END SEMESTER EXAMINATION, JUNE-2023
Computer Science Workshop2 (CSE3141)

Programme:BTech(CSE/CSIT)　　　　　　　　　Semester: 4th
Full Marks: 60　　　　　　　　　　　　　　　Time: 2 Hours

Subject/Course Learning Outcome	*Taxonomy Level	Ques. Nos.	Marks
Analysis algorithm, using time and space complexity.	L3	Q1	5
Understanding and effectively use ADT, java collection, sorting and searching.	L3	Q2	5
Applying linked list, stack, queue on different problem solving.	L3	Q3, Q4	5+5
Applying priority queue, graph on problem solving.	L3	Q5, Q6	5+5+5 +5
Understanding algorithm design techniques.	L4	Q5	5+5
Applying design techniques on problem solving.	L4	Q6	5+5

*Bloom's taxonomy levels: Knowledge (L1), Comprehension (L2), Application (L3), Analysis (L4), Evaluation (L5), Creation (L6)

Answer all questions. Each question carries equal mark.

1. (a) Given an array of positive integers representing edges of triangle. Write a program to find the number of triangles that can be formed from these elements representing side of triangle.　　5

   (b) Given an array of integer and a range. Write a program to partition array so that values smaller than range come to left, then values under the range followed with values greater than the range.　　5

2. (a) Write a program to create an **Employee** class having private 5
member name, age, id, and required method and constructor.
Create a **Node** class having member info reference to
Employee object, and next and require constructor both
default and parameterized. Create another class **LinkedList**
has a member function to create a list and to display the list.

(b) Add a method to **LinkedList** class to delete all the nodes 5
whose id is same as the id of a given employee object. Add a
method to **LinkedList** class to find Nth node from beginning.
Create a class **LinkedListApp** has main function and call all
the method created for execution.

3. (a) Write a program to create a class **Stack** has member char 5
array[], maxSize ,top and required constructor. Add method
isEmpty to check stack is empty or not, push, pop, display
method to **Stack** class.

(b) Create a class **StackApp** and add a method to the class which 5
takes an infix equation and return true if the number of open
parentheses is equal to close parenthesis otherwise false. Add
a main method to check the balance parenthesizing of an infix
equation.

4. (a) Write a program to solve josephus problem using queue. 5
Note: Josephus' problem is, there are n people are seating in
a round table. Kth people from start is going to be execute,
The execution proceeds around the circle until only the last
person remains. Find the position where you want to stand
and gain your freedom.

(b) Create a static function which takes an integer array and 5
make it as minimum heap. Create another static function
which takes an array and check, is it minheap or not. Invoke
both the function for execution.

5. (a) Create a class **File** having member fileId, size and required 5
constructor and method. Create a class **BNode** has member
info to store a File object, left to point to left child, right to
refer to right child. Create the required constructor. Create
another class **BST** having a member root, add required
constructor, add a method to inset a node in binary search
tree.

(b) Add method to **BST** to traverse a tree in in-order, find-max to 5
find the node with maximum file size and find-min to find the
node with minimum file size. Invoke The above methods for its
execution.

6. (a) Create a class **Graph** and has member a 2D matrix, and N 5
number of vertex. Add the required constructor to it. Add a
method to the Graph class to read a graph and store it in the
2D matrix. Add a DFS method to **Graph** class to traverse the
vertices of the graph and a main method to invoke all the
methods.

(b) Write an algorithm to find the minimum spanning tree from a 5
graph using prims algorithm.

End of Questions