Course Name: Design and Analysis of Algorithms

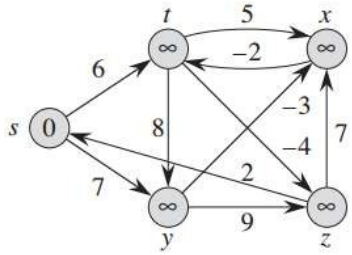
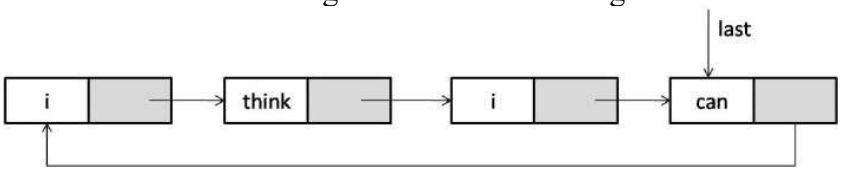
Course Outcomes (COs):

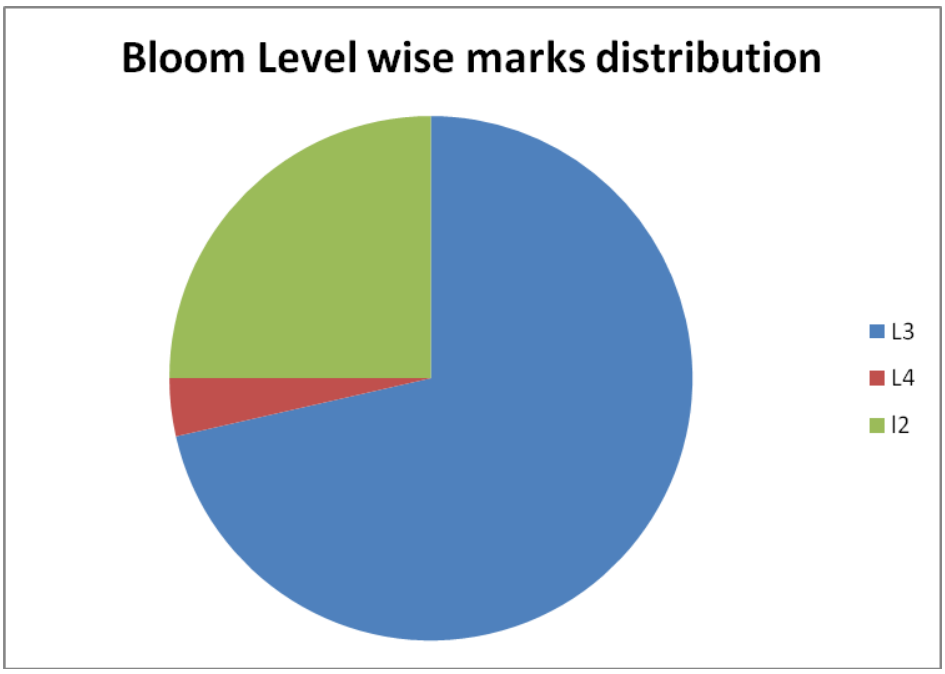
At the end of the course the student should be able to:

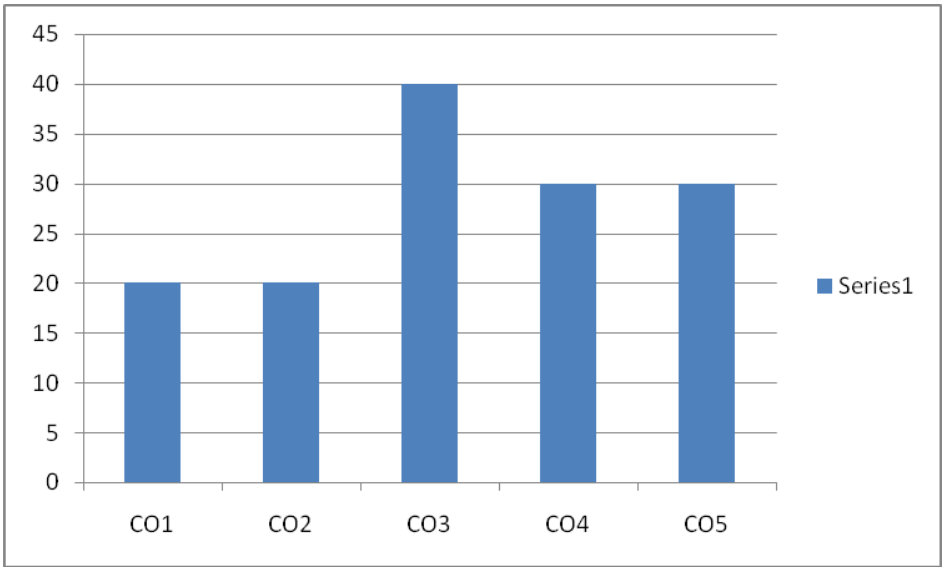
1. Discuss features of algorithms and analyze the differences between recursive and iterative algorithmic structure.
2. Analyze the role of design structures in structuring and manipulating solutions and implement respective programs.
3. Discuss the properties, operations, applications, strengths and weaknesses of the different algorithmic design approaches and their analysis.
4. Analyze, interpret and compare various problem solving strategies and their efficiency analysis
5. Discuss the storage management for efficient access of data

Model Question Paper for End Semester Examination					
Course Code:BCST603		**Course Title: Design and Analysis of Algorithms**			
Duration: 3 hrs		**Max. Marks: 100**			
Note: Answer five questions; any Four questions from each unit-I and unit-II and Two full question from unit-III, IV & V					
Unit-I					
Q.No	Questions	Marks	CO	PI Code	B L
1 (a)	Suppose we wish to search a linked list of length n, discuss best, worst and average case of searching a random element.	5	CO3	L3	1.4.4
(b)	With the help of suitable code discuss travelling salesman problem.	5	CO2	L2	1.4.4
(c)	Differentiate between Linear and non-linear data structures with suitable example.	5	CO1	L3	1.4.4
(d)	Write an algorithms to print the nth node from end of a singly linked list	5	CO2	L3	1.4.4
(e)	Complete the function described below: Function Name: welcome Input Params: base address of string Return Type: base address of welcoming string Description: A manager wants to generate welcoming notes for its employees.For inputstring “Parker”, the function should produce “Welcome Parker”. Do not use any inbuilt string handling functions	5	CO1	L3	1.4.4
Unit-II					

2 (a)	You have been invited to a post-exam party. i) You walk in and shake everyone's hand. As the number of attendees Nincreases, what is the order of growth to shake everyone's hand? Justify. You meet everyone else and during each meeting, you talk about everyone else in the room. To what efficiency class does this belong to? Justify.	5	CO3	L4	1.4.4
(b)	Create a AVL Tree for: 50, 60, 80, 30, 20, 40, 70 Can you perform the three tree traversals on AVL tree? Justify youranswer.	5	CO3	L3	1.4.4
(c)	Bring out the differences between BFS and DFS algorithm. Also compare with respect to efficiency analysis.	5	CO4	L2	1.4.4
(d)	Write a algorithm for given below description:ALGORITHM CountLeafNodes(T) // Recursively counts the number of leaf nodes in the tree T	5	CO3	L3	1.4.4
(e)	Which algorithm design technique is used for the given below algorithms/problems: i) Merge Sorting ii) Binary Search iii) Fractional knapsack problem iv) 0/1 knapsack problem v) Travelling salesman problem vi) N-Queen's Problem vii) Graph coloring problem viii) Matrix chain multiplication ix) Job sequencing with deadline Prim's algorithm	5	CO4	L2	1.4.4
	Unit-III				
3(a)	Apply Quick Sort on the following: D I V I D E A N D C O N Q U E R Write the efficiency analysis of quick sort (Best, Worst, and Average).	10	CO4	L3	1.4.4
(b)	Write a function to delete a node from a Binary Search Tree. Suitablycomment the code explaining each of the cases.	10	CO3	L3	1.4.4
(c)	A file consists of t e x t data. Write a program to read and count the number of appearances of 'is', 'am', 'are' .Write the individual count in a separate file.Also find the size of the file.	10	CO5	L3	**2.1.2**
	Unit-IV				
4(a)	With a help of a suitable program explain the concept of divide and conquer strategy and how it can be used to minimize the time complexity.	10	CO5	L3	1.4.4

(b)	Apply Dijkstra's Algorithm on the given graph.  How is Bellman-Ford different from Dijkstra's Algorithm? To what design technique does the algorithm belong to? Explain.	10	CO4	L3	1.4.4
(c)	Write the modules to implement the following using appropriate data structure: 1. Check if the given string is palindrome 2. Sort the given set of integers	10	CO3	L3	1.4.4
	Unit-V				
5(a)	Using state space tree prove that: 1. There is no solution for a 2 queen problem 2. There are multiple solutions for a 4 queen problem	10	CO1	L2	1.4.4
(b)	Consider the circular list given below with string data:  Write a function which will display the output in following fashion: *can* *ican* *think i can* *i think i can* At each line, the function should display data from all the nodes present.After printing each line, an appropriate node has to be deleted. After printing the last line, "last" pointer should be holding the NULL value.	10	CO2	L3	1.4.4
(c)	Describe NP –Hard and NP complete problems with example. Also differentiate among them.	10	CO5	L2	1.4.4





BL – Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3 – Applying, 4 – Analysing, 5 – Evaluating 6 - Creating)

CO – Course Outcomes

PO – Program Outcomes;

PI Code – Performance Indicator Code

Competency addressed in the Course and corresponding PerformanceIndicators

Competency	Performance Indicators
1.4: Demonstrate competence in computer science engineering knowledge	**1.4.4** Apply machine dependent/independent features to build system modules.
2.1: Demonstrate an ability to identify and characterize an engineering problem.	**2.1.2**: Identify processes, modules, variables, and parameters of computer based system to solve the problems.

Eg: 1.2.3: Represents Program Outcome „1", Competency „2" and Performance Indicators „3".