Question Label: Short Answer Question

What sample weight will be assigned to the last example to create the next stump? Don't normalize the sample weights. Enter your answer correct to two decimal places.

Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Range

Text Areas: PlainText

Possible Answers:

0.08 to 0.12

PDSA

Section Id: 64065322455

Section Number: 13

Section type: Online

Mandatory or Optional: Mandatory

Number of Questions: 31

Number of Questions to be attempted: 31

Section Marks: 100

Display Number Panel: Yes

Group All Questions: No

Enable Mark as Answered Mark for Review and

Yes Clear Response:

Maximum Instruction Time: 0

Sub-Section Number: 1

Sub-Section Id: 64065352631

Question Shuffling Allowed: No

Question Number: 412 Question Id: 640653360661 Question Type: MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 0

Question Label: Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL: PROGRAMMING DATA STRUCTURES AND ALGORITHMS USING PYTHON"

ARE YOU SURE YOU HAVE TO WRITE EXAM FOR THIS SUBJECT?
CROSS CHECK YOUR HALL TICKET TO CONFIRM THE SUBJECTS TO BE WRITTEN.

(IF IT IS NOT THE CORRECT SUBJECT, PLS CHECK THE SECTION AT THE <u>TOP</u> FOR THE SUBJECTS REGISTERED BY YOU)

Options:

6406531194585. Ves

6406531194586. * No

Sub-Section Number: 2

Sub-Section Id: 64065352632

Question Shuffling Allowed : Yes

Question Number: 413 Question Id: 640653360662 Question Type: MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 3

Question Label: Multiple Choice Question

Here is an function to return the maximum value among three positive integers. There is an logical error in this function.

```
1 def max3bad(x,y,z):
2
        maximum = 0
3
       if x >= y:
           if x >= z:
4
5
                maximum = x
6
        elif y >= z:
7
            maximum = y
        else:
8
9
            maximum = z
        return(maximum)
10
```

Select the input for which max3bad produces an incorrect output.

Options:

```
6406531194587. \times x = 2, y = 5, z = 3
6406531194588. \times x = -3, y = 2, z = 5
6406531194589. \times x = 4, y = 5, z = 6
```

Question Number: 414 Question Id: 640653360663 Question Type: MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 3

Question Label: Multiple Choice Question

A list having 2^k items has to be processed using either of two given algorithms. Algorithm **A** takes $8n \log n$ time units and algorithm **B** takes $0.02n^2$ time units to process a list of n items. What is the largest value of k for which algorithm **B** would be preferred?

Options:

6406531194591. * 11

6406531194592.

12

6406531194593. * 13

6406531194594. st Algorithm **A** would be preferred always irrespective of k

Question Number: 415 Question Id: 640653360664 Question Type: MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 3

Consider the following iterative code:

```
1 def fun(n):
2    i,j = 1,1
3    while(j <= n):
4         i = i+2
5         j = j+i
6         print(j)</pre>
```

What would be the running time complexity of the above given function?

Options:

```
6406531194595. * O(\log n)
6406531194596. * O(n \log n)
6406531194597. \checkmark O(\sqrt{n})
```

Question Number: 416 Question Id: 640653360665 Question Type: MCQ Is Question

 ${\bf Mandatory: No\ Calculator: None\ Response\ Time: N.A\ Think\ Time: N.A\ Minimum\ Instruction}$

Time: 0

Correct Marks: 3

Question Label: Multiple Choice Question

What is the time complexity of the following recurrence relation?

$$T(1) = 1$$

For
$$n > 1$$
, $T(n) = 8T(n/2) + n$

Options:

6406531194599. *
$$O(n^2)$$

6406531194600.
$$\checkmark O(n^3)$$

6406531194601. *
$$O(n^2 \log_2 n)$$

```
6406531194602. * O(n^3 \log_2 n)
```

Question Number: 417 Question Id: 640653360666 Question Type: MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 3

Question Label: Multiple Choice Question

```
1 def selectionsort(L):
       n = len(L)
       if n < 1:
 3
4
           return(L)
5
       for i in range(n):
6
            mpos = i
7
            for j in range(i+1,n):
                if L[j] < L[mpos]:
8
9
                    mpos = j
10
            (L[i],L[mpos]) = (L[mpos],L[i])
11
        return(L)
```

Which of the following statement(s) is/are correct with regard to the given Selection Sort?

- 1. Selection sort is not stable and it sorts In-place
- 2. The complexity of Selection sort is $O(n^2)$ in best, average and worst case.
- 3. In Selection sort, after *m* passes through the list, the first *m* elements in the list are the *m* smallest element of the list.

Options:

```
6406531194603. * Only statement 1 is true
6406531194604. * Statement 1 and Statement 2 are true
6406531194605. * Statement 1 and Statement 3 are true
6406531194606. * All statements are true
```

Question Number: 418 Question Id: 640653360667 Question Type: MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 3

Assuming that the median of n elements can be found in O(n) time. What would be the complexity of quick sort, if the median item is always selected as the pivot?

Options:

```
6406531194607. * O(\log n)
6406531194608. * O(n \log \log n)
6406531194609. \checkmark O(n \log n)
```

Question Number: 419 Question Id: 640653360671 Question Type: MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 3

Question Label: Multiple Choice Question

Let G be a undirected connected graph. Let Td be a depth first search tree of G. Let Tb be a breadth first search tree of G. Consider the following statements.

- 1. No edge of ${\it G}$ is a cross edge with respect to ${\it Td}$
- 2. For every edge (u,v) of G, if u is at depth i and v is at depth j in Tb, Then |i-j|=1.

Which of the above statements must necessarily be true?

Options:

```
6406531194617. ✓ 1 only
6406531194618. ※ 2 only
6406531194619. ※ Both 1 and 2
6406531194620. ※ Neither 1 nor 2
```

Question Number: 420 Question Id: 640653360672 Question Type: MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

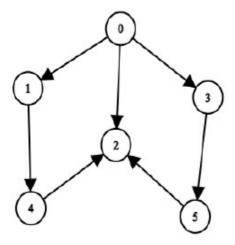
Correct Marks: 3

Question Label: Multiple Choice Question

Consider the following directed graph. Run DFS on this graph from vertex ① . Which of the following is a cross edge.

Note: In the case of multiple neighbours, the algorithms first pick the node which has the *largest*

labelled value.



Options:

6406531194621. * (0,1)

6406531194622. * (0,3)

6406531194623. * (5,2)

6406531194624. * (0,2)

6406531194625. **(**4,2)

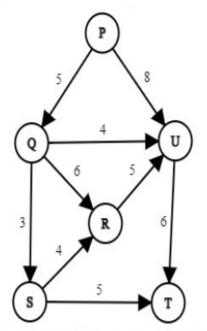
Question Number : 421 Question Id : 640653360675 Question Type : MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 3

Consider the following directed weighted graph on which Dijkstra algorithm is run with vertex P as the source vertex.



What is the order of nodes in which the nodes are marked as visited by Dijkstra's algorithm?

Note: If two vertices have same distance, the algorithm picks the next vertex which comes **first** alphabetically

Options:

6406531194628. **※** P,Q,S,U,T,R

6406531194629. ✔ P,Q,S,U,R,T

6406531194630. ₩ P,Q,R,S,T,U

6406531194631. * P,Q,S,T,U,R

Question Number: 422 Question Id: 640653360676 Question Type: MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 3

Question Label: Multiple Choice Question

Consider a undirected connected graph G, where each edge contains the equal weight 1. Which one of the following is **true**?

Options:

6406531194632. * Graph G has no minimum spanning tree

6406531194633. * Graph G has unique MST of cost n-1

6406531194634. ✓ Graph G has multiple MSTs, each of cost n-1

6406531194635. ₩ Graph G has multiple MSTs of different cost

Question Number: 423 Question Id: 640653360677 Question Type: MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 3

Question Label: Multiple Choice Question

The maximum and minimum number of nodes in a binary search tree of height 7 are_____.

Consider that the height of the empty tree is 0.

Options:

6406531194636. **4** 64 and 6, respectively

6406531194637. * 128 and 7, respectively

6406531194638. * 127 and 6, respectively

6406531194639. **✓** 127 and 7, respectively

Question Number: 424 Question Id: 640653360678 Question Type: MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 3

Question Label: Multiple Choice Question

Consider a complete binary tree with n nodes, where the left and right subtrees of the root are max heaps. The upper bound to convert the tree to a max heap by an efficient algorithm is

Options :

```
6406531194640. \checkmark O(\log n)
6406531194641. \checkmark O(n)
6406531194642. \checkmark O(n \log n)
6406531194643. \checkmark O(n^2)
```

Question Number: 425 Question Id: 640653360679 Question Type: MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 3

Question Label: Multiple Choice Question

Consider a binary min-heap made up of {1, 2, 3, 4, ..., 1024}. Assume that each number occurs exactly once in the heap. The depth of a node in the heap is equal to the number of edges to that node from the root node. Thus, the root is at depth 0. What is the maximum possible depth of the node number **7**?

Options:

6406531194644. * 8

6406531194645. * 7

6406531194646. * 2

6406531194647.

6

Question Number : 426 Question Id : 640653360681 Question Type : MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 3

Question Label: Multiple Choice Question

Which of the following statement(s) is/are **true** about Huffman code algorithm?

1. In an optimal Huffman tree, if leaf labelled **x** is at depth smaller than leaf labelled **y**, then

frequency(x) >= frequency(y)

- 2. Huffman code algorithm always generates prefix code.
- 3. Huffman code algorithm is based on a greedy approach.

Options:

6406531194652. * 1 and 2

6406531194653. **3** 2 and 3

6406531194654. * 1 and 3

6406531194655. **1**, 2 and 3

Question Number: 427 Question Id: 640653360683 Question Type: MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 3

Question Label: Multiple Choice Question

There are 5 sorted arrays of sizes 10, 20, 36, 45, and 12. If the merge algorithm is used to optimally combine all of these sorted arrays together into one sorted sequence, then what is the total number of comparisons needed by the optimal merge algorithm in the worst case?

Note: the merge algorithm would merge the arrays pairwise, i.e. it would only merge two arrays into a single larger one.

Options:

6406531194657. * 186

6406531194658. * 281

6406531194659. 🗸 264

6406531194660. * 271

Question Number: 428 Question Id: 640653360684 Question Type: MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 3

Question Label: Multiple Choice Question

In a list L, two elements L[i] and L[j] form a inversion if L[i] > L[j] and [i < j]. Which of the following options represents the inversions in the list L = [2,1,6,4,5,3]?

Options:

```
6406531194661. * (2,1), (5,2), (6,5), (6,3), (4,1), (5,3)
6406531194662. * (2,1), (6,4), (6,5), (6,2), (4,3), (5,2)
6406531194663. * (2,1), (6,4), (6,5), (6,3), (4,3), (5,3)
6406531194664. * (2,1), (6,4), (6,5), (6,3), (4,1), (5,2)
```

Question Number: 429 Question Id: 640653360688 Question Type: MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 3

Question Label: Multiple Choice Question

Which of the following option represents the fail function (or prefix function) for pattern 'abababaa' in the Knuth-Morris-Pratt (KMP) algorithm?

Options:

```
6406531194668. * [1,1,1,2,3,4,0,1]
6406531194669. * [0,0,1,2,3,4,5,1]
6406531194670. * [0,0,0,1,1,2,3,4]
```

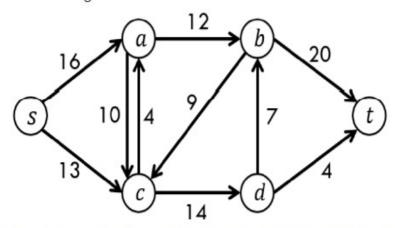
Question Number: 430 Question Id: 640653360690 Question Type: MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 3

Consider the following network.



Consider the network given above with source s and sink t, with the numbers on the edges denoting maximum capacity across a particular edge. Which of the following edges form a **valid min cut** in the given network?

Options:

6406531194676. **See Edges (ab, cd, dt, db)**

6406531194677. ✓ Edges {ab, db, dt}

6406531194678. **Edges** {ca, db, dt}

6406531194679. * Edges {ab, cd, bc}

Question Number: 431 Question Id: 640653360691 Question Type: MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 3

Question Label: Multiple Choice Question

Consider the following statements and select the appropriate option regarding them

- 1. SAT is a NP complete problem.
- 2. Given a problem α which is reduced in polynomial time from another problem β . If β is solvable in polynomial time then α is also solvable within polynomial time.

Options:

6406531194680. ✓ Only statement 1 is correct

6406531194681. * Only statement 2 is correct

6406531194682. * Both the statements are correct

6406531194683. * Both the statements are wrong

Sub-Section Number: 3

Sub-Section Id: 64065352633

Question Number: 432 Question Id: 640653360668 Question Type: MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 4

Question Label : Multiple Choice Question Consider the following implementation for Queue

```
1 class Queue:
 2
      def __init__(self):
 3
            self.queue = []
     def enqueue(self,v):
 4
 5
            self.queue.append(v)
 6
        def isempty(self):
            return(self.queue == [])
 7
        def dequeue(self):
 8
 9
           v = None
           if not self.isempty():
10
                v = self.queue[0]
11
                self.queue = self.queue[1:]
12
13
            return(v)
```

```
1 def fun(Q):
2    if (not Q.isempty()):
3         i = Q.dequeue()
4         fun(Q)
5         Q.enqueue(i)
```

Assuming that the initial state of the queue was [12,24,20,6,12,8,16], what is Q.queue[2] after fun(Q) is executed?

Options:

```
6406531194611. 40 6406531194612. 6 6406531194613. 12 6406531194614. 16
```

Question Number : 433 Question Id : 640653360689 Question Type : MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 4

Question Label: Multiple Choice Question

First kind of cake requires 200g of flour and 25g of fat, and second kind of cake requires 100g of flour and 50g of fat. Formulate this problem as a linear programming problem to find the maximum number of cakes that can be made from 5 kg of flour and 1 kg of fat, assuming that there is no shortage of the other ingredients used in making the cakes.

The above problem is to be formulated as a linear programming problem. Let x and y be the number of cake of kind first and second, respectively. Objective function to maximize the number of cakes z = x + y.

Which of the following is **not a valid** constraint for the given problem?

Options:

6406531194672. * 2x + y <= 50

6406531194673. **✓** x + 2y <= 50

6406531194674. ***** x >= 0 , y >= 0

6406531194675. **¾** x + 2y <= 40

Sub-Section Number: 4

Sub-Section Id: 64065352634

Question Shuffling Allowed : Yes

Question Number: 434 Question Id: 640653360680 Question Type: MSQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 3

Question Label: Multiple Select Question

Which of the following statement(s) is/are **true**?

Options:

While inserting a new element in a max heap of n elements, binary search is performed on the path from the new node to the root to find the correct position of the new node. Number of

6406531194648. \approx comparisons performed in this process is $O(\log^2 n)$

Given a binary search tree and a min-heap with the same constituent items, the min-heap is more efficient for printing the items in ascending order.

When we implement Prim's algorithm using min-heap the time complexity is improved to 6406531194650. \checkmark $O((m+n)\log n)$.

When we implement Dijkstra's algorithm using min-heap the time complexity is improved to 6406531194651. \checkmark $O((m+n)\log n)$..

Sub-Section Number: 5

Sub-Section Id: 64065352635

Question Shuffling Allowed : Yes

Question Number: 435 Question Id: 640653360669 Question Type: SA Calculator: None

Response Time: N.A Think Time: N.A Minimum Instruction Time: 0

Correct Marks: 4

Question Label: Short Answer Question

A hash table of size 8 (index 0 to 7) uses open addressing with hash function $h(k) = k \mod 8$, and linear probing. The following elements are added into the hash table which was initially empty

22,11,85,27,34 and 50

The key value 50 is stored at which index of the hash table?

Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Equal

Text Areas: PlainText

Possible Answers:

7

Question Number : 436 Question Id : 640653360670 Question Type : SA Calculator : None

Response Time: N.A Think Time: N.A Minimum Instruction Time: 0

Correct Marks: 4

Question Label: Short Answer Question

Consider a **undirected graph** *G* with **65** edges with the least number of vertices possible. What will

be the number of vertices in graph *G*?

Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Equal

Text Areas: PlainText

Possible Answers:

12

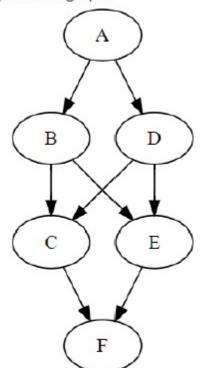
Question Number: 437 Question Id: 640653360673 Question Type: SA Calculator: None

Response Time: N.A Think Time: N.A Minimum Instruction Time: 0

Correct Marks: 4

Question Label: Short Answer Question

Consider the following directed graph.



The number of different topological orderings of the vertices of the graph is _____

Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Equal

Text Areas: PlainText

Possible Answers:

4

Question Number: 438 Question Id: 640653360674 Question Type: SA Calculator: None

Response Time: N.A Think Time: N.A Minimum Instruction Time: 0

Correct Marks: 4

Question Label: Short Answer Question

Consider the following adjacency matrix AMAT of an undirected graph with 5 vertices.

$$AMat = \begin{pmatrix} 0 & 1 & 8 & 1 & 4 \\ 1 & 0 & 12 & 10 & 9 \\ 8 & 12 & 0 & 7 & 3 \\ 1 & 10 & 7 & 0 & 2 \\ 4 & 9 & 3 & 2 & 0 \end{pmatrix}$$

What is the cost of the minimum spanning tree for the given adjacency matrix of a graph?

Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Equal

Text Areas: PlainText

Possible Answers:

7

Question Number: 439 Question Id: 640653360682 Question Type: SA Calculator: None

Response Time: N.A Think Time: N.A Minimum Instruction Time: 0

Correct Marks: 4

Question Label: Short Answer Question

What will be the minimum number of nodes in an AVL tree of height **9**? Consider that the height of the empty tree is 0.

Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Equal

Text Areas : PlainText

Possible Answers:

88

Question Number: 440 Question Id: 640653360685 Question Type: SA Calculator: None

Response Time: N.A Think Time: N.A Minimum Instruction Time: 0

Correct Marks: 4

Question Label: Short Answer Question

Let A1, A2, A3, A4 be 4 matrices with dimensions $(10 \times 5), (5 \times 20), (20 \times 10), (10 \times 15)$ respectively. What is the minimum number of scalar multiplications required to find the product

 $A1 \times A2 \times A3 \times A4$?

Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Equal

Text Areas: PlainText

Possible Answers:

2500

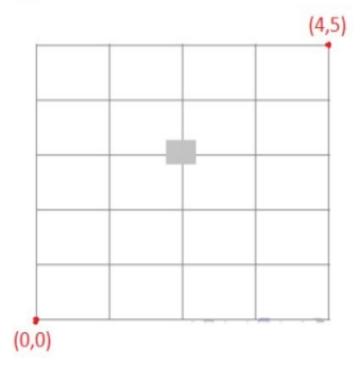
Question Number: 441 Question Id: 640653360686 Question Type: SA Calculator: None

Response Time: N.A Think Time: N.A Minimum Instruction Time: 0

Correct Marks: 4

Question Label: Short Answer Question

Consider the following grid.



How many unique paths are available from (0,0) to (4,5)? Condition is that you can only travel one step right or one step up at a time, and the gray box at intersection point (2,3) represents a blockage.

Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Equal

Text Areas: PlainText

Possible Answers:

66

Question Number: 442 Question Id: 640653360687 Question Type: SA Calculator: None

Response Time: N.A Think Time: N.A Minimum Instruction Time: 0

Correct Marks: 4

Question Label: Short Answer Question

Consider the Rabin-Karp algorithm using modulo arithmetic to match the pattern in base 10. Taking modulo q = 11, how many **false positives** matches does the Rabin-Karp matcher encounter while searching pattern 26 in the text 3141592653589793?

Response Type: Numeric

Evaluation Required For SA: Yes

Show Word Count: Yes

Answers Type: Equal

Text Areas: PlainText

Possible Answers:

3

System Commands

Section Id: 64065322456

Section Number: 14

Section type: Online

Mandatory or Optional: Mandatory

Number of Questions: 21

Number of Questions to be attempted: 21

Section Marks: 100

Display Number Panel: Yes

Group All Questions: No

Enable Mark as Answered Mark for Review and

Yes Clear Response:

Maximum Instruction Time: 0

Sub-Section Number: 1

Sub-Section Id: 64065352636

Question Shuffling Allowed: No

Question Number: 443 Question Id: 640653360692 Question Type: MCQ Is Question

Mandatory: No Calculator: None Response Time: N.A Think Time: N.A Minimum Instruction

Time: 0

Correct Marks: 0