQL program to demonstrate exception-handling
- 3) Demonstrate the working of COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
- 4) Develop a program that includes the features NESTED IF, CASE and CASE expression.
- 5) Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT -IN Exceptions, USE defined Exceptions, RAISE-APPLICATION ERROR.
- 6) Programs using CURSORS
- 7) Programs development using creation of procedures and functions.
- 8) Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers

Text Books:

1. Oracle Database 11g, Jason Price, Oracle Press
2. Oracle PL/SQL for Dummies, Michael Rosenblum, Paul Dorsey, Wiley Publications.

MCA 2.7 OBJECT ORIENTED PROGRAMMING LAB

Instruction: 3 Periods/week

Time: 3 Hours

Credits: 2

Internal: 50 Marks

External: 50 Marks

Total: 100 Marks

LIST OF EXPERIMENTS WITH C++:

1. Simple programs to understand basic object oriented concepts using C++.
2. Program performing complex number addition using friend functions.
3. Program to demonstrate function overloading.
4. Program to perform string operations by over loading operators.
5. Program on constructor overloading and copy constructor
6. Programs to understand different types of inheritance.
7. Program on virtual functions.
8. Program to handle exception handling
9. Generic program with function templates
10. Generic program with class templates.

LIST OF EXPERIMENTS WITH JAVA:

1. Simple Programs to understand basic object oriented concepts using Java.
2. Write a Java program for sorting a given list of names in ascending order.
3. Write a Java program to implement file operations.
4. Write a Java program that displays the number of characters, lines and words in a text file.
5. Write a Java program for defining, extending and implementing interfaces.
6. Write a Java program for creating, accessing & using packages.
7. Write a Java program to demonstrate threads execution in Java.
8. Write a Java program to implement Exception Handling in Java.
9. Write a Java program to implement calculator using applets.
10. Write a Java program to implement database operations using JDBC.

Text Books:

1. Mastering C++ K R Venu Gopal, Raj Kumar, T Ravi Shankar, Tata McGraw Hill
2. Object Oriented Programming in C++, Robert Lafore, SAMS
3. Object Oriented Programming Using C++, Ira Pohl, Pearson Education
4. Programming with Java-A primer: E. Balagurusamy, PHI
5. Java: The Complete Reference, Herbert Schildt, Ninth Edition, Oracle Press
6. Java How to Program, Paul Deitel and Harvey Deitel.