SECOND YEAR B.SC. COMPUTER SCIENCE

Paper-I : Introduction to Database Management System

UNIT - I

Introduction : Database system applications, What is database System, database systems versus file systems, views of data, database languages, database users , database system structure, Data Dictionary. Advantages of DBMS.

UNIT - II

Database Architecture and Modelling: DBMS Architecture(Internal ,Conceptual and External),Data Independence ,Database Models: Hierarchical ,Network and Relational , Role of DBA. Data modeling using the Entity Relationship Model**:** ER model concepts, notation for ER diagram, mapping constraints, keys, concepts of super key, candidate key, primary key, unique key, generalization, aggregation, reduction of an ER diagram to tables.

UNIT - III

Relational DMBS : Terminology , views , Structure of relational databases, CODD'S Rules Relational algebra : Operators and Operands in relational algebra, Projection, Selection , Set union, Set difference, Set intersection , Cartesian product, Join , Natural join

UNIT - IV

Introduction to SQL : Characteristics of SQL, Advantages of SQL, Types of SQL commands, SQL operators and their precedence. Tables, Views and Indexes : Create, Alter , Insert , Drop Operations. Integrity Constraints.

Queries and sub-queries. Aggregate functions : Sum , Avg , Max , Min , Count.

SQL Functions : Arithmetic Functions , Character Functions , Date Functions.

UNIT - V

Backup and Recovery : Database backups, Hardware protection and redundancy , Importance of Backups. Database Recovery : Databse Recovery , Data Storage , Causes of Failures , Recovery Concepts and terminology..

Database Security and Integrity : Types of Integrity constraints , Restrictions on Integrity Constraints , Data Security Risks, Dimensions of Security. Protecting data within the database : Database audit , Authenticating users to the database, Statistical database , Data Encryption.

Recommended Books :

1. **Introduction to Database Systems :- Bipin Desai**
2. **Fundamental of database system :- Elmasiri and Navathe**

Paper- II : <u>Object Oriented Programming using C++</u>

UNIT – I

Different paradigms for problem solving, need for OOP, Differences between OOP and Procedure oriented programming, Advantages of OOP. Concept of Object Oriented Programming - Data hiding, Data Abstraction, Data encapsulation, Class and Object , Polymorphism , Inheritance.

Beginning with C++ : What is C++, Applications of C++ , Structure of C++ Program , C++ character set, Tokens , C++ Data types, Variables, A simple C++ Program. Comparing C with C++.

UNIT – II

Expressions and control structures : Operators in C++, Scope resolution operator, Member dereferencing operators, Memory Management operators, set manipulators, Expressions and implicit conversions.

Classes : Need for classes, Class definition, Class structure , Class objects, referencing Class members , scope of class and its members.

Functions in C++ : Function prototyping, Inline function, Constant member function ,Default arguments , function overloading, friend function.

UNIT - III

Classes and Objects : Array of objects , Arrays within class , Object as function arguments, function returning objects , Nesting of member function , Nesting of classes , Private member function, Friendly function.

Memory Allocation : Memory allocation of objects, Static data members, Static member functions, pointers to members , New and delete Operator ,This Pointer.

UNIT - IV

Constructor : Need for Constructors, Declaration and Definition , Default Constructors, Parameterized Constructors , copy Constructors, Order of constructor invocation , Dynamic initialization of Objects, Constructor overloading, Dynamic Constructors , Constructor with Default arguments , Constructing two - Dimensional Arrays , Special characteristics of Constructors.

Destructors : Need for Destructors , Declaration and Definition , Characteristics of Destructors.

UNIT - V

Inheritance : Need for Inheritance , Different forms of inheritance , Derived and base classes : single Inheritance , Multiple Inheritance , Multi level Inheritance , Hierarchical Inheritance and hybrid Classes.Visibility Modes ,Inheritance and Access control , Virtual Base Classes , Abstract Classes, Constructors in Multiple Inheritance.

Virtual Functions and Polymorphism : Pointers to objects, Pointers to Derived Classes , Virtual Functions , Pure Virtual Functions.

Recommended Book :

1. **Object Oriented Programming with C++ :- E. Balaguruswamy**

Paper-III : <u>Computer Organization</u>

UNIT - I

Instruction codes : Introduction , Stored program organization , Indirect address, computer registers , common bus system.

Register transfer language , register transfer, Bus and memory transfer, Three state bus buffer. Arithmetic Micro operations, Logic micro operations, Shift micro operation. Binary Adder, Binary Incrementer , Arithmetic circuits.

UNIT -II

Computer instructions : Basic computer Instructions ,Instruction set completeness , Timing and Control. Instruction Cycle : Fetch and Decode, Type of instructions , Register- Reference Instructions, Memory - Reference Instructions , Input-Output Instructions. Interrupt Cycle.

UNIT - III

CPU   : Introduction, General Register organization, control word ,Example of micro operations , Stack Organization , register stack, memory stack , Instruction Formats : Three-address Instructions, Two-address Instructions ,one-address Instructions, Zero-address Instructions.

Addressing modes : Implied, Immediate , Register , Register Indirect ,Auto increment or Auto decrement , Direct Address , Indirect Address , Relative Address , Indexed Addressing ,Base Register Addressing Mode.

UNIT - V

Inheritance : Need for Inheritance , Different forms of inheritance , Derived and base classes : single Inheritance , Multiple Inheritance , Multi level Inheritance , Hierarchical Inheritance and hybrid Classes.Visibility Modes ,Inheritance and Access control , Virtual Base Classes , Abstract Classes, Constructors in Multiple Inheritance.

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UNIT - IV

Asynchronous Data Transfer , Handshaking Asynchronous Serial Transfer, Modes of Transfer : DMA Transfer.

Main memory : RAM and ROM chips, Auxiliary Memory : Magnetic Disk , Associative Memory , Cache memory , Direct mapping Scheme.

UNIT - V

Microprocessor Architecture :Introduction to Microprocessor 8085 , ALU , Timing and Control Unit, Registers , Data and Address Bus.

Instruction Set of intel 8085 : Data Transfer Group , Arithmetic Group , Logic Group , branch control Group , Input/ Output and Machine Control Group.

Recommended Book :

1. **Computer Organisation :- Mano M.M.**
2. **Fundamentals of microprocessors and Microcomputers :- B.Ram**

PAPER - IV : PRACTICALS

NOTE : Students are required to perform all the experiments selecting one from each part.
MARKS DISTRIBUTION
PART - A : 20
PART - B : 20
PART -C (POWERPOINT REPRESNTATION) : 10
VIVA : 10
Two RECORDS (Topic covered Part-A & part-B) : 15

PART - A

Database Examples :
    Simple Payroll Program.
    Simple Library Management.
    Simple Inventory Control Program.
    Simple Student Profile Program.
1. SQL Queries Practical based on DDL Commands.
    Create, alter, drop.
2. SQL Queries Practical based on DML Commands.
    Select, update , delete ,Insert.
3. SQL Queries Practical based on DCL Commands.
    Grant, Revoke
4. SQL Queries Practical based on Boolean and comparisons operator related Commands.
5. SQL Queries Practical based on Arithmetic and Aggregate Functions.
6. SQL Queries Practical based on Nested sub queries,set membership, set comparisons , set cardinality.
7. SQL Queries Practical based on selective data from multiple databases.
8. SQL Queries Practical on Create views.
9. SQL Queries Practical based on Arithmetic Function.
10. SQL Queries Practical based on Character Function.
11. SQL Queries Practical based on Date Function.

PART - B

1. Write C++ Program using class and objects.
2. Write C++ Program using Scope resolution operator.
3. Write C++ Program using different types of operators in C++.
4. Write C++ Program using Function Prototype.
5. Write C++ Program using Function Overloading without class and objects.
6. Write C++ Program using Function Overloading using class.
7. Write C++ Program using Default arguments.
8. Write C++ Program using Friend function.
9. Write C++ Program using Inline Function.
10. Write C++ Program using Array of objects.
11. Write C++ Program using Array within class.
12. Write C++ Program using Objects as an Function arguments.
13. Write C++ Program using Function returning objects.
14. Write C++ Program using Nesting of Member Function.

15. Write C++ Program using Nesting of class.
16. Write C++ Program using Static data members.
17. Write C++ Program using Static Member Function.
18. Write C++ Program using New and delete operator.
19. Write C++ Program using Three types of Constructor.
20. Write C++ Program using Order of invocation of constructor and destructor.
21. Write C++ Program using CALL BY REFERENCE.
22. Write C++ Program using Single Inheritance.
23. Write C++ Program to create class hierarchy in which base class have multiple derived classes.
24. Write C++ Program to create class hierarchy in which derived class have multiple base classes.
25. Write C++ Program illustrating the use of abstract classes.
26. Write C++ Program illustrating the use of constructors in derived classes.
27. Write C++ Program using virtual base class.
28. Write C++ Program using pointers to derived classes.
29. Write C++ Program using virtual functions.
30. Write C++ Program using pure virtual functions.

PART - C

Power point presentation on the topics covered in Paper -I , Paper - II ,Paper -III as assigned by the concerned teacher.