Reg. No. ☐☐☐☐☐☐☐☐☐☐☐☐☐

B.E. / B.TECH. DEGREE EXAMINATION, DEC 2022

Fifth Semester

CS18551 – PROGRAMMING AND DATA STRUCTURES

(Electrical and Electronics Engineering)

(Regulation 2018)

TIME: 3 HOURS   **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Apply the basic concepts of Object-Oriented Programming to solve computational problems.	4
CO 2	Apply Inheritance and Polymorphism concepts for real world problems	5
CO 3	Implement abstract data types for linear data structures	5
CO 4	Apply non-linear data structures to solve various problems	4
CO 5	Implement sorting and searching algorithms.	4

PART- A(10x2=20Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	How do you dynamically allocate / deallocate a memory for an array in C++?	1	2
2.	Will all predefined C++ operators be overloaded?	1	4
3.	Differentiate static binding and dynamic binding.	2	4
4.	class Box{	2	2

```
class Box{
int capacity;
public:
Box();
void print();
friend void show();
bool compare();
friend bool lost(); };
```

How many member functions are there in this class Box and explain it?

		CO	RBT LEVEL
5.	Compare the advantages and limitations of arrays over linked list.	3	4
6.	The following sequence of operation is performed on an empty stack of size 5:	3	3

Push (1), Push (2), Pop, Push (3), Push (4), Pop, Pop, Push (5),Pop, Pop.
Determine the sequences of popped out values.

7.	Represent the below graph as an adjacency matrix.	4	3
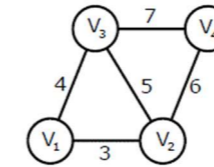
8.	Differentiate DFS and BFS traversals	4	4
9.	Illustrate the trace of Binary Search to search the key 102 in the key set <34, 67, 89, 90, 100, 102>.	5	3
10.	Write an algorithm to search a given set of keys in unordered list	5	2

PART- B (5x 14=70Marks)

		Marks	CO	RBT LEVEL
11. (a)	Create a class weight with kilogram and gram as its member variables and necessary read/write functions. Write a C++ program to calculate the sum and difference of two weight objects by overloading binary + and – operators as friend functions.	(14)	1	3

(OR)

		Marks	CO	RBT LEVEL
(b)	Create a class Student<NAME, GENDER, REG_NO>. Write read/write functions to read and display a Student details. The class should contain parameterized constructor with default value for Gender as M, Copy constructor and Destructor. Demonstrate the call of created constructors and functions from main().	(14)	1	3

		Marks	CO	RBT LEVEL
12. (a)	Write a C++ program to design a base class Person (name, address, phone_no). Derive a class Employee (eno, ename) from Person. Derive a class Manager (designation, department name, basic-salary) from Employee. Write a menu driven program to: a. Accept all details of 'n' managers. b. Display manager having highest salary.	(14)	2	3

(OR)

		Marks	CO	RBT LEVEL
(b)	Implement the following pseudo-code as an executable C++ program by including necessary constructs and replacing the comments with logical statements. You can design the access specifiers appropriately.	(14)	2	3

Class Employee

// zero parameterized constructor

//name, aadharno, age as member variables,

read( )//pure virtual function

display() // pure virtual function

// Create a destructor

Derive FullTimeEmployee from Employee

// Designation, salary as member variables

read( ) {//read ALL details }

display() {//print ALL details }

// Create a destructor

Derive PartTimeEmployee from Employee

// No_of_hours, hourly_charges as member variables

read( ) {//read ALL details }

display() {//print ALL details }

// Create a destructor

main() { /**

Read and display Employee details using an employee pointer that dynamically points to FullTimeEmployee and PartTimeEmployee. Ensure that destructors are executed in proper order.**/}

13. (a) Write the pseudo code for INSERT(LIST L, index k), DELETE(LIST L, index k) to insert and delete a node at index k in a singly linked list L. **(14)   3   3**

(OR)

(b) Write the enqueue and dequeue routines for queue using linked list. Show the content of the front and rear positions of the Queue after the following operations are performed. **(14)   3   3**

    Enqueue 15, 17, 26

    Dequeue

    Enqueue 83

    Dequeue

    Dequeue

    Enqueue 40

14. (a) Explain in detail about Binary Search Tree and its operations with a suitable example. **(14)   4   2**

(OR)

(b) Explain in detail about Dijkstra's Shortest Path Algorithm with a suitable example. **(14)   4   2**

15. (a) Show how the numbers < 15, 16, 18, 11, 13, 14, 17, 19, 12, 20> are sorted using quick sort and write the pseudo code. **(14)   5   3**

(OR)

(b) Choose an effective algorithm to search a key from the set of sorted keys. Write its pseudo code and apply it to search 44 from <11, 22,33, 44,66,77,88,99>. **(14)   5   3**

PART- C(1x 10=10Marks)
(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	Develop an application for Student Management System.	**(10)**	**2**	**5**