## Semester-III

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BCA (III Semester)
Course : US03CBCA01
(Relational Database Management Systems-I)

Credits : 4
Lectures per week : 4

All units carry equal weightage.

1. Introduction
   - The three-schema architecture for a Database Management System (DBMS)
   - Introduction to data models (hierarchical, network, relational)
   - Examples of current RDBMS products
   - The relational data model: concepts and terminology, operations on data (DDL, DML), relationships and relationship types

2. Relational Database Theory and Data Modeling
   - Integrity constraints
   - Codd rules
   - Entity-relationship modeling (different types of entities, attributes, relationships and their representation in the E-R diagram)
   - Case studies of data modeling using E-R modeling

3. Introduction to SQL
   - SQL - introduction, advantages and disadvantages
   - Data types – built-in (number, char, varchar2, date, raw, long raw)
   - Types of SQL Statements : DDL (Data Definition Language), DML (Data Manipulation Language), DCL (Data Control Language), TCL (Transaction Control Language)
   - Working with SQL*Plus – overview and basic commands like ed, start, get, save, exit, connect, set linesize, set pagesize and host
   - Creating table and inserting data - CREATE TABLE, INSERT, retrieving data using query – SELECT, manipulating data – DELETE and UPDATE, modifying and removing table – ALTER TABLE and DROP TABLE.

4. Data Constraints and Functions
   - Pseudo columns – ROWID, ROWNUM, USER, UID, SYSDATE
   - Null values, TAB table, DUAL table
   - Operators – arithmetic, relational, logical, range searching, pattern matching and set
   - Data constraints – Introduction, advantages and disadvantages
   - Type of data constraints – NOT NULL, UNIQUE, PRIMARY KEY, FOREIGN KEY and CHECK
   - Modifying constraints, working with data dictionary and use of USER_CONSTRAINTS
   - Functions – introduction, merits and demerits, types of functions (scalar and aggregate)
   - Scalar : Numeric functions (ABS, FLOOR, MOD, POWER, ROUND, SIGN, SQRT and TRUNC), Character functions (CHR, ASCII, CONCAT, INITCAP, LOWER, SUBSTR,TRIM, UPPER), Date functions (ADD_MONTHS,
LAST_DAY, NEXT_DAY, MONTHS_BETWEEN), Conversion functions (TO_NUMBER, TO_CHAR and TO_DATE)
- Aggregate fun : AVG, COUNT, MAX, MIN, SUM
- Miscellaneous functions – NVL, DECODE, COALESCE

5. Query, Subquery and Joins
- Query and subquery, types of subquery
- Creation and manipulation of database objects – indexes, views, sequences and synonym
- Joining tables, types of joins (cross join, natural join, inner join, equijoin, outer joins, self join.

6. Transaction Management and Reporting through SQL*Plus
- Data control language statements – GRANT and REVOKE
- Transaction control language statements – COMMIT, ROLLBACK and SAVEPOINT
- Overview of SQL*Plus report
- Building a simple report
- Reporting commands – remark, setheadsep, ttitle, btitle, column, breakon, compute, spool, set pause.

MAIN REFERENCE BOOKS :

BOOKS FOR ADDITIONAL READING :
Course: US03CBCA02
(Object Oriented Programming and C++)

Credits: 4
Lectures per week: 4

All units carry equal weightage.

1. **Object Oriented Programming (OOP) Concepts and C++**
   - Structured programming vs. object oriented programming
   - Basic OOP concepts: objects, classes, encapsulation, data hiding, inheritance, polymorphism
   - Introduction to C++: structure of a C++ program, data types, variables, constants, expressions, statements and operators
   - Usage of header files

2. **Control Flow Constructs, Input/Output and Arrays**
   - Control flow statements: if else, for loop, while loop, do while loop, switch, break and continue
   - Basic I/O in C++
   - Arrays in C++: introduction, declaration, initialization of one, two and multi-dimensional arrays, operations on arrays
   - Working with strings: introduction, declaration, string manipulation and arrays of string

3. **Working with Classes**
   - Classes and objects in C++
   - Constructors: default, parameterized, copy, constructor overloading and destructor
   - Access specifiers, implementing and accessing class members
   - Working with objects: constant objects, nameless objects, live objects, arrays of objects

4. **Functions and Inheritance**
   - Introduction to functions, library and user-defined functions, parameters passing, default arguments,
   - Inheritance: Introduction, derived class declaration, forms of inheritance
   - Inheritance and member access ability, constructor and destructor in derived class, construction invocation and data member initialization.

5. **Overloading and Introduction to Pointers**
   - Functions overloading, inline functions, friend functions and virtual functions
   - Operator overloading: Introduction, overloaded operators, unary operator overloading, operator keyword, operator return values, binary operators overloading, overloading with friend function
   - Usages of Pointers in C++: basic overview
   - Dynamic memory allocation
6. Working with Files
   - Files: introduction and applications
   - File operations: open, read, write, seek and close

MAIN REFERENCE BOOKS:

BOOKS FOR ADDITIONAL READING:
2. OOP's using C++ for Dummies.
Course: US03CBCA03  
(Advanced Data and File Structures)

Credits: 4
Lectures per week: 4

All units carry equal weightage.

1. Arrays and Trees
   - Introduction to arrays, one and two-dimensional arrays
   - Representation of arrays in memory: row-major and column-major order
   - Address calculation of elements of one and two-dimensional arrays
   - Sparse array, applications of arrays
   - Introduction to trees
   - Definitions of basic terms: Tree, Directed Tree, Root, Leaf, Branch, Level, Node
   - Applications of a tree

2. Binary Trees and Graphs
   - Binary trees: introduction, linear and linked representations
   - Preorder, inorder and postorder traversal of a binary tree
   - Insertions and deletions in a lexically ordered binary tree
   - The concept of a graph and basic terminology

3. Sorting
   - Introduction to sorting, applications of sorting
   - Basic sorting techniques - bubble sort, selection sort and merge sort
   - Implementation of sorting techniques

4. Searching
   - Introduction to searching, applications of searching
   - Basic sorting techniques - sequential search and binary search
   - Implementation of searching techniques
   - Sorting vs. searching

5. File Organization - I
   - Terminology, definitions and concepts in file organization
   - The structure of sequential files
   - Processing sequential files
   - Direct files, Processing direct files

6. File Organization – II
   - Indexed sequential files
   - The structure of indexed sequential files
   - Processing indexed sequential files

MAIN REFERENCE BOOKS:
Course: US03CBCA04  
(Practicals)

Credits: 6
No. of laboratory hours per week: 12

University examination duration: 4 Hours

Part-I: Weightage-50%
- Practical based on US03CBCA01: Relational Database Management Systems-I

(Questions based on table creation/modification, data insertion/modification, query writing and object creation (e.g. view, synonym, sequence) may be asked)

Part-II: Weightage-50%
- Practical based on US03CBCA02: Object Oriented Programming and C++

(Questions based on C++ programming concepts may be asked)
Course : US03FBCA01
(Financial and Accounting Management)

Credits : 4
Lectures per week : 4

All units carry equal weightage.

1. Introduction to Accounting & Accounting Process
   - Some basic terms: debtor, creditor, solvent, insolvent, bad debts, bad debts recoverable, income, expenditure, trade discount and cash discount
   - Objectives, advantages and scope of accounting.
   - System of book keeping, classification of accounts and rules for debit and credit.
   - Journal: purpose, format, ruling, example, advantages and disadvantages.

2. The Accounting Process
   - Ledger: purpose, format, posting, closing ledger accounts, advantages and disadvantages
   - Trial Balance: purpose, format, advantages and disadvantages
   - Subsidiary books: Cash books, Purchase books and Sales books

3. Final Accounts & Depreciation
   - Trading account and profit and loss account, balance sheet (each with purpose, format, examples)
   - Adjustment entries: interest on capital, interest of loan, depreciation on fixed assets
   - Depreciating concept and methods (straight line, double decline and sum of the year's digit)

4. Introduction to Financial Management
   - Introduction, scope of finance, finance functions
   - Financial manager’s role, financial goal, profit versus wealth, conflict of goals, management versus owners
   - Financial goal and firm’s objectives
   - Organization of the finance functions

5. Ratio Analysis
   - Financial ratio analysis: introduction, users, uses and limitation
   - Types of ratio: liquidity ratios, leverage ratios, activity ratios, profitability ratio.

6. Cost-Volume-Profit (CVP) Analysis and Operating Leverage
   - Introduction, Break-Even Analysis, Cash Break-even point, Operating leverage and risks
   - Profit-analysis: impact of changing factors
   - CVP analysis for a multi-product firm
   - Utility and limitations of CVP analysis
MAIN REFERENCE BOOKS:
1. A text Book of Accounting for management by S N Maheshwari and S K Maheshwari, vikas publishing house pvt ltd
2. Financial management eighth edition I M Pandy

BOOKS FOR ADDITIONAL READING:
1. R.L. Gupta : Principles and practices of accounting
Course: US03EBCA01
(Introduction to Microprocessors)

Credits: 2
Lectures per week: 2

All units carry equal weightage.

1. Introduction
   - Microprocessor evolution
   - The 8086 microprocessor family overview
   - 8086 internal architecture: the execution unit, the bus interface unit
   - Overview of 8086 register set
   - The concept of assembler

2. 8086 Instruction Descriptions – I
   - Arithmetic instructions: AAA, AAD, ADC, SUB, SBB, DIV, MUL
   - Logical instructions: AND, OR, NOT
   - Other instructions: MOV, CMP, NEG, DEC, INC

3. 8086 Instruction Descriptions – II
   - Rotate and shift instructions: ROL, ROR, SHL, SHR
   - Unconditional & conditional JUMP instructions
   - Unconditional & conditional LOOP instructions

4. 8086 Programming Using Assembly Level Language
   - The structure of a typical assembly program
   - The concept of assembler directives
   - Implementation of control structures: IF-THEN, IF-THEN-ELSE, MULTIPLE IF-THEN-ELSE
   - Implementation of looping structures: WHILE-DO, REPEAT-UNTIL
   - Programming based on Units 2,3,4

MAIN REFERENCE BOOKS:
Course : US03EBCA02
(Introduction to Artificial Intelligence)

Credits : 2
Lectures per week : 2

All units carry equal weightage.

1. Introduction
   - Concepts and definitions of Artificial Intelligence (AI)
   - Brief history of AI
   - AI and related fields
   - The AI problems and underlying assumptions

2. Expert Systems
   - Introduction
   - Representing and using domain knowledge
   - Knowledge acquisition and representation
   - General structure of Expert Systems
   - Expert System Shell
   - Advantages and disadvantages of Expert Systems

3. Introduction to AI Techniques and Application Areas - I
   - Introduction to basic search strategies : some examples and classification
   - Introduction to heuristic search technique : Best first search
   - Using predicate logic
   - Representing simple facts in logic

4. Introduction to AI Techniques and Application Areas - II
   - Introduction to fuzzy logic
   - Introduction to various application areas of AI like Natural Language Processing (NLP), Game Playing, Robotics

MAIN REFERENCE BOOKS :
2. Patterson, Dan W. : Introduction to Artificial Intelligence, Prentice Hall of India (PHI)
3. R.Akerkar : Introduction to Artificial Intelligence, PHI, 2005