Jain College of Engineering & Research

Udyambag, Belagavi.

(Approved by AICTE, New Delhi, Affiliated to VTU Belagavi & Recognized by Govt. of Karnataka)

NBA Accredited Programs- ECE & ME

Program: Computer Science and Engineering (AIML)

CONTINUOUS INTERNAL EVALUATION-I

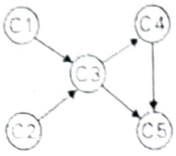
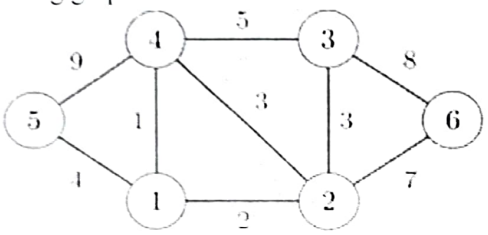
Semester: 4th A
Course: Analysis and Design of Algorithms
Course Coordinator: Prof. Megha Varun Patil

Code: BCS401

Date: 07/04/2025
Max. Marks: 50
Duration: 1 Hour 30 Min

Note: Answer any one full question choosing from each part.

Q. No.	Question	Marks	CO	PO	R.B.T. Level
	Part –A				
1 a)	Write the algorithm for selection sort. Apply selection sort algorithm to find sorted array. 65, 70, 75, 80, 85, 60, 55, 50, 45	10	1	1,2, 3,4, 12	L2
1 b)	What are the basic efficiency classes? Explain the following Asymptotic notations: (i) Big O (ii) Big Ω (iii) Theta Θ	10	1	1,2, 3,4, 12	L2
1 c)	With the algorithm derive the worst case efficiency for Bubble sort	5	2	1,2, 3,4, 12	L2
	OR				
2 a)	Define an algorithm. With neat diagram explain different steps in designing and analyzing an algorithm	10	1	1,2, 3,4, 12	L2
2 b)	Give the general plan for analysis of recursive algorithm And also analyze towers of Hanoi algorithm.	10	1	1,2, 3,4, 12	L2
2 c)	Explain the Divide and Conquer technique.	5	2	1,2, 3,4, 12	L2
	Part -B				
3 a)	Define transitive closure of a graph. Apply Warshalls algorithm to compute transitive closure of a directed graph $\begin{array}{c} \\ a \\ b \\ c \\ d \end{array}\begin{array}{c} \begin{array}{cccc} a & b & c & d \end{array} \\ \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 \end{bmatrix} \end{array}$	10	4	1,2, 3,4, 12	L3
3 b)	Apply Strassen's matrix multiplication to the following and also show the computations $\begin{bmatrix} 4 & 3 \\ 1 & 2 \end{bmatrix} * \begin{bmatrix} 1 & 2 \\ 6 & 5 \end{bmatrix}$	10	2	1,2, 3,4, 12	L3
3 c)	Sort the following array elements using Merge sort and also mention its time complexity. 8, 3, 2, 9, 7, 1, 5, 4	5	2	1,2, 3,4, 12	L3
	OR				

4 a)	Obtain the topological sorting for following graph by using i) DFS method ii) Source removal method 	10	2	1,2, 3,4, 12	L3
4 b)	Construct minimum cost spanning tree using Prims algorithm for the following graph. 	10	4	1,2, 3,4, 12	L3
4 c)	Write an algorithm for coin collecting problem.	5	4	1,2, 3,4, 12	L2

COURSE OUTCOMES (COs)	
1	Apply asymptotic notational method to analyze the performance of the algorithms in terms of time Complexity.
2	Demonstrate divide & conquer approaches and decrease & conquer approaches to solve computational Problems.
3	Make use of transform & conquer and dynamic programming design approaches to solve the given real World or complex computational problems.
4	Apply greedy and input enhancement methods to solve graph & string based computational problems.
5	Analyze various classes (P,NP and NP Complete) of problems
6	Illustrate backtracking, branch & bound and approximation methods

REVISED BLOOMS TAXONOMY LEARNING LEVEL (RBT)					
L1: Remember	L2: Understand	L3: Apply	L4: Analyze	L5: Evaluate	L6: Create

PROGRAM OUTCOMES (POs)					
1	Engineering Knowledge	5	Modern tool usage	9	Individual and Team-Work
2	Problem Analysis	6	Engineer and Society	10	Communication
3	Design / Development Solutions	7	Environment and Sustainability	11	Project Management and Finance
4	Conduct Investigations of Complex problems	8	Ethics	12	Life-long Learning