

Solapur University, Solapur



B.Sc. Computer Science)
Syllabus (Semester- III and IV)
With Effect from June 2017-2018

Solapur University, Solapur
Faculty of Science
Choice Based Credit System (CBCS)
Semester-III

Sr. No.	Code	Paper	Hrs/week			Marks			Credits
			L	T	P	Total	UA	CA	
1	Paper-V	Object Oriented Programming Using C++	3			100	70	30	3
2	Paper-VI	Software Engineering	3			100	70	30	3
Total (Sem-III Theory)			6	0	0	200	140	60	6

Semester-IV

Sr. No.	Code	Paper	Hrs/week			Marks			Credits
			L	T	P	Total	UA	CA	
1	Paper-VII	Data Structure	3			100	70	30	3
2	Paper-VIII	DBMS Using Oracle	3			100	70	30	3
Total (Sem-IV Theory)			6	0	0	200	140	60	6
8	Practical III & IV	Based on Paper V, VII and VIII			8	200	140	60	8
Total (Practical's)					8	200	140	60	8
Grand Total (Theory)			12			400	280	120	20

UA (University Assessment): University Theory paper shall be of 70 marks for 3.00 hrs duration.

CA (College Assessment): The internal examination for theory and Practical course

Object Oriented Programming using C++

Unit 1: **5**

Introduction to Object-Oriented-Programming: Comparison with Procedure Oriented programming, Object oriented Programming paradigm, Basic concepts of object oriented programming, Benefits of OOP, object oriented Languages, Applications of OOP.

Introduction to C++: Tokens, Keywords, Identifiers and constants, Basic Data types, Userdefined data types, Derived data types, symbolic constants, Type compatibility,

Declaration of variables, Dynamic initialization of variables, reference variables, operators & Expressions in C++, Scope resolution operator, member dereferencing operators, Memory management operators, Type casting, Control structures.

Unit 2: **18**

Introduction of function:- The main function, Types of Functions, Function prototyping, parameter passing technique, Inline functions, Default arguments, Function Overloading.

Classes and Objects:- Structures in C++, specifying a class, Access specifiers, Defining member functions, Making an outside function inline, Nesting of member functions, Private member functions, Memory allocation for the objects, Static data members. static member functions, Array of objects, objects as Function arguments, Friend functions, Returning objects, Constant member functions, Local classes.

Constructors & Destructors:- Types of Constructors, Multiple Constructors in a class, Constructors with default arguments, Dynamic initialization of objects, Constructing two Dimensional Arrays, Const Objects, Destructors.

Operator overloading and Type Conversions: Introduction, Defining operator overloading, Overloading Unary and Binary operators,

Manipulation of string using operators, Rules for Overloading operators, Type Conversion.

Unit 3 : 17

Inheritance: Extending classes, Introduction, Defining derived classes, Single Inheritance, Making private member Inheritable, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual base classes, Abstract classes, Constructors in derived classes, Member classes: Nesting of classes, Pointers, virtual functions

Polymorphism: Introduction, Pointers to objects, *this* pointer, Pointer to derived classes, virtual functions, pure virtual functions.

Managing Console I/O Operations: Introduction, C++ stream classes, Unformatted I/O Operations, Managing output with manipulators, Working With Files, classes for file stream operations, Opening and closing a file, Detecting end of file, File modes, file pointers and their manipulations, sequential input and output operations, Random access, Error handling During file Operations, Command-Line Arguments.

Reference Books

1. C++ the Complete Reference By Herbert Schildt – TMH.
2. C++ By Balguruswami – TMH.
3. C++ by Kumar – TMH.

Software Engineering

Unit 1: **10**

System concepts: Introduction, Definition, Elements of system, system concepts, Types of system, System Analysis, Role of System Analyst. Software Engineering: Definition, Characteristics of software, Qualities of software. System Development life cycle, Process Models-Waterfall model, v shape model, Spiral model, Prototyping, incremental, RAD

Unit 2: **15**

Requirement Analysis, Fact finding techniques: Interviews, Questionnaire, Record reviews, Observation, Basic and User design requirements, Organization Dependant Requirements, Analysis and Design Tools: Flow charting, Decision tables, Decision Trees, Structure charting Techniques (HIPO). System Design: Data flow Diagram (Physical, Logical), Entity relation diagram, Input output design, Structured chart, Data Dictionary, Dependencies, Normalization (1NF, 2NF, 3NF, BCNF, 4NF, 5NF)

Unit 3: **15**

Configuration of the System: Collection of system statistics, Setting Sub-system Boundaries. Construction of the system: traditional and incremental approaches, conversion methods, Software Testing: Need of Testing, types of testing, Software Implementation and maintenance, System Development Tools: Role, Benefits and weakness of case Tools, Taxonomy of case tools, Case studies: Pay Roll, Fixed Deposit, Inventory system, College Admission System, Library System, Loan system.

Reference Books :

1. Analysis and Design of Information Systems By James Senn.
2. System analysis and Business application (for case studies) By Rajesh Nike / swapna kishore.
3. Software Engineering By Pressman.
4. System Analysis and Design By Parthsarty / Khalkar.
5. Practical guide to structure System Design By Miller/Page/jones.

Data Structures

Unit 1

15

Introduction: Need of Data Structure, Types of Data Structure, ADT, Algorithm: Definition, characteristics, Space complexity, time complexity, Asymptotic notation (Big O, Omega Ω , theta Θ), introduction and control abstraction of algorithm design strategies Divide and Conquer, Greedy, Dynamic programming, Backtracking, Branch and Bound.

Stack: Introduction to stack, Representation-static & dynamic, stack Operations, Application -infix to postfix & prefix, postfix evaluation, recursion, expression validity.

Queues: Introduction to Queue, Representation -static & dynamic, Operations, Circular queue, Deque, priority queues.

Unit 2

15

Linked List:-Introduction to List, Implementation of List – static & dynamic representation, Types of Linked List, Operations on List, Applications of Linked List – polynomial manipulation

Trees: Concept & Terminologies, Binary tree, binary search tree, Representation – static & dynamic, Operations on BST – create, Insert, delete, traversals (preorder, inorder, postorder), counting leaf, non-leaf & total nodes,

Unit 3

10

Sorting: Bubble sort, Quick sort, Simple Insertion sort, Shell sort, Address calculation

sort, Binary Search Tree, Heap Sort, Merge sort, Radix Sort.

Searching: Linear Search, Binary Search, Tree searching methods, Multiway search tree (B-tree, B+ tree), Height balance tree- AVL trees-Rotations. Hash function (open and close).

Reference Books

1. Aho, Hopcroft, Ulman: Data structures and Algorithms.
2. Niklaus Wirth: Algorithms, data structures, Programs.
3. ThomsHorbron: File Systems, Structures and Algorithms (PHI).
4. D. E. Kunth: Art of computer Programming Vol – I.
5. Tanenbaum: Data structures using C and C++ (PHI).
6. fundamentals of computer algorithms by ellis horowitz sartaj sahni 2nd edition galgotia publication

Database Management System

Unit 1: **15**

Introduction to database system:- Definition, Limitations of traditional file system, indexing, Advantages of DBMS, Components of DBMS, Database Architecture, Database Users, Schemas and instances, 2 tier and 3 tier architecture, Database languages, Types of data models- relational, Network, Hierarchical, Distributed, hybrid E-R model: E-R Diagram, entities, attributes and its types, Relationship and relationship sets, Cardinality, Degree, Generalization, Specialization, Aggregation

Relational Model and Database design:- Relation, Domain, Tuples, types of keys, relational integrity rules, Codd's rules,

Relational Algebra operations:- Select, Project, Cartesian Product, Union, Set difference, Natural Join, Outer Join, dependencies and its types, Normalization and its types-1NF, 2NF, 3NF, BCNF, lossless joins, Data dictionary. Case study

Unit 2: **10**

Transaction Management & Concurrency Control: -Introduction, properties, transaction states, scheduling, conflict and view serializability, Introduction to Concurrency Control, problems of concurrency control., , log based protocols, timestamp based protocol, deadlock, deadlock handling.

Database recovery and Atomicity:- Introduction, recovery algorithms, log base recovery, shadow paging, recovery with concurrent transaction, checkpoints or syncpoints or savepoints.

Unit 3: **15**

SQL & PL/SQL using oracle 11g :- Simple Queries, Expressions, Conditions and Operators, Functions, Group by having, Where clause, Joins, Sub queries, Views, indexes, sequences. Blocks, Conditional

statement and loops, Cursors and types, procedures and functions, packages, trigger, Exception Handling.

Reference Books:

1. Database System Concepts By KorthSilberschetz
2. Fundamentals of Database Systems by Elmsari, Navathe
3. Teach Yourself SQL in 14 Days by Jeff Parkins and Bryan Morgan
4. An Introduction to Database Systems by Bipin Desai
5. SQL and PL/SQL Programming by Ivan Bayross
6. SQL and PL/SQL Programming by Oracle Press

LABORATORY COURSE IN C++

1. Write a program to calculate factorial of given number by using recursion.
2. Write a program for addition, subtraction, multiplication and division of two complex numbers by using return by object method.
3. Create 2 distance classes “class A” stores distance in meter and cm and “Class B” stores distance in feet and inches and add two distances by friend function and display the result.
4. Generate the result for 5 students with following data - Name, exam no, Theory marks in 5 subjects, grade. Use array of object concept.
5. Write a program for constructor overloading.
6. Write a program to calculate root of quadratic equation by using default argument constructor.
7. Write a program to demonstrate friend function, friend class, member function of a class is friend to another class.
8. Write a program to count no. of objects created by using static data member & member function.
9. Write a program to overload unary operators (++ , - - , -).
10. Write a program to overload binary operator.(+ , - , * , / , %) by using member function and friend function.
11. Write a program to implement-- Simple inheritance, Multiple inheritance, Multilevel inheritance, Multipath inheritance, Hybrid inheritance and Hierarchical inheritance.
12. Write a program to use virtual base class.
13. Write a program to demonstrate constructor invocation (use 4 classes)
14. Write a program to demonstrate use to virtual function
15. Write a program to demonstrate Abstract class.
16. Write a program to implement all manipulators
17. Write a program to implement ostream, istream class

18. Write file handling program for following operations
 - a. copy one file into another file
 - b. append one file into another
 - c. read numbers from one file and write only even numbers into another file.
 - d. To counts total numbers of lines, words and characters present in file
 - e. To check whether two files are identical or not
 - f. Write at least 5 employee information in file
19. Write a program to random file access
20. Write a program to implement command line argument
21. Write a program to for parameter passing technique

LABORATORY COURSE IN DS

1. Write a program on recursive function
2. Write a program to implement stack using array and using list.
3. Write a program to check whether the expression is valid or not.
4. Write a program to convert infix expression to postfix.
5. Write a program to implement queue using static and dynamic method.
6. Write a menu driven program to implement singly, doubly, singly circular , doubly circular linked list with operation
 - a) insert at beginning of linked list
 - b) insert at specific position
 - c) insert at end
 - d) delete the first node
 - e) delete specific node
 - f) delete last node
 - g) display the list
7. Write a menu driven program to implement singly linked list with operation
 - a) sort list
 - b) maximum value
 - c) minimum value
 - d) find & replace a value
 - e) count the number of nodes.
8. Write a program to create binary search tree and display its contents by using inorder, preorder and postorder traversal method.
9. Write programs to implement
 - a) Bubble Sort Technique.
 - b) Straight Selection Sort Technique.
 - c) Simple Insertion Sort Technique.

- d) Shell Sort Technique.
- e) Quick Sort Technique.
- f) heap sort technique.
- g) address calculation Sort Technique.
- h) Radix Sort Technique.
- i) Merge Sort Technique.

10. Write programs to implement

- a) sequential searching Technique.
- b) indexed searching Technique.
- c) Binary searching technique

11. Write a program to add, subtract two polynomials by using Linked list

Note: - Try to implement at least 5 programs on Linux operating system

Lab on DBMS

1. Create table employee (eno, name, dept, basic salary, HRA, tax, deduction). Dept are D1, D2, D3 and D4. Use constraints.
 - a. Insert 20 records.
 - b. Display total amount spend by company on salary.
 - c. Display name of dept for which company spend maximum amount.
 - d. Display average salary of employee in company.
 - e. Display average salary of each dept.
 - f. Display total salary for each dept.
 - g. Display highest salary for each dept.
 - h. Display different between average of max salary for each dept and average of each dept.
 - i. Display no of dept in the company.
 - j. Display name of all employee whose basic pay is higher then average salary.
 - k. Display average, minimum, maximum salary of each dept.
 - l. Display dept average of dept whose employee >5.
2. Create following table. Book (id, title, author, publisher, category, year, price) Distributor(did, name, city, discount) and Order(order_no, title, did, qty)
 - a. Display title and category of all books.
 - b. Display the total no of books per year.
 - c. Display list of authors.
 - d. Display the books published in 1991,92 and 93.
 - e. Display the books published from 1991 to 95.
 - f. Display the books whose price is greater than200.
 - g. Display the total no of books of each category.
 - h. Display titles of all books whose price is greater than average price.

- i. Display the list of all books whose price is greater than average price of “computer” category.
- j. Show the name of all the distributors who supply “software testing” books.
- k. Display the details of all books whose price is greater than the maximum of the category average.
- l. Display name of all books who are supplying the books whose author is ‘Pressman’.

3. Create the following table & solve given queries.

Table Name : branch

Column_name	Datatype	Constraint	Description
Bno	number(4)	Primary key	Branch number
bname	Varchar2(20)	Not null	
city	Varchar2(15)	Not null	

Table Name : customer

Column_name	Datatype	Constraint	Description
Cust_no	Number(6)	Primary key	
Cust_name	Varchar2(20)	Not null	
City	Varchar2(15)	Not null	

Table Name : deposit

Column_name	Datatype	Constraint	Description
Acc_no	Varchar2(5)	Primary key	Starts from ‘D’ character
Cust_no	Number(6)	Foreign key	references table ‘customer’
Bno	Number(4)	Foreign key	Branch number references from table ‘branch’
Amount	Number(9,2)	Not null	Default amount is 500.00
Adate	Date	Not null	Date of money deposited

Table Name : borrow

Column_name	Datatype	Constraint	Description
Loan_no	Number(5)	Primary key	
Cust_no	Number(6)	Foreign key	references table 'customer'
Bno	Number(4)	Foreign key	references from table 'branch'
Amount	Number(9,2)	Not null	Default amount is 500.00

- a) Give names of depositors having amount greater than 4000.
 - b) Give name of customer having living city BOMBAY and branch city DELHI.
 - c) Give name of customers who are borrowers as well as depositors and having living city NAGPUR.
 - d) Give name of customers who are depositors and have the same branch city as that of sunil.
 - e) Give names of depositors having the same living city as that of shivani and having deposit amount greater than 200.
 - f) Give names of borrowers having deposit amount greater than 1000 and loan amount greater than 2000.
 - g) Give names of borrowers having loan amount greater than the loan amount of anil.
 - h) Give loanno and loan amount of borrowers having the same branch as that of depositor sunil.
 - i) Give loanno, loan amount, account no, and deposit amount of customers living in city NAGPUR.
 - j) Give loanno, loan amount, account no, and deposit amount of customers having deposit branch located in delhi.
4. write a plsql block to find maximum number.
5. Write a program to find grade of marks.

6. write a plsql block for insert 10 rows in table.
7. write a plsql block for display sum of first n numbers.
8. write a function which return multiplication of two numbers.
9. write a plsql block to demonstrate the reverse loop.
10. write a procedure without parameter.
11. Define cursor for display information of student.
12. Write a procedure for addition and subtraction of two numbers.
(Return result).
13. Create user A and B. create table student (roll_no, name) by user A.
Create trigger for avoid update or delete in table by user B.
14. Create a package for addition and multiplication of two numbers.
15. Create trigger for generating primary key.
16. Create trigger for avoiding inserting the records whose address
'solapur' and deleting the records whose address 'satara'.(use any
table with address field).
17. Create overloaded functions for addition of numbers.
18. Create package for addition, multiplication.
19. Implement function overloading.
20. Create function with cursor.
21. Create package which contain procedure, function , cursor.