	Course Title: **Design and Analysis of Algorithms Lab**		
Design & Analysis Of Algorithms	Scheme (L:T:P) : **0:2:4**	Total Contact Hours: **78**	Course Code: **15CS56P**
	Type of Course: **Tutorial and Practical's**	Credit :**03**	Core/ Elective: **Core**
CIE- 25 Marks			SEE- 50 Marks

Prerequisites

Knowledge of Data Structures.

Course Objectives

1. Write sorting programs using Divide-and-Conquer techniques.
2. Implement to find the minimum cost spanning tree and shortest path using different Greedy techniques.
3. Construct DFS, BFS programs and topological ordering using Decrease-and-Conquer technique.
4. Implement knapsack, travelling salesperson

Course Outcome

On successful completion of the course, the students will be able to attain CO:

	Course Outcome	**Experiment linked**	**CL**	**Linked PO**	**Teaching Hrs**
CO1	Demonstrate Quick sort and Merge sort and calculate the time required to sort the elements.	*1,2*	*U,A,AL*	1,2,3,4,6,7,8,9,10	**12**
CO2	Implement the topological ordering of vertices, travelling salesman problem and Knapsack problem.	*3 to 5*	*U,A*	1,2,3,4,6,7,8,9,10	**18**
CO3	Construct programs to check graph is connected or not using BFS and DFS methods	*6,7*	*U,A,AL*	1,2,3,4,6,7,8,9,10	**15**
CO4	Implement programs on divide and conquer, decrease and conquer	*8,9*	*U,A,AL*	1,2,3,4,6,7,8,9,10	**15**
CO5	Experiment finding the minimum cost of spanning tree using Prim's algorithms and shortest path using Dijkstra' algorithm.	*10,11*	*U,A,AL*	1,2,3,4,6,7,8,9,10	**18**
			Total sessions		**78**

Legends: R = Remember U= Understand; A= Apply AL=Analyze E=Evaluate and above levels (Bloom's revised taxonomy)

Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Design and Analysis of Algorithms Lab	3	3	3	3	-	3	3	3	3	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.
Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.
If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3
If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2
If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1
If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

List of Graded Practical Exercises

Sl.No	Practical/Exercise
1	Sort a given set of elements using the Quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n.
2	Sort a given set of elements using merge sort method and determine the time required to sort the elements. Repeat the experiment for different of values of n.
3	Write a program to obtain the topological ordering of vertices in a given digraph.
4	Implement travelling salesman problem.
5	Implement the knapsack problem (0/1).
6	Print all the nodes reachable from a given starting node in a digraph using BFS method.
7	Check whether a given graph is connected or not using DFS method.
8	Write a program to implement binary search using divide and conquer technique
9	Write a program to implement insertion sort using decrease and conquer technique
10	Find minimum cost spanning tree of a given undirected path using a Prim's algorithm.
11	From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.

Note: Use any programming tools like C/Java/Python to execute the above exercises.

Reference

1. **Introduction to the Design and Analysis of Algorithms** ,3rd edition, Anany Levitin, Pearson Publication, ISBN: 9789332583771

Suggested list of student activities

Note: the following activities or similar activities for assessing CIE (IA) for 5 marks (Any one)
   1. Each student should conduct different activity and no repeating should occur.

1.	Using C/Java/Python, build and execute any one of the unsolved exercise given at the end of each chapter of the reference text.

Course Delivery

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The course will be delivered through Demonstration and Practices

Course Assessment and Evaluation Scheme

Method	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
Direct Assessment	CIE (Continuous Internal Evaluation)	IA	Students	Two tests (average of two tests)	10	Blue books	1,2,3,4,5
				Record	10	Record	1,2,3,4,5
				Student activity.	05	Report.	
				Total	**25**		
	SEE (Semester End Examination)	End Exam		**End of the course**	**50**	Answer scripts at BTE	1,2,3,4,5
Indirect Assessment	Student Feedback on course		Students	Middle of the course		Feedback forms	1,2,3 Delivery of course
	End of Course Survey			End of the course		Questionnaires	1,2,3, 4 & 5 Effectiveness of Delivery of instructions & Assessment Methods

*CIE – Continuous Internal Evaluation   ***SEE** – Semester End Examination

Note:
1. I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.
2. Rubrics to be devised appropriately by the concerned faculty to assess Student activities.

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No	Bloom's Category	%
1	Remembrance	10
2	Understanding	30
3	Application	30
4	Analysis	30

   1. Blue books (10 marks)
   2. Record (10 marks)
   3. Student suggested activities report for 5 marks
   4. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods.

Format for Student Activity Assessment

DIMENSION	Unsatisfactory 1	Developing 2	Satisfactory 3	Good 4	Exemplary 5	Score
Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collects some basic information; refer to the topic	Collects relevant information; concerned to the topic	Collects a great deal of information; all refer to the topic	3
Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs all duties	Performs all duties of assigned team roles with presentation	4
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Does the assigned job without having to be reminded.	Always does the assigned work without having to be reminded and on given time frame	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Listens, but sometimes talk too much	Listens and contributes to the relevant topic	Listens and contributes precisely to the relevant topic and exhibit leadership qualities	3
					TOTAL	**13/4=3.25=4**

Note: This is only an example. Appropriate rubrics/criteria may be devised by the concerned course co-ordinator for assessing the given activity.

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Scheme of Valuation for End Examination

SN	Particulars	Marks
1	Record	05
2	Writing two programs	20
3	Execution of any one program	15
4	Viva Voce	10
	Total	**50**

**Evaluation should be based on the screen output only. No hard copy required.

**Change of question is allowed only once. Marks of 05 should be deducted in the given question.

Resource requirements for Design and Analysis of Algorithms Lab
(For an Intake of 60 Students [3 Batches])

Sl. No.	Equipment	Quantity
1	PC systems (latest configurations with speakers)	20
2	Laser Printers	01
3	Networking (Structured) with CAT 6e / wireless 24 Port switches / Wireless Router I/O Boxes for networking(as required)	03
4	Broad Band Connection	01

MODEL QUESTION BANK

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