RAMAIAH Institute of Technology

Department of Computer Science & Engineering

QUESTION BANK FOR IVSEMESTER

Algorithms Laboratory (CSL47)

I.A. Marks: 50 **Exam Hours: 03**
Credits: 0:0:1 **Exam Marks: 50**

Develop the following programs using Java programming language

1. Given a set of men and women design and implement Gale–Shapley algorithm to determine the stable set of marriages among them.

Assumptions:

Men propose first according to their preference list.
Women can choose a better partner based on the preference.

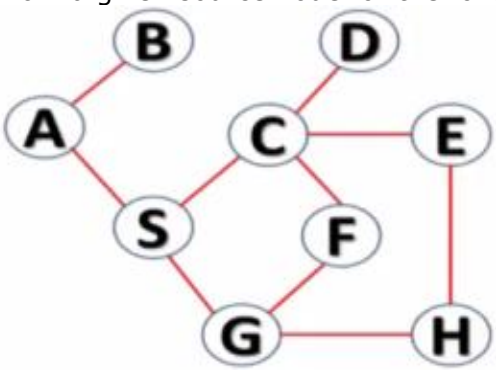
Men's preference list

	1	2	3	4
A	W	X	Y	Z
B	X	W	Y	Z
C	Z	W	Y	X
D	Z	Y	X	W

Women's preference list

	1	2	3	4
W	A	B	D	C
X	B	C	A	D
Y	C	D	A	B
Z	C	D	B	A

2. A GPS navigation system needs an approach to discover the reachable areas in a given geographical region from a given source area. Design and implement an algorithm to find which nodes can be reached from a given source node for the following graph.



3. A rat is searching for cheese in a maze that consists of nodes and edges as shown in the fig. It always goes deep into the maze, if it hits a wall then it returns back to the ancestor node and searches further. Suggest which algorithm can be chosen for it.

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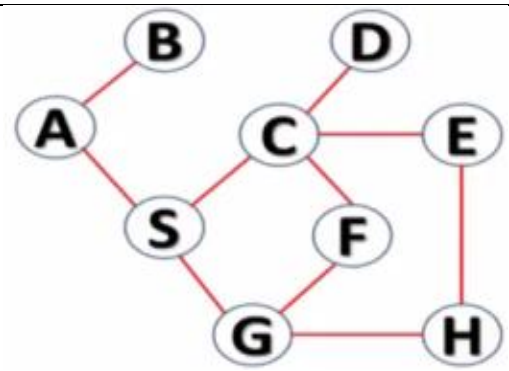
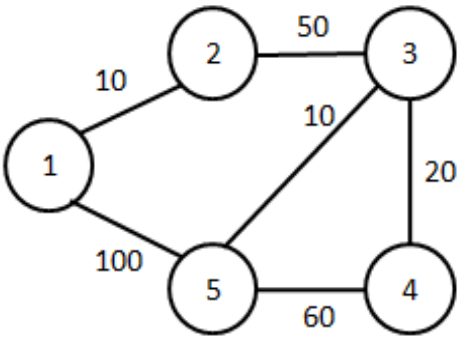
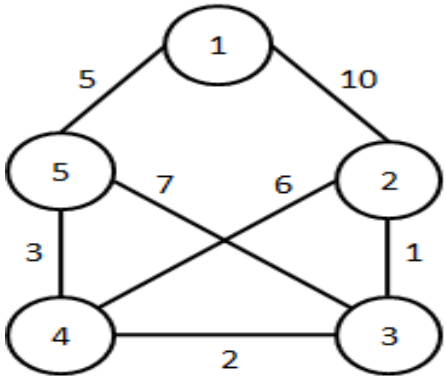
	
4.	Design and implement merge sort algorithm that takes random number input and displays the execution time required.
5.	In a database of numbers there is a table of unsorted numbers. The database admin now wants to sort these numbers using an approach wherein a pivot element is selected for sorting. At certain point, the first half elements are less than the pivot and right half elements are greater than the pivot. Design and implement an algorithm to solve it using random numbers and also display the execution time.
6.	A truck driver is given a set of locations to be covered with their distances by a company. The company strictly orders that truck should be started from a particular location. Design and implement an algorithm that gives a greedy solution to the truck driver's problem and display the shortest path for a given source location to all other locations. 
7.	A phone company wants to lay lines for communication in a city. Different amounts are charged for connecting between a pair of cities. Design and implement a greedy solution such that it forms a spanning tree with minimum cost. 

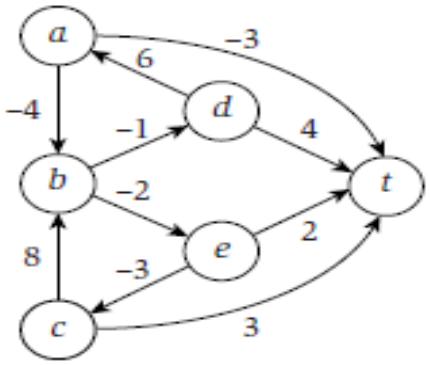
8. A drama venue needs to be allocated for different drama school requests such that maximum profit is obtained for the company owning the drama venue. The requests are shown in the table with start –time, finish-time and the amount affordable by the drama school. Design and implement an algorithm such that maximum profit is obtained for the company owning the drama venue.

Drama School	Start-time	Finish-time	Value
1	1	2	100
2	2	5	200
3	3	6	300
4	4	8	400
5	5	9	500
6	6	10	100

9. Ravi is planning for a trekking expedition with a backpack that can hold 7kg. She needs to select the most valuable items from the following list that can be accommodated within the backpack.
Design and implement an algorithm that displays the most valuable items that can be carried by him using Dynamic programming principles.

Items	Weight	Value
1	3	10
2	5	4
3	6	9
4	2	11

10. Design and implement Bellman ford algorithm to find the shortest path from a given source to all other nodes using dynamic programming.



Marks Distribution:

Conduction and Result	Write Up	Viva	Change of question	Total
35 M	08 M	07 M	-10 M	50 M

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