Solapur University, Solapur
Semester Pattern Revised Syllabus of B.Sc.-II
Computer Science
(w. e. f. June-2014)

Semester - III

Paper Code	Paper Name	Theory / Practical	Marks
V	Object Oriented Programming using C++	Theory	50
VI	RDBMS	Theory	50
Lab-II	Lab course is based on paper-V & VII	Practical	--
Lab-III	Lab course is based on paper-VI	Practical	--
Total Marks			**100**

Semester - IV

Paper Code	Paper Name	Theory / Practical	Marks
VII	Data Structures	Theory	50
VIII	System Analysis and Design	Theory	50
Lab-II	Lab course is based on paper-V & VII	Practical	50
Lab-III	Lab course is based on paper-VI	Practical	50
Total Marks			**200**

Paper-V
Object Oriented Programming using C++

Unit- 1 : Object oriented concepts [8]

Difference between object oriented and procedural oriented programming, the object oriented approach, Object oriented design, Concept of OOP –Data abstraction , Encapsulation , Inheritance , Polymorphism

Introduction to C++ : Introduction, Terminology –Tokens ,keywords, Identifiers, Basic Data types, Operators, Input –Output streams, Structure of C++

Unit- 2 : Classes and objects [10]

Concept of Class and Object, Simple class, Member function, private, public & protected member, Array of objects, Nested class, Passing objects as parameter, Inline function, reference arguments

Constructor and Destructor : Introduction of constructor and destructor, Default constructor, Copy constructor, Parameterized constructor, Multiple Constructor in class, Friend function

Unit- 3 : Polymorphism [10]

Concepts, Types of polymorphism, Overloading of function, Virtual function

Operator overloading and type conversions : Concept of operator overloading, Rules for overloading operators, Overloading of Unary, Binary and Special operators, Type conversion, Dynamic memory allocation (New and Delete) , this pointer, Dynamic Initialization of variable, reference variable

Unit- 4 :Inheritance [7]

Concept of inheritance, defining base and derived classes, Behavior of constructor and destructor in inheritance, Types of Inheritance, Virtual Class, Delegation

Unit-5: Streams [8]

Introduction, C++ Streams, C++ stream classes, Unformatted I/O Operations, Managing output with manipulators. Opening and closing a file,

Detecting end of file,More about open( ) : File modes, file pointers and their manipulations, sequential input and output operations,

Updating a file :Random access, Error handling During file Operations.

Reference Books

1. Object oriented programming by E. Balgurusamy
2. Mastering C++ by Venugopal
3. Mastering C++ by Ravichandran

Paper VI

RDBMS

Unit- 1 : Introduction to RDBMS [6]

Definition of data and data information, database, Concepts of DBMS & RDBMS, DBA & responsibilities of DBA, RDBMS terminology, Relation, Attribute, Domain, Tuple

Unit- 2 : SQL(Structured Query Language) [10]

Features of SQL, Data types, Integrity Constraints, Classification of SQL commands, SQL operators and clauses, Logical, Relational, in, between, like operator, Order by, group by, having clause

SQL functions : Arithmetic functions, Conversion functions, Aggregate functions, Date Functions, String Functions, Views, indexes, sequence, synonyms

Unit- 3 : Sub queries and join [5]

Sub queries, Join : Cartesian Join, Equi-Join, Self Join, outer join

Unit- 4 : PL-SQL [8]

Comparison between SQL and PL/SQL, Advantages of PL/SQL

Structure of PL/SQL

If-else construct, Loop statement for loop, while loop

Unit- 5 : Cursor [16]

Definition of cursor, Types of cursor-implicit, Explicit, Open, Fetch, Cursor Attributes, Close cursor, Use of cursor.

Procedure & function : Definition of procedure & functions., IN, OUT AND INOUT Parameters, Triggers, Packages, Exception handling

Reference books :

1. Database System Concepts-Korth, Silberschetz, Sudarshan.
2. Oracle, The Complete Reference- Oracle Press.
3. SQL & PL/SQL-Ivan Bayross

Paper – VII

Data Structures

Unit- 1 : Introduction to Data structure and Array [4]

1. Concept of Abstract Data Types
2. Definitions – Data types, Data objects, Data Structure.
4. Array

Unit- 2 : Stack and queue [13]

1. Definition of stack.
2. Operations on stack
3. Representation of Stack
4. Applications of stack –Recursion, infix, prefix and postfix expression.
5. Definition of queue
6. operations on queue
7. Types of queue –Linear and Circular queue
8. Implementation of Linear and Circular Queue.
9. Priority queue
10. Applications of queue
11. Comparison between Stack and Queue.

Unit- 3 : Linked List [8]

1. Drawbacks of sequential storage
2. Concept of Linked List
3. Implementation of Linked List
4. Operations on List
5. Operation On circular linked list ,Doubly Linked List
6. Implementation of Stack and queue using linked list

Unit- 4 : Trees [8]

1. Tree terminology
2. Representation of Binary Trees
3. Operation on binary trees
4. Tree Traversal – (Preorder, Inorder, Postorder)
5. AVL tree, threaded binary tree.

Unit- 5 : Sorting and Searching [12]

1.Introduction

2. Efficiency consideration

3.Sorting Methods.

i) Exchange Sort

ii) Bubble Sort

iii) Insertion Sort.

iv) Selection sort and tree sort

v) Merge and radix sort

4. Linear Search

5. Binary Search- B-Tree, B+-Tree.

6. Indexed sequential search

7. Tree search- multiway search tree

8. Hashing.

Reference Books

1. Data structure using C++ by Tannenbaum
2. Aho, Hopcroft,Ulman:Data structures and Algorithms.
3. Nikaulus Wirth:Algorithms,data structures, Programs.

Paper – VIII

System Analysis and Design

Unit- 1 : System Analysis and design overview [8]

Meaning and definition , Characteristics , Elements of System, and Types of system, subsystem, System development life cycle, and feasibility study operational, Technical, And Economical

Unit- 2 : System Analysis [5]

Definition, Role & skills of system Analyst, System planning and initial Investigation, Fact finding Technique – Interviews, Questionnaires, Record reviews, observation

Unit- 3 : Charting Technique [6]

Decision Tables, Decision Trees, Program flowchart, System flowchart, Table contents

Unit- 4 : Process, Data and System design [14]

Context diagram, Data flow diagram- Level of DFD, Drawing DFD for payroll system etc, Concept of Entity. Attributes, Types of relation, Entity Relationship Diagram, Normalization –forms of normalization (upto 3 NF)

Input Design, Output Design, File Design.

Unit- 5 : System Implementation [12]

Hardware and software selection , System Testing-Black Box, White Box Testing etc., System Implementation.

Case studies : Library information system, college admission system, payroll system

Reference Books :

1. System Analysis and Design-Awad E. H.
2. System Analysis and Design- Parthsarathy/Khalkar
3. Software Engineering –Roger Pressman

Lab - II

Lab course is based on paper-V and VII.

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 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 subject, grade.
   Use any form of constructor.

5. Write a program to calculate root of quadratic equation by using default argument constructor.

6. Write a program to demonstrate friend function ,friend class, member function of a class is friend to another class.

7. Write a program to display no. of objects created by using static data member & member function.

8. Write a program to overload unary operators (++, - -, -).

9. Write a program to overload binary operator.(+, -, *, /, %).

10. Write a program to overload binary operator.(+, -, *, /, %) by using friend function.

11. Write a program to concatenate string using operator overloading.

12. Write a program to implement--
    a. Simple inheritance.
    b. Multiple inheritance.
    c. Multilevel inheritance.
    d. Multipath inheritance.
    e. Hybrid inheritance.
    f. Hierarchical inheritance.

13. Write a program to for hybrid inheritance by using virtual base class

14. Write a program to demonstrate constructor invocation (use 4 classes)

15. Write a program to demonstrate use to virtual function

16. Write a program to implement all manipulators

17. Write a program to implement istream class

18. Write a program to implement ostream class

19. Write a program to copy one file into another file

20. Write a program to append one file into another

21. Write a program to which shows sequential file access

22. Write a program to random file access

23. Write a program to implement command line argument

24. Write a recursive function
    a. to find the prime number.
    b. to find out face value of given number.
       (e.g. 5678 -> 26 -> 8)

25. Write a menu driven program to implement stack (using array)

26. Write a program to check whether the expression is valid or not.

27 Write a program to convert infix expression to postfix.

28. Write a program to implement queue (array).

29. Write a program to implement queue dynamically.

30. Write a program to implement stack dynamically.

31. Write a menu driven program to implement singly linked list with operation
    a) insert at beginning of linked list
    b) delete the first node
    c) insert at the end of linked list
    d) delete the last node
    e) display the list

32. 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.

33. Write a program to implement singly circular linked list.

34. Write a menu driven program to implement various operations on doubly linked list with operation.

35.Write a program to create binary search tree and display its contents by using inorder traversal method.

36. Write a program to create binary search tree and display its contents by using preorder traversal & postorder traversal method.

37. 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) binary search tree Technique.
    g) heap sort technique.
    h) address calculation Sort Technique.
    i) Radix Sort Technique.
    j) Merge Sort Technique.

38. Write programs to implement
    a) sequential searching Technique.
    b) indexed searching Technique.

39. Write a program to implement simple hash function.

40. Write a program to traverse a graph through BFS method.

41. Write a program to traverse a graph through DFS method.

42. Write a program to add two polynomials by using array (single variable).

43. Write a program to add two polynomials by using Linked list (single variable).

44.Write a program to subtract two polynomials by using Linked list (single variable).

44. Write a program to represent matrix as sparse matrix.

45. Write a program to transpose sparse matrix.

46. Write a program to add two sparse matrix.

Lab –III

Lab course is based on paper- VI

1. Consider the following table and solve the following queries:

Table Name : Employee

Column_name	Datatype	Constraint	Description
Eno	Varchar2(6)	Primary key	Starts from 'E' character
Ename	Varchar2(20)	Not Null	
Eaddr	Varchar2(20	Not Null	
Edob	Date	Not null	
Edname	Varchar2(20)	Not null	Dept name must be from sales, purchase, production, research, marketing
Emgr	Varchar2(20)	Not null	
Ejob	Varchar2(12)	Not null	
Edoj	Date	Not null	Date of joining must greater than edob
Esal	Number(9,2)	Not null	Default 5000.00

1. Insert at least 10 records.
2. Display all the employees working in 'sales' dept.
3. Sort the employee list according to joining date.
4. Increase 5% salary whose experience is more than 2 years.
5. Display the names of employees in ascending order of employee name.
6. Find out employee who are either working as 'Analyst' or salary greater than 5000.
7. List the department name, no. of employees in each department
8. Find out the employee who is getting maximum salary.
9. Remove the employees who work as 'clerk' or 'account'.
10. Raise the salary of all 'salesman' by 20%.
11. Display the names of employees whose age is greater than 50.
12. Display the all details of employees who are not manager.
13. Display the names of employees having experience more than 5 years in the company.
14. Display the names of employees whose salary is greater than employee 'ramesh' but less than 'sunil'.
15. Display the depart names who are having more than 3 employees.
16. Display the job names whose total salary is greater than 40000 for each job.
17. Display the names of employees who are getting highest salary.
18. Display the names of employees who are getting 5 digit salary.
19. Write a query to list the employees who jave joined in the last seven days
20. List all the employees whose names are having 'R' as last character.
21. Find all the employees who joined the company before their manager.
22. Display the department where there are no employees.
23. Display those emp whose salary is odd value.

2. Write a PL/SQL block to display the details of given emp_no.

3. Write a PL/SQL block of code to calculate the area of a circle for a value of radius & store calculated area in a table.

4. The HRD manager has decided to raise the salary for all the employees working as salesmanby 0.05%. Whenever such raise is given to the employees, record for the same is maintained in the emp_raise table. It includes emp_no, date when the raise was given & actual raise. Write a PL/SQL block to update salary of each employee & insert a record in the emp_raise table.

5. Define cursor that will accept acc_no & update the balance amount (bal_amt) by 3% as intrest if bal_amt>1,00,000 from the Acc_Master(acc_no, name, city, bal_amt).

6. Consider the tables salespeople(snum, sname, city, commission).Write a PL/SQL block to increase commission of a particular salesperson by the given increment value.

7. Consider the following entities & their relationship s.
   Employee(empno, empname, joiningdate, sex, salary, commission, deptno)
   Department(deptno, deptname, location)
   1. Display names of all employees working in the 'Accoutns' department .
   2. Display names of all employees alongwith their salary and department name.
   3. Display names of all departments alongwith no. of employees working in that department.

8. Consider the following entities & their relationships.
   Company(company_name, address,city, phone, share_value)
   Person(per_name, per_city)
   Comp_per(company_ name, per_name, no_of_shares)
   Company & person are related with many-to-many relationship.
   1. Write a PL/SQL block to transfer the shares owned by 'Mr.Kale' to 'Mr. Joshi'.
   2. Write a PL/SQL block to print name of persons alogwith their total invested values in various companies.

B. Sc. (Computer Science) – II (Semester Pattern)
Nature of Practical Examination

1. No. of sections : 02
2. Each section contains 02 questions
3. Each question carries 20 marks.
4. Attempt one question from each question. : 40 marks
5. Viva : 10 marks

Total Marks **: 50 marks**