

Quiz 1: GATE Questions

03 July 2024 22:44

Week 1:

What is the output of the following snippet of code?

```
1 def foo(n):
2     if n % 2 == 0:
3         return n // 2
4     return 3 * n + 1
5
6 count = 0
7 x = 10
8 while x != 1:
9     x = foo(x)
10    count += 1
11 print(count)
```

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Week 2/ Sorting / Searching:

Question 5

Given two sorted list of size m and n respectively. The number of comparisons needed the worst case by the merge sort algorithm will be:

- A** $m-n$
- B** maximum of m and n
- C** minimum of m and n
- D** $m+n-1$

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Question 1

Consider the following array.

23	32	45	69	72	73	89	97
----	----	----	----	----	----	----	----

Which algorithm out of the following options uses the least number of comparisons (among the array elements) to sort the above array in ascending order?

- A** Selection sort
- B** Mergesort
- C** Insertion sort
- D** Quicksort using the last element as pivot

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An unordered list contains n distinct elements. The number of comparisons to find an element in this list that is neither maximum nor minimum is

A $\Theta(n \log n)$

B $\Theta(n)$

C $\Theta(\log n)$

D $\Theta(1)$

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Give the correct matching for the following pairs:

Group - 1

- (A) $O(\log n)$
- (B) $O(n)$
- (C) $O(n \log n)$
- (D) $O(n^2)$

Group - 2

- (P) Selection
- (Q) Insertion sort
- (R) Binary search
- (S) Merge sort

A A - R B - P C - Q D - S

B A - R B - P C - S D - Q

C A - P B - R C - S D - Q

D A - P B - S C - R D - Q

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Week 3 / Linked List / Stacks /Queues:

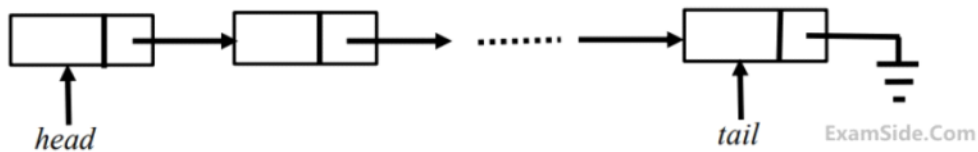
1

GATE CSE 2018

MCQ (Single Correct Answer) +2 -0.6



A queue is implemented using a non-circular singly linked list. The queue has a head pointer and a tail pointer, as shown in the figure. Let n denote the number of nodes in the queue. Let *enqueue* be implemented by inserting a new node at the head, and *dequeue* be implemented by deletion of a node from the tail.



Which one of the following is the time complexity of the most time-efficient implementation of *enqueue* and *dequeue*, respectively, for this data structure?

A $\theta(1), \theta(1)$ B $\theta(1), \theta(n)$ C $\theta(n), \theta(1)$ D $\theta(n), \theta(n)$

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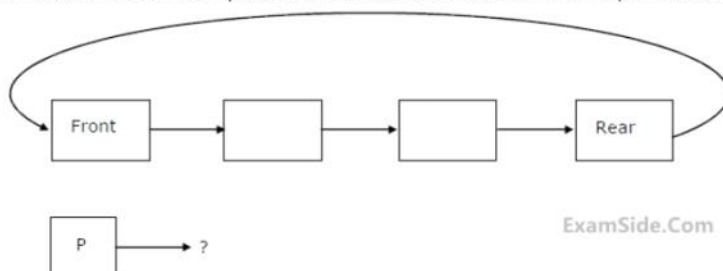
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GATE CSE 2004

MCQ (Single Correct Answer) +2 -0.6



A circularly linked list is used to represent a Queue. A single variable p is used to access the Queue. To which node should p point such that both the operations *enQueue* and *deQueue* can be performed in constant time?



A rear node

B front node

C not possible with a single pointer

D node next to front

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2 GATE CSE 2021 Set 1
Numerical +2 -0.67



Consider the following sequence of operations on an empty stack.

push(54); push(52); pop(); push(55); push(62); s = pop();

Consider the following sequence of operations on an empty queue.

enqueue(21); enqueue(24); dequeue(); enqueue(28); enqueue(32); q = dequeue();

The value of $s + q$ is _____

Answer

Correct answer is 86

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3 GATE CSE 2014 Set 2
MCQ (Single Correct Answer) +2 -0.6



Suppose a stack implementation supports an instruction REVERSE, which reverses the order of elements on the stack, in addition to the PUSH and POP instructions. Which one of the following statements is TRUE with respect to this modified stack?

A A queue cannot be implemented using this stack.

B A queue can be implemented where ENQUEUE takes a single instruction and DEQUEUE takes a sequence of two instructions.

C A queue can be implemented where ENQUEUE takes a sequence of three instructions and DEQUEUE takes a single instruction.

D A queue can be implemented where both ENQUEUE and DEQUEUE take a single instruction each

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Week 4:

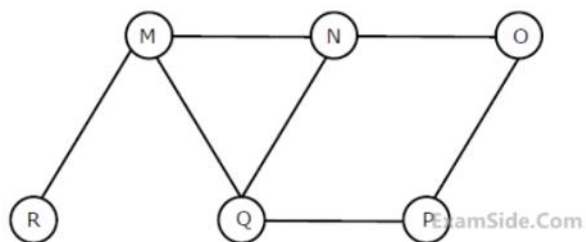
1

GATE CSE 2008

MCQ (Single Correct Answer) +1 -0.3



The Breadth First Search algorithm has been implemented using the queue data structure. One possible order of visiting the nodes of the following graph is



A MNOPQR

B NQMPOR

C QMNPRO

D QMNPOR

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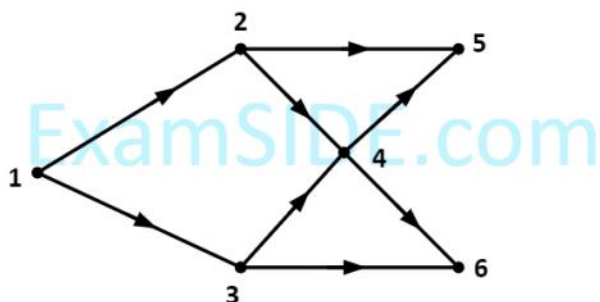
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GATE CSE 2007

MCQ (Single Correct Answer) +1 -0.3



Consider the DAG with $V = \{1, 2, 3, 4, 5, 6\}$, shown below.



Which of the following is **NOT** a topological ordering?

A 1 2 3 4 5 6

B 1 3 2 4 5 6

C 1 3 2 4 6 5

D 3 2 4 1 6 5

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The most efficient algorithm for finding the number of connected components in an undirected graph on n vertices and m edges has time complexity

- A $\Theta(n)$
- B $\Theta(m)$
- C $\Theta(n + m)$
- D $\Theta(mn)$

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Let G be a simple undirected graph. Let T_D be a depth first search tree of G . Let T_B be a breadth first search tree of G . Consider the following statements.

- (I) No edge of G is a cross edge with respect to T_D . (A cross edge in G is between two nodes neither of which is an ancestor of the other in T_D .)
- (II) For every edge (u, v) of G , if u is at depth i and v is at depth j in T_B , then $|i - j| = 1$.

Which of the statements above must necessarily be true?

- A I only
- B II only
- C Both I and II only
- D Neither I nor II

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1

GATE CSE 2015 Set 1

MCQ (Single Correct Answer) +2 -0.6



Let $G = (V, E)$ be a simple undirected graph, and s be a particular vertex in it called the source. For $x \in V$, let $d(x)$ denote the shortest distance in G from s to x . A breadth first search (BFS) is performed starting at s . Let T be the resultant BFS tree. If (u, v) is an edge of G that is not in T , then which one of the following CANNOT be the value of $d(u) - d(v)$?

A -1

B 0

C 1

D 2

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1

GATE CSE 2008

MCQ (Single Correct Answer) +2 -0.6



Consider the following sequence of nodes for the undirected graph given below.

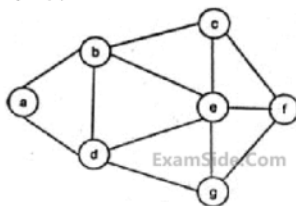
1. a b e f d g c

2. a b e f c g d

3. a d g e b c f

4. a d b c g e f

A Depth First Search (DFS) is started at node a . The nodes are listed in the order they are first visited. Which all of the above is (are) possible output(s)?



A 1 and 3 only

B 2 and 3 only

C 2, 3 and 4 only

D 1, 2 and 3

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3

GATE CSE 2006

MCQ (Single Correct Answer) +2 -0.6



Consider the depth-first-search of an undirected graph with 3 vertices P, Q, and R. Let discovery time $d(u)$ represent the time instant when the vertex u is first visited, and finish time $f(u)$ represent the time instant when the vertex u is last visited. Given that

$d(P) = 5$ units $f(P) = 12$ units

$d(Q) = 6$ units $f(Q) = 10$ units

$d(R) = 14$ unit $f(R) = 18$ units

Which one of the following statements is TRUE about the graph

- ☐ A There is only one connected component
- ☐ B There are two connected components, and P and R are connected
- ☐ C There are two connected components, and Q and R are connected
- ☐ D There are two connected components, and P and Q are connected

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