K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109

III SESSIONAL TEST QUESTION PAPER 2018 – 19 EVEN SEMESTER

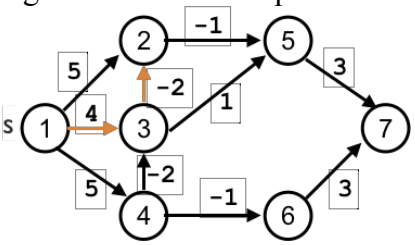
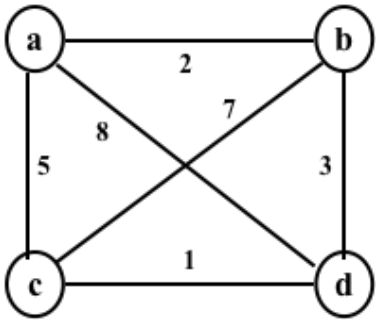
SET – A~~/B~~

USN										

Degree : B.E **Semester : IV**
Branch : Computer Science and Engineering **Course Code : 17CS43**
Course Title : **Date : 21-May-2019**
Duration : 90 Minutes **Max Marks : 30**

Note: Answer ONE full question from each part.

Q No.	Question	Marks	CO mapping	K-Level
	PART-A			
1(a)	Compare the principle of optimality with Greedy approach. Dissect the problem of shortest path from vertex u to vertex v in a graph and test if the principle of optimality holds for this shortest path problem.	**5**	**CO4**	Analyze
(b)	Establish the multi-stage graph for the following resource allocation problem. A team of 3 students needs to complete 4 assignments. An assignment can only be done by only one student, however, any student can do more than assignments. Students in the team do the assignment in stages i.e. first assignment(s) are done by student S1, then by student S2 and remaining by student S3. Marks allocated to students as per number of assignments done are given below. A↓ S → | S1 | S2 | S3 1 | 2 | 4 | 5 2 | 5 | 7 | 5 3 | 7 | 8 | 6 4 | 8 | 10 | 6	**5**	**CO4**	Analyze
(c)	Identify the reasons that are used to terminate a search path in a state-space tree of a branch-and-bound algorithm.	**5**	**CO5**	Apply
	OR			
2(a)	List the Optimal Binsearch algorithm and analyze its space and time complexity.	**5**	**CO4**	Analyze
(b)	Construct an OptimalBST for 3 keys. Pa=0.2, Pb=0.5, Pc=0.3	**5**	**CO4**	Analyze
(c)	Apply the branch and bound approach to solve the instance of following assignment problem among 4 persons for 4 jobs. | | J_1 | J_2 | J_3 | J_4 | P_a | 8 | 2 | 7 | 9 | P_b | 3 | 4 | 2 | 7 | P_c | 5 | 8 | 7 | 1 | P_d | 7 | 9 | 5 | 4 |	**5**	**CO5**	Apply
	PART-B			

3(a)	Calculate the shortest path to all nodes from node 2 to all the nodes using Bellman Ford algorithm and list output after each of the iteration.  	**5**	**CO4**	Analyze
(b)	Establish the shortest tour for the Traveling Salesperson Problem using Dynamic Programming for the following graph. Discover all the applicable `g(i,S)` values in your analysis of TSP steps.  	**5**	**CO4**	Analyze
(c)	Apply the branch and bound algorithm to solve Traveling Salesperson Problem for the graph Q3b.	**5**	**CO5**	Apply
	OR			
4(a)	Analyze the problem of designing a system that is composed of n devices connected in series and maximizing its reliability using device duplication. Examine the maximization expression along with applicable constraints to be used for solving this problem using dynamic programming.	**5**	**CO4**	Analyze
(b)	Calculate the shortest distance between all pairs for the diagraph with the below weight matrix. $\begin{bmatrix} 0 & 2 & \infty & 1 & 8 \\ 6 & 0 & 3 & 2 & \infty \\ \infty & \infty & 0 & 4 & \infty \\ \infty & \infty & 2 & 0 & 3 \\ 3 & \infty & \infty & \infty & 0 \end{bmatrix}$	**5**	**CO4**	Analyze
(c)	Apply the branch and bound technique to solve the following knapsack problem with knapsack weight of 16, with weights and values for 4 items are given below. Item Weight Value 1 10 Rs 100 2 7 Rs 63 3 8 Rs 56 4 4 Rs 12	**5**	**CO5**	Apply

Signature of Course in charge **Signature of HOD-CSE**