Home Assignment - 4

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Q 1) Explain various graph representation techniques with examples?

Ans→ Graphs can be represented using

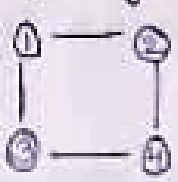
i. Adjacency Matrix:-

An adjacency matrix is a 2D array where the rows and columns represent the vertices of the graph & each cell (i,j) contains either a 1 or 0, indicating whether there is an edge b/w vertices i & j.

Example:-

Matrix

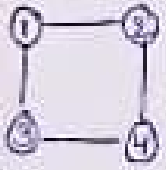
	1	2	3	4
1	0	1	1	0
2	1	0	0	1
3	1	0	0	1
4	0	1	1	0



ii. Adjacency list:- It is a collection of list or arrays where each matrix has a list of its adjacent vertices.

Example:-

1 : [2, 3]
2 : [1, 4]
3 : [1, 4]
4 : [2, 3]

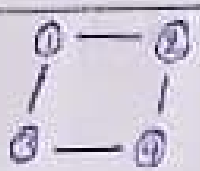


Q-2) write an algorithm for BFS with example?

Ans→ Algorithm

1. Initialize an empty queue & a set to keep track of visited vertices.
2. Enqueue the start vertex into the que and mark it as visited.
3. while the queue is not empty Dequeue a vertex from queue.
4. Repeat step 3 until queue is empty

Ex:-



Starting from vertex 1

1) Enqueue 1
2) Dequeue 1, enqueue 2 & 3
3) Dequeue 2, enqueue 4
4) Dequeue 4

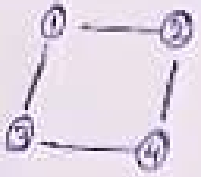
The BFS traversal of the graph starting from vertex 1 is 1,2,3,4.

Q-3) write an algorithm for DFS with example?

Ans→ Algorithm

1. Initialize an empty stack & mark the start vertex as visited.
2. Push the start vertex onto the stack.
3. while the stack is not empty. pop a vertex from the stack & process the popped vertex.
4. Repeat step 3 until the stack is empty.

Example:-



Starting from vertex 1

1. Push 1 onto the stacks
2. Pop 1, push 3 & 2 onto the stack
3. pop 2, push 4 onto the stack
4. pop 4
5. pop 3

The DFS traversal of the graph starting from vertex 1 is 1,3,4,2.

Q.4) Define MST ? and find the MST for the following graph using Prm's algorithm.

Ans-> A MST (Minimum Spanning Tree) is a subgraph that is a tree (a graph without cycles) and spans all the vertices of the original graph while minimizing the total edge weight.

Step-1:-

choose a vertex

Step-2:- choose the shortest edge from this vertex & add it

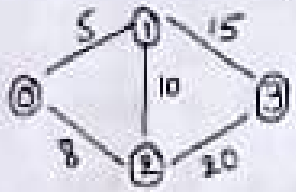
Step-3:- choose the nearest vertex not yet in the solution.

Step-4:-

Step-5:-

MST of the following graph is :

Q-5) Find the MST for the following graph using Kruskal's algorithm.



Ans→ From the given graph sorting of edges

$(0, \overset{5}{1})$; $(0, \overset{8}{2})$; $(1, \overset{\times 10}{2})$;

$(1, \overset{15}{3})$; $(\overset{\times 20}{2}, 3)$

MST of the following graph is 28.