Question - 1

Edges Count

SCORE: **5 points**

For an undirected graph with 8 vertices, what is the maximum number of edges it can has, assuming there are no parallel edges?

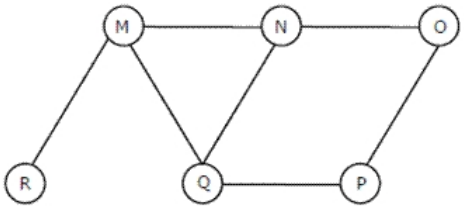
- [ ] 7
- [ ] 8
- [x] 28
- [ ] 32

Question - 2

BFS

SCORE: **5 points**

One possible order of visiting the nodes of the following graph by Breadth First Search algorithm is:



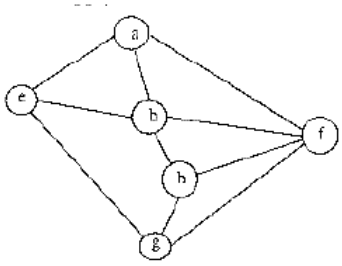
- [ ] QMNPOR
- [ ] NQMPOR
- [ ] MNOPQR
- [x] QMNPRO

Question - 3

DFS

SCORE: **5 points**

Which are depth first traversals of given graph? Select all possible solutions.



- a b f h e g
- a b f e h g
- a b e g h f
- a f g h b e

Question - 4

Degree of Undirected Graph

SCORE: **5 points**

Given an undirected graph G with V vertices and E edges, the sum of the degrees of all vertices is

- E
- 2 * E
- V
- 2 * V

Question - 5

Cycle

SCORE: **5 points**

Which algorithms can be used to most efficiently determine the presence of a cycle in a given graph? DFS or BFS?

- BFS is most efficient
- DFS is most efficient
- BFS and DFS have same efficiency
- None of them

Question - 6

Data Structure

SCORE: **10 points**

Problem Statement

Correct choice of data structures can improve the performance of algorithms. Match the following algorithms with appropriate data structures:

(Each answer (A, B, C) can be selected only once)

i. Breadth first search <blank 1>
first search <blank 2>
<blank 3>

A. Heap ii. Depth
B. Stack iii. Sorting
C. Queue

Answers

<blank 1> : [C, c, Queue, queue]
<blank 2> : [B, b, Stack, stack]
<blank 3> : [A, a, Heap, heap]

Question - 7

SCORE: 5 points

Graph vs. Tree

Traversal of a graph is different from tree because

- DFS of a graph uses stack, but inorrder traversal of a tree is recursive
- BFS of a graph uses queue, but a time efficient BFS of a tree is recursive
- (selected) There can be a loop in graph so we must maintain a visited flag for every vertex
- None of the above

Question - 8

SCORE: 5 points

Undirected Graph

How many undirected graphs (not necessarily connected) can be constructed out of a given set V= {V1, V2,...Vn} of n vertices ?

- 2 ^ n
- n * (n - 1) / 2
- n!
- (selected) 2 ^ (n * (n - 1) / 2)

Question - 9

SCORE: 5 points

Breadth-First Traversal

Consider an undirected unweighted graph G. Let a breadth-first traversal of G be done starting from a node r. Let d(r, u) and d(r, v) be the lengths of the shortest paths from r to u and v respectively, in G. If u is visited before v during the breadth-first traversal, which of the following statements is correct?

- d(r, u) < d (r, v)

- [ ] d(r, u) > d(r, v)
- [x] d(r, u) <= d (r, v)
- [ ] None of the above

Question - 10

SCORE: **5 points**

Bonus question

What are the numbers written on the board?

- [ ] 2
- [x] 23
- [ ] 31
- [x] 49
- [x] 53
- [ ] 75
- [ ] 77