Data Structures_15B11CI311_24Dec20 (15B11CI311)

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Registration Details

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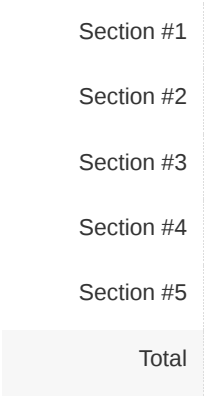
Profile Picture Snapshot

Identity Card Snapshot

Overall Summary

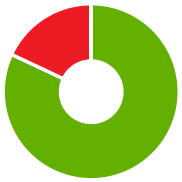
MARKS SCORED



	Score	Percentile	Percentage
Section #1	2 / 2	100	100
Section #2	6.5 / 7	98	92.86
Section #3	3.5 / 6	44	58.33
Section #4	14.5 / 18	89	80.56
Section #5	2 / 2	100	100
Total	28.5 / 35	98	81.43

Percentile is among 594 candidate(s) who've taken this test.

SUMMARY OF ATTEMPTS



9 Incorrect
(Scored 0/6.5)

41 Correct
(Scored 28.5/28.5)

TIME TAKEN

1	29
hr	min

Available time: **1 hr 30 min**

TOTAL QUESTIONS

50

Section-wise Details

Section #1

MARKS SCORED

	Score	Percentage
DS_CO1	2 / 2	100
Total	2 / 2	100

SUMMARY OF ATTEMPTS

4 Correct
(Scored 2/2)

TIME TAKEN

0	1
hr	min

This was untimed section.

TOTAL QUESTIONS

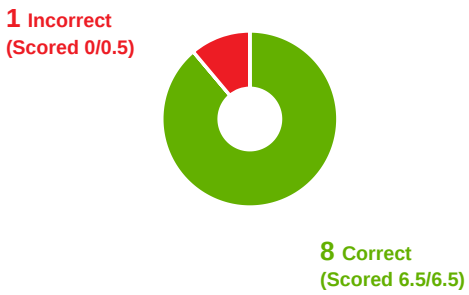
4

Section #2

MARKS SCORED

	Score	Percentage
DS_CO2	1.5 / 2	75
DS_CO2	5 / 5	100
Total	6.5 / 7	92.86

SUMMARY OF ATTEMPTS



TIME TAKEN

0	9
hr	min

This was untimed section.

TOTAL QUESTIONS

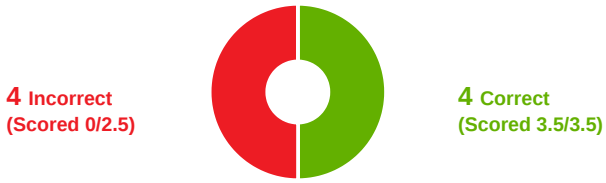
9

Section #3

MARKS SCORED

	Score	Percentage
DS_CO3	0.5 / 2	25
DS_CO3	3 / 4	75
Total	3.5 / 6	58.33

SUMMARY OF ATTEMPTS



TIME TAKEN

0	12
hr	min

This was untimed section.

TOTAL QUESTIONS

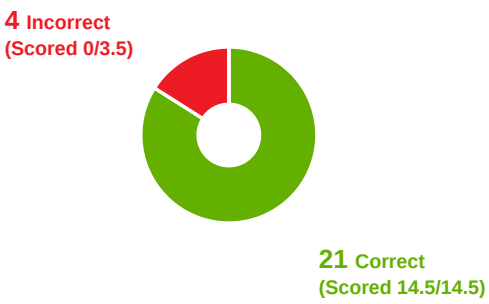
8

Section #4

MARKS SCORED

	Score	Percentage
DS_CO4	6.5 / 7	92.86
DS_CO4	8 / 11	72.73
Total	14.5 / 18	80.56

SUMMARY OF ATTEMPTS



TIME TAKEN

1	4
hr	min

This was untimed section.

TOTAL QUESTIONS

25

Section #5

MARKS SCORED

	Score	Percentage
DS_CO5	2 / 2	100
Total	2 / 2	100

SUMMARY OF ATTEMPTS

4 Correct
(Scored 2/2)

TIME TAKEN

0	2
hr	min

This was untimed section.

TOTAL QUESTIONS

4

Question-wise Details

Section #1

Question 1: **Time:** 13 Sec Marks: 0.5 / 0.5

Which of the following statements are valid for allocating memory to an integer and assigning it value 20 using dynamic memory allocation?

I. int *variable = new int (20);
II. int *variable; variable = new int; *variable = 20;
III. int *variable = NULL; *variable=new int (20);

Options	Response	Answer
I, II and III		
Only I		
II and III		
Only III		
I and III		
Only II		
I and II	✔	✔

Question 2: **Time:** 18 Sec Marks: 0.5 / 0.5

Which of the following statements are true about static and dynamic memory allocation:

I. All the variables declared inside any function are stored on heap.
II. Dynamically allocated memory at runtime is allocated on the heap.
III. Dynamically allocated memory at runtime is allocated on stack.
IV. All the local variables of any function are stored on stack.

Options	Response	Answer
I and III		
III and IV		
II and IV	✔	✔
I and II		

Question 3: **Time:** 10 Sec Marks: 0.5 / 0.5

Assume the size of an integer is “I” bytes and size of a pointer variable is “P” bytes. Predict the output of below given code:

```
int main()
{
   int *ptr = new int [50];
   for (int i=0 ; i<50; i++)
   { ptr[i]=i*2;
   }
   cout<<sizeof(ptr)<<" ";
   delete ptr;
   cout<<sizeof(ptr);
}
```

Options	Response	Answer
50*P 49*P		
50*I 49*I		
I 0		
P P	✔	✔
50*I 0		

Question 4: **Time:** 29 Sec Marks: 0.5 / 0.5

Predict the output of the following code (assume necessary header files are included).

```
void do_something(char *input, int length)
{ stack<char> sss;
  for (int pass=0; pass<2; pass++)
  {
     for (int i = 0; i < length; i++)
     sss.push(input[i]);

    for (int i= 0; i < length; i++)
    { input[i] = sss.top();
      sss.pop();
    }
    cout<<input<<endl;
  }
}
```

```
int main ()
{
   char str [] ="DS T3 EXAM";
   int len = strlen(str);
   something(str, len);
}
```

Options	Response	Answer
MAXE 3T SD DS T3 EXAM	✔	✔
MAXE 3T SD		
DS T3 EXAM MAXE 3T SD		
DS T3 EXAM DS T3 EXAM		
DS T3 EXAM		

Section #2

Question 1: **Time:** 1 Min 12 Sec Marks: 0.5 / 0.5

Predict the output of given code:

```
template <class A>
A calculate (A local)
{   static int freq=0;
    cout<< "freq= " << freq <<" ";
    freq++;
    local++;
    return local;
}
```

```
int main()
{
    cout<<calculate<int> (1)<<"\n";
    cout<<calculate<int>(2)<<"\n";
    cout<<calculate<double>(1.1)<<"\n";
    cout<<calculate<double>(2.1)<<"\n";
    cout<<calculate<char>('a')<<"\n";
    return 0;
}
```

Options	Response	Answer
freq= 0 2 freq= 1 3 freq= 0 2.1 freq= 1 3.1 freq= 0 b	✔	✔
freq= 0 2 freq= 0 3 freq= 1 2.1 freq= 1 3.1 freq= 2 b		
freq= 0 1 freq= 1 2 freq= 2 1.1 freq= 3 1.1 freq= 4 a		
freq= 0 2 freq= 1 3 freq= 2 2.1 freq= 3 3.1 freq= 4 b		

Question 2: **Time:** 16 Sec Marks: 0.5 / 0.5

Consider the following function template and the main() function. How many instances of calculate() function template are created in memory?

```
template <class A>
A calculate (A local)
{   static int freq=0;
   cout<< "freq= " << freq;
   freq++;
   local++;
   return local;
}
```

```
int main()
{
   cout<<calculate<int> (1);
   cout<<calculate<int>(2);
   cout<<calculate<double>(1.1);
   cout<<calculate<double>(2.1);
   cout<<calculate<char>('a');
   return 0;
}
```

Options	Response	Answer
3	✔	✔
5		
None of the above		
1		

Question 3: **Time:** 14 Sec Marks: 0 / 0.5

Consider the following Template declarations. Which of these declarations are valid?

Code 1	Code 2	Code 3

Template <class T>
T fun1()
{ T var1;
  cin>>var1;
  return var1;
}
int main()
{ fun1();
}
	Template <class T>
	void fun2(int a)
	{ T var2;
	  var2= a+10;
	  cout<<var2;
	}
	int main()
	{ fun2(100);
	}
		Template <class T, class U>
		void fun3(T a)
		{ U b;
		  cin>>b;
		  cout<<a<<b;
		}
		int main()
		{ fun3<int, char>(20);
		}

Options	Response	Answer
All are invalid.		
Code 1 and Code 2 are valid, Code 3 is invalid.	✔	
Code 1 and code 2 are invalid, Code 3 is valid.		✔
Code 2 and Code 3 are valid, Code 1 is invalid.		
Code 1 and Code 3 are invalid, Code 2 is valid.		

Question 4:

Time: 40 Sec Marks: 0.5 / 0.5

Consider the code given below and predict its output.
Assume the size of integer and double variables to be 4 bytes and 8 bytes respectively. You can assume that there is no alignment done by the compiler.

```
template <class P, class Q, class R=double>
class Temp
{
   P x;
   Q y;
   R z;
   static int c;
};
```

```
int main()
{
  Temp<int, int> a;
  Temp<double, double> b;
  cout << sizeof(a) << endl;
  cout << sizeof(b) << endl;
  return 0;
}
```

Options	Response	Answer
Compiler Error: template parameters cannot have default values		
8, 16		
16, 24	✔	✔
20, 28		

Question 5:

Time: 3 Min 20 Sec Marks: 1 / 1

Consider the following code. What is the sequence of constructor invocation?

```
class f1
{   public:
    f1() {cout<<" f1()"; }
    f1(int t){ cout<<" f1(int)";}
   ~f1() {cout<<" d1";}
};
class f2 : virtual public f1
{   public:
    f2():f1(3){ cout<<" f2()";}
    f2(int t){cout<<" f2(int)";}
    ~f2(){cout<<" d2";}
};
class f3 : virtual public f1
{     public:
      f3(){cout<<" f3()";}
    ~f3(){cout<<" d3";}
};
```

```
class f4:  public f2, public f3
{   int z;
    public:
    f4(): f1(2) {cout<<"f4()";}
    f4(int t) : f2(1) { cout<<" f4(int)";}
    ~f4() {cout<<" d4";}
};

int main()
{
    f4 obj;
    f4 *obj2;
    obj2=new f4(10);
    return 0;
}
```

Options	Response	Answer
f1(int) f2() f3() f4() f1() f2(int) f3() f4(int)	✔	✔
f1(int) f2()f4() f1() f3() f2(int) f4(int)		
f1() f2() f3() f4(int) f1(int) f2() f3() f4()		
f1() f2() f3() f4(int) f1(int) f2(int) f3() f4()		

Question 6: **Time:** 28 Sec Marks: 1 / 1

Predict the output of following code:

```
class Test3
{
int a;
public:
        Test3() { cout << "1 "; }
        Test3(int x) { a=x; cout<<"2 ";}
        Test3(const Test3 &t) { cout << "3 "; }

        void f1(Test3 arg1) { cout << "4 ";}
        Test3 f2(Test3 &arg2)
         {  cout<<"5 ";
           Test3 temp1;
            return temp1;
         }
};
```

```
int main()
{
Test3 *t1, *t2;
t1 = new Test3();
t2 = new Test3(*t1);
Test3 t3 = *t1;
Test3 t4;
 t4 = t3;
Test3 t5(7);
Test3 t6(t5);

t1->f1(t5);
t6=t1->f2(t5);

return 0;
}
```

Options	Response	Answer
1113312451		
1331233451	✔	✔
1331323451		
1331231451		

Question 7: **Time:** 59 Sec Marks: 1 / 1

Consider the following code. What is the sequence of destructor invocation?

```
class f1
{   public:
    f1() {cout<<" f1()"; }
    f1(int t){ cout<<" f1(int)";}
   ~f1() {cout<<" d1";}
};
class f2 : virtual public f1
{   public:
    f2():f1(3){ cout<<" f2()";}
    f2(int t){cout<<" f2(int)";}
    ~f2(){cout<<" d2";}
};
class f3 : virtual public f1
{     public:
      f3(){cout<<" f3()";}
    ~f3(){cout<<" d3";}
};
```

```
class f4:  public f2, public f3
{   int z;
    public:
    f4(): f1(2) {cout<<"f4()";}
    f4(int t) : f2(1) { cout<<" f4(int)";}
    ~f4() {cout<<" d4";}
};

int main()
{
    f4 obj;
    f4 *obj2;
    obj2=new f4(10);
    delete obj2;
    return 0;
}
```

Options	Response	Answer
d1 d2 d3 d4 d1 d2 d3 d4		
d4 d3 d2 d1 d4 d3 d2 d1	✔	✔
d3 d2 d1 d4 d4 d3 d2 d1		
None of these		

Question 8: **Time:** 1 Min 2 Sec Marks: 1 / 1

Consider the following code and statements given below it:

```
class T1
{
  public:
  T1(){ cout<<"1 "; }
  T1(int k) { cout<<" 2 ";}
  ~T1() { cout<<"3 "; }
};

class T2
{ public:
  T1 O1;
  public:
  T2() { cout<<"4 "; }
  T2(int k):O1(k){ cout<<"5 "; }
  ~T2() { cout<<"6 "; }
};
```

```
class T3
{   T2 O2;
    public:
    T1 *O3;
    public: T3() : O2(8) { O3=new T1(); cout<<"7 "; }
    T3(int k, int l){ cout<<"8 "; }
};

int main()
{
    T3 *O5;
    T2 *O6;
    O5 = new T3(8,11);
    O6 = new T2;
    delete(O5);
    return 0;
}
```

1: Relationship between class T3 and class T1 is Association.
2: Relationship between class T3 and class T1 is Aggregation.
3: Output of above code is: 1 4 8 1 4 6 3
4: Output of above code is: 2 5 8 1 4 6 3

Options	Response	Answer
Statement 1 and 4 are true		
Statement 1 and 3 are true		
Statement 2 and 3 are true	✔	✔
Statement 2 and 4 are true		

Question 9: **Time:** 1 Min 8 Sec Marks: 1 / 1

UrbanClap is a famous service providing application and has gained more popularity in the pandemic days. UrbanClap stores their data in form of a list of lists. UrbanClap provides services in different CATEGORIES like electrician, plumber, beauty etc which is maintained by a singly linked list. Within each category a list of service provider's contact details is maintained using doubly linked list. Which of the below structure definitions (CODE A/B/C/D) represent this scenario?

CODE (A)

```
struct category
{
        String category_name;
        category *next_category;
        service_provider *next_sp;
        category *prev_category;
};

struct service_provider
{
        service_provider *prev_contact;
        String sp_name;
        double mobile_no;
        service_provider *next_contact;
};
```

CODE (B)

```
struct category
{
        String category_name;
        category *next_category;
        service_provider *next_sp;
};

struct service_provider
{
        String sp_name;
        double mobile_no;
        service_provider *next_contact;
        service_provider *prev_contact;
};
```

CODE (C)

```
struct category
{
        String category_name;
        category *next_category;
};

struct service_provider
{
        category *next_category;
        String sp_name;
        double mobile_no;
        service_provider *next_contact;
        service_provider *prev_contact;
};
```

CODE (D)

```
struct category
{
        String category_name;
        category *next_category;
        category *prev_category;
};

struct service_provider
{
        category *next_category;
        String sp_name;
        double mobile_no;
        service_provider *next_contact;
        service_provider *prev_contact;
};
```

Options	Response	Answer
Code B and C both can be correct implementation of given scenario		
Code A is correct implementation of given scenario		
Code B is correct implementation of given scenario	✔	✔
Code D is correct implementation of given scenario		
Code C is correct implementation of given scenario		

Section #3

Question 1: **Time:** 2 Min 30 Sec Marks: 0 / 0.5

Consider a hash table of size 11 and hash function is defined as h1(key) = key mod 11. Collisions are resolved using a second hash function h2(key) = (key mod 7) + 1. Following keys are inserted into table: 14, 17, 25, 37, 34, 18, 29. What will be hash table (00 represent empty space)?

Options	Response	Answer
00 34 00 14 37 18 17 00 25 29 00	✔	
00 34 00 14 37 18 17 25 29 00 00		
00 34 29 14 37 25 17 18 00 00 00		✔
25 34 29 14 37 18 17 00 00 00 00		

Question 2: **Time:** 1 Min 44 Sec Marks: 0.5 / 0.5

Consider a hash table of size 10 and hash function is defined as h(key)=key mod 10. Collisions are resolved using linear probing. After inserting few values into an empty hash table, the resulting hash table is shown below.

0	
1	
2	112
3	253
4	74
5	562
6	336
7	13
8	
9	

Which option represents a possible order of the key values inserted in the hash table?

Options	Response	Answer
112, 336, 13, 253, 74, 562		
336, 74, 112, 253, 562, 13	✔	✔
74, 112, 253, 562, 13, 336		
336, 112, 74, 562, 253, 13		

Question 3: **Time:** 2 Min 40 Sec **Marks: 0 / 0.5**

Consider the following statements:

1. Worst case time complexity of Quick Sort is O(nlogn)
2. Best case time complexity of Quick Sort is O(nlogn)
3. Quick Sort is an in-place sorting technique
4. Quick Sort is a stable sorting technique

Options	Response	Answer
Statements 2 and 4 are true.	✔	
Statements 1 and 4 are true.		
Statements 1 and 3 are true.		
Statements 2 and 3 are true.		✔

Question 4: **Time:** 34 Sec **Marks: 0 / 0.5**

Consider the following statements:

1. Best case time complexity of Insertion sort is O(n)
2. Best case time complexity of Selection Sort is O(n)
3. Best case time complexity of Bubble sort is O(n)

Options	Response	Answer
2 and 3 are true		
Only 2 is true		
1 and 3 are true		✔
Only 3 is true		
All are true	✔	
1 and 2 are true		
Only 1 is true		

Question 5: **Time:** 28 Sec Marks: 1 / 1

Suppose we are debugging a quicksort implementation that is supposed to sort an array in descending order. After the first partition step has been completed, the contents of the array are in the following order:
22 24 26 19 16 3 11 2. Choose the correct option after reading following statements:

1. 19 could have been the pivot element.
2. 16 could have been the pivot element.
3. 3 could have been the pivot element.

Options	Response	Answer
Only 3 is correct.		
Only 2 is correct.		
1 and 2, both are correct.	✔	✔
1, 2 and 3, all are correct.		
Only 1 is correct.		

Question 6: **Time:** 1 Min 59 Sec Marks: 1 / 1

Consider the following code and identify its functionality.

```
int partition(int arr[], int l, int r)
{
    int x = arr[r], i = l;
    for (int j = l; j <= r - 1; j++) {
        if (arr[j] <= x) {
            swap(arr[i], arr[j]);
            i++;
        }
    }
    swap(arr[i], arr[r]);
    return i;
}
int base_function(int arr[], int l, int r, int n)
{
        if (n > 0 && n <= r - l + 1) {
         int index = partition(arr, l, r);
        if (index - l == n - 1)
            return arr[index];
        if (index - l > n - 1)
            return base_function(arr, l, index - 1, n);
               return base_function(arr, index + 1, r,
                                    n - index + l - 1);
    }
    return INT_MAX;
}
```

Options	Response	Answer
Segregate positive and negative elements.		
Recursively partition array with pivot as n to sort repeated element.		
Sort the element inside the array.		
Find n^{th} smallest element in array	✔	✔

Question 7: **Time:** 29 Sec Marks: 1 / 1

Consider the following count sort implementation inside Radix Sort. Choose the correct option for missing line in the code indicated by .....

```
void countSort(int arr[], int n, int e)
{
    int output[n];
    int i, count[10] = { 0 };

    for (i = 0; i < n; i++)
        count[(arr[i] / e) % 10]++;

   for (i = 1; i < 10; i++)
        count[i] += count[i - 1];

    for (i = n - 1; i >= 0; i--) {
        ........................;
        count[(arr[i] / e) % 10]--;
    }

   for (i = 0; i < n; i++)
        arr[i] = output[i];
}
```

Options	Response	Answer
output[count[arr[i]%10]/e]=arr[i];		
output[count[(arr[i]/e)%10]-1]=arr[i-1];		
output[count[(arr[i] / e) % 10] - 1] = arr[i];	✔	✔
output[count[(arr[i]/e)%10]]=arr[i];		

Question 8: **Time:** 1 Min 40 Sec Marks: 0 / 1

You have been given some numbers to be sorted in ascending order. The numbers are uniformly distributed in the range 0 to 1 and are as follows: 0.82, 0.89, 0.84, 0.87,0.73, 0.79, 0.74, 0.61, 0.83, 0.31. How many swaps will be required if bucket sort (internally using insertion sort to sort the buckets) is used to sort them?

Options	Response	Answer
5		
7	✔	
6		✔
12		

Section #4

Question 1: **Time:** 30 Sec Marks: 0.5 / 0.5

If A[x*3][y*2] represents an adjacency matrix, which of these could be the value of x and y?

Options	Response	Answer
x=0, y=0		
x=2, y=3	✔	✔
x=3, y=2		
x=3, y=3		

Question 2: **Time:** 45 Sec Marks: 0.5 / 0.5

Consider the following statements about a graph.

1. Every complete graph is a regular graph.
2. Every regular graph is a complete graph.
3. Every complete graph is connected graph.
4. Every regular graph is connected graph.

Options	Response	Answer
Statement 1 and 3 are true.	✔	✔
Statement 1, 3 and 4 are true.		
Statement 1 and 4 are true.		
All statements are true.		

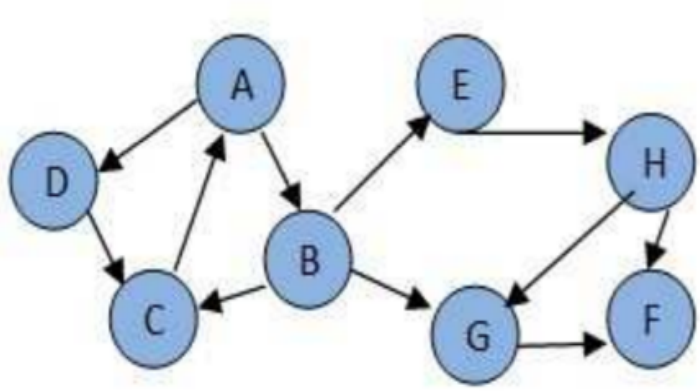
Question 3: **Time:** 5 Min 50 Sec Marks: 0.5 / 0.5

Let {2, 8, 6, 1, 10, 15, 3, 12, 11} is a set of integers which are inserted into empty heap. **The insertion takes place one element at a time**. If you create a maximum heap from these integers, then how many swap operations would be required?

Options	Response	Answer
8	✔	✔
9		
7		
6		

Question 4: **Time:** 2 Min 19 Sec Marks: 0.5 / 0.5

Given a graph below:



What is BFS and DFS traversals of above graph?

Options	Response	Answer
ABDCEGHF, ABCEHFGD	✔	✔
ABDEHGFC, ABCEHFGD		
ABDEHGFC, ABCDEFHG		
ABDCEGHF, ABCDEFHG		

Question 5: **Time:** 7 Min 17 Sec Marks: 0.5 / 0.5

Create an AVL tree from a given elements A={16,14,20,11,10,9,4,2,7} by inserting them one by one.
Now, if right child of a node is NULL then replace it with a pointer (thread) to the node that comes after that node in the pre-order traversal of the tree.
Considering the created threaded AVL tree, which of the following statements is true?

i. Right child of 11 is 20.
ii. Right child of 7 is 14
iii. Right child of 2 is 9

Options	Response	Answer
(i) and(iii) are correct but not (ii)		
(i) and(ii) are correct but not (iii)		
None is correct	✔	✔
(i), (ii) , and (iii) are correct		

Question 6: **Time:** 24 Sec Marks: 0.5 / 0.5

How many number of nodes are present in a complete graph having 15 edges?

Options	Response	Answer
8		
6	✔	✔
12		
5		

Question 7: **Time:** 1 Min 44 Sec Marks: 0.5 / 0.5

Consider a graph G represented by adjacency matrix given below and read the statements below it.

0	1	0	0	1
1	0	1	0	0
0	1	0	1	0
0	0	1	0	1
1	0	0	1	0

1. G is a regular graph
2. G is a connected graph
3. G is a complete graph
4. G has 1 connected component

Choose the correct option:

Options	Response	Answer
Only Statement 1 is true.		
Statement 1 ,2, and 3 are true		
Statement 1,2 and 4 are true.	✔	✔
Only Statement 2 is true.		

Question 8: **Time:** 2 Min 1 Sec Marks: 0 / 0.5

A 3-ary max heap is like a binary max heap, but instead of 2 children, nodes have 3 children. A 3-ary heap can be represented by an array as follows:
The root is stored in the first location, a[0], nodes in the next level, from left to right, is stored from a[1] to a[3]. The nodes from the second level of the tree from left to right are stored from a[4] location onward. An item x can be inserted into a 3-ary heap containing n items by placing x in the location a[n] and pushing it up the tree to satisfy the heap property.

Which one of the following is a valid sequence of elements in an array representing 3-ary max heap?

Options	Response	Answer
25, 16, 14, 13, 20, 10, 8, 9, 11	✔	
25, 20, 14, 11, 8, 9, 10, 16, 13		
25, 16, 13, 14, 20, 9, 10, 8, 11		
25, 14, 16, 20, 13, 10, 8, 9, 11		✔

Question 9: **Time:** 1 Min 24 Sec Marks: 0.5 / 0.5

Consider the following statements about the heap data structure.
1. If a heap is converted to binary search tree, the time required for the process will be O(n).
2. If a binary search tree is converted to heap, the time required for the process will be O(n).
3. Smallest element in the max heap will be one of the leaf nodes.

Which of the above statements are True?

Options	Response	Answer
1, 2 and 3		
Only 3		
2 and 3 only	✔	✔
1 and 3 only		

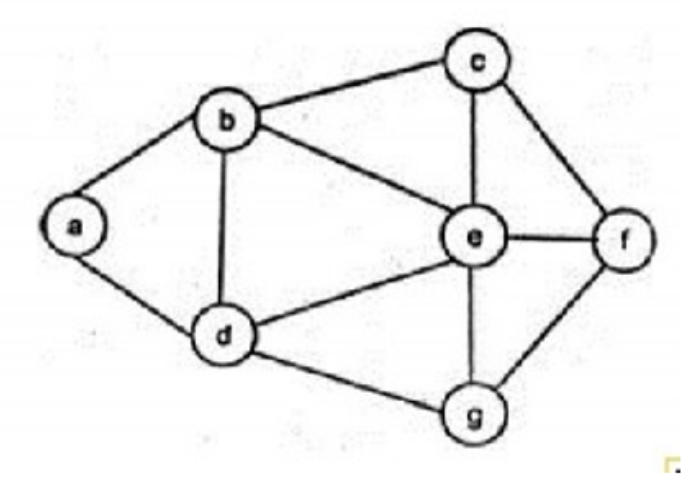
Question 10: **Time:** 49 Sec Marks: 0.5 / 0.5

How many times a vertex is discovered while implementing DFS ?

Options	Response	Answer
Once		
total of incoming edges to that vertex	✔	✔
n times		
two times		

Question 11: **Time:** 2 Min 12 Sec Marks: 0.5 / 0.5

Given a graph shown below:



There some traversals given below:

I. a d b c g e f
II. a b e f c g d
III. a d g e b c f
IV. a b e f d g c

Which traversal shows DFS?

Options	Response	Answer
1 and 3		
1, 2 and 3		
2 and 3	✔	✔
2, 3 and 4		

Question 12:

Time: 1 Min 38 Sec Marks: 0.5 / 0.5

When the Breadth First Search of a graph is unique?

Options	Response	Answer
When the graph is a Linked List	✔	✔
When the graph is a n-ary Tree		
When the graph is a Binary Tree		
When the graph is a Ternary Tree		

Question 13:

Time: 4 Min 5 Sec Marks: 0.5 / 0.5

The root of a min-heap consisting of 7 elements is repeatedly deleted and is inserted in the same order into two different tree structures (a BST and an AVL tree). What will be the depth (number of levels) of each of these tree structures?

Options	Response	Answer
BST: 7, AVL: 4		
BST: 4, AVL: 4		
BST: 7, AVL: 3	✔	✔
BST: 3, AVL: 3		

Question 14:

Time: 3 Min 44 Sec Marks: 0.5 / 0.5

You have been given preorder traversal of a Binary Search Tree as: 60, 40, 32, 20, 38, 45, 42, 70, 65, 80, 84. Find the post order traversal of same tree.

Options	Response	Answer
20, 42, 38, 32, 40, 45, 70, 80, 65, 84, 60		
20, 32, 38, 40,43, 45, 65, 70, 80, 84, 60		
20, 38, 32, 42, 45, 40, 65, 84, 80, 70, 60	✔	✔
20, 38, 42, 45, 32, 40, 65, 84, 80, 70, 60		

Question 15:

Time: 4 Min 30 Sec **Marks: 0 / 1**

Consider the algorithms: Algorithm 1 and Algorithm 2 to sort an array A of size 'n' using heap sort.

Heap-sort (A)	Heap-sort (A)
1 Build-max-heap(A) 2 for i= length[A] downto 2 3 exchange A[1] and A[i] 4 heap-size[A] ← heap-size[A] -1 5 Max-Heapify(A,1)	1 Build-min-heap(A) 2 for i= length[A] downto 2 3 exchange A[1] and A[i] 4 heap-size[A] ← heap-size[A] -1 5 Min-Heapify(A,1)
Algorithm 1	Algorithm 2

Which of the following statements are False?

1. Algorithm 1 sorts A in increasing order , Algorithm 2 sorts A in decreasing order
2. Algorithm 1 sorts A in decreasing order , Algorithm 2 sorts A in increasing order
3. Time complexity of Algorithm 1 and Algorithm 2 is $O(n^2)$
4. Time complexity of Algorithm 1 and Algorithm 2 is O(n log n)

Options	Response	Answer
Statement 2 and Statement 4		
Statement 2 and Statement 3		✔
Statement 1 and Statement 4	✔	
Statement 1 and Statement 3		

Question 16:

Time: 3 Min 28 Sec **Marks: 0 / 1**

How many minimum number of keys can be present in a B-Tree of order 6 and height 3?

Options	Response	Answer
42		
50		
53		✔
64	✔	

Question 17: **Time:** 36 Sec Marks: 1 / 1

Consider the code given below.

```
bool checkTree (struct Node* root)
{
   if (root == NULL)
      return true;

   if (root->left == NULL && root->right == NULL)
      return true;

   if ((root->left) && (root->right))
      return (checkTree(root->left) && checkTree(root->right));

   return false;
}
```

The above code checks whether a given tree is

Options	Response	Answer
AVL Tree		
Min Heap		
Full Binary Tree	✔	✔
Complete Binary Tree		

Question 18: **Time:** 48 Sec Marks: 1 / 1

An AVL tree is constructed from a given sequence of elements: 1,2,3,4,8,7,6,5,11,10,12. What will be the preorder traversal of AVL tree formed?

Options	Response	Answer
4,2,1,3,5,6,8,7,10,11,12		
7,6,5,4,2,1,3,10,8,11,12		
7,4,2,1,3,6,5,10,8,11,12	✔	✔
4,2,1,3,7,6,5,10,8,11,12		

Question 19: **Time:** 2 Min 48 Sec **Marks: 0 / 1**

Consider the following recursive implementation of checking of min heap

```
1  bool checkheap(Node* root, int i, int n)
2  {
3      if (root == nullptr)
4          return true;
5      if (i >= n)
6          return false;
7      if ((root->left && root->left->data <= root->data) &&
8              (root->right && root->right->data <= root->data))
9          return false;
10     return checkheap(root->left, 2*i + 1, n) &&
11             checkheap(root->right, 2*i + 2, n);
12 }
```

Options	Response	Answer
It is incorrect implementation of checking a tree for min heap which require to change && in line 10 to ||.		
It is a correct implementation of checking a tree for min heap.	✔	
It is incorrect implementation of checking a tree for min heap which require to modify 2nd && in line 7 to change to ||.		✔
The recursion will result in segmentation fault.		

Question 20: **Time:** 6 Min 21 Sec Marks: 1 / 1

The order of an internal node in a B+ tree index is the maximum number of children it can have. Suppose that a child pointer takes 8 bytes, the search field value takes 20 bytes, and the block size is 1024 bytes. What is the order of the internal node?

Options	Response	Answer
36		
37	✔	✔
39		
34		

Question 21: **Time:** 1 Min 3 Sec Marks: 1 / 1

How many leaf node splits are involved if B+ Tree of order 4 is constructed by inserting elements in following order: 12, 13, 15, 17, 21, 27, 29, 33, 39, 41, 19, 20, 18, 16, 11, 14?

Options	Response	Answer
10		
7	✔	✔
12		
11		

Question 22: **Time:** 35 Sec Marks: 1 / 1

A graph with V = {1, 2, 3, 4} and E = {a,b,c,d,e,f} is described by
G = [a {1,2}, b {1,2},c {1,4}, d {2,3}, e {3,4}, f {3,4} }] .
It has weights on its edges given by w= [(a , 3), (b, 2), (c,1),(d, 2),(e, 4), (f ,2)] .
What is the weight of the minimum spanning trees of it and how many such trees are there?

Options	Response	Answer
6,2		
5,3	✔	✔
4,2		
4,3		

Question 23: **Time:** 6 Min 28 Sec Marks: 1 / 1

The following steps were followed during the construction of an AVL Tree:
a) Elements are inserted in the order 8, 22, 31, 27, 42, 52, 37, 35, 39, 65, 40
b) The element 22 is deleted.

What is the balance factor of the root node after the process?

Options	Response	Answer
-1		
0	✔	✔
1		
2		

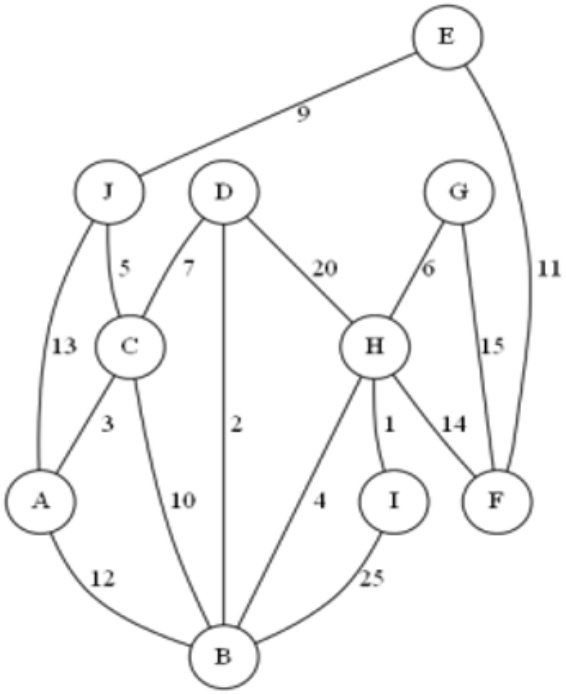
Question 24: **Time:** 1 Min 59 Sec Marks: 1 / 1

Let G be an undirected connected graph with distinct edge weight. Let Emax be the edge with maximum weight and Emin the edge with minimum weight. Which of the following statements is false?

Options	Response	Answer
No minimum spanning tree contains Emax.	✔	✔
Every minimum spanning tree of G must contain Emin.		
If Emax is in minimum spanning tree, then its removal must disconnect G.		
G has a unique minimum spanning tree.		

Question 25: **Time:** 1 Min 28 Sec Marks: 1 / 1

Consider the following graph:



What is the total weight of minimum spanning tree using Prim's algorithm?

Options	Response	Answer
48	✔	✔
49		
50		
53		

Section #5

Question 1:

Time: 1 Min 4 Sec Marks: 0.5 / 0.5

Consider a situation where you have 1 million documents. Now you have a single document for which you need to find best match document. The best match document is defined as the number of words matched in both the document. Now you want to store the data so that you can find out first best, second best etc. The data structure you will use

Options	Response	Answer
Stack		
Heap	✔	✔
B+ Tree		
Array		

Question 2:

Time: 14 Sec Marks: 0.5 / 0.5

Consider a situation where you need to search a particular key in hard disk. For this purpose, you need to use a data structure which will enable you to save time so that minimum hard disk access occurs. The data structure you will prefer would be

Options	Response	Answer
Binary search tree		
AVL Tree		
B+ tree	✔	✔
Balanced Binary search tree		

Question 3:

Time: 40 Sec Marks: 0.5 / 0.5

Karan wants to visit forts at Jaipur city. He starts from Aamer fort then wants to visit every fort connected to this fort and so on. Which algorithm will be best to use?

Options	Response	Answer
Prim's algorithm		
Kruskal's algorithm		
Breadth First Search	✔	✔
Depth First Search		

Question 4:

Time: 41 Sec Marks: 0.5 / 0.5

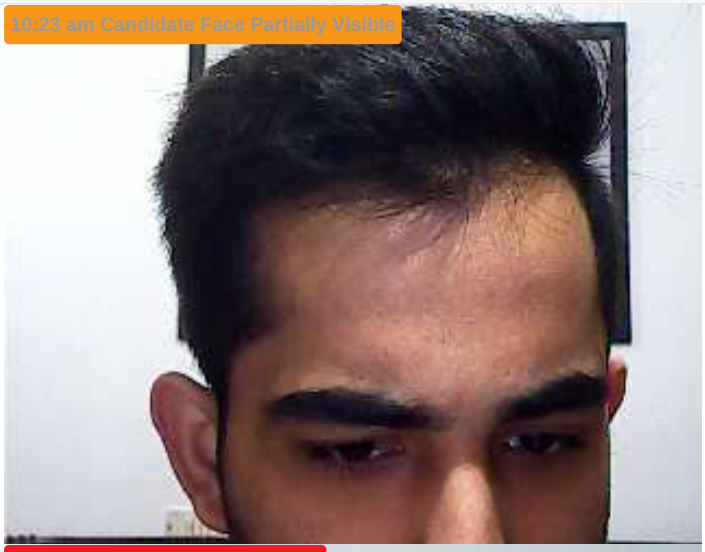
A computer network is designed to optimize the data transfer between different hosts. If connecting to various hosts a loop exists then we must apply a data structure that could avoid loops and also find minimum cost, which graph algorithm of graph you will use

Options	Response	Answer
DFS		
Minimum Spanning Tree	✔	✔
BFS		
Adjacency matrix with loop detection		

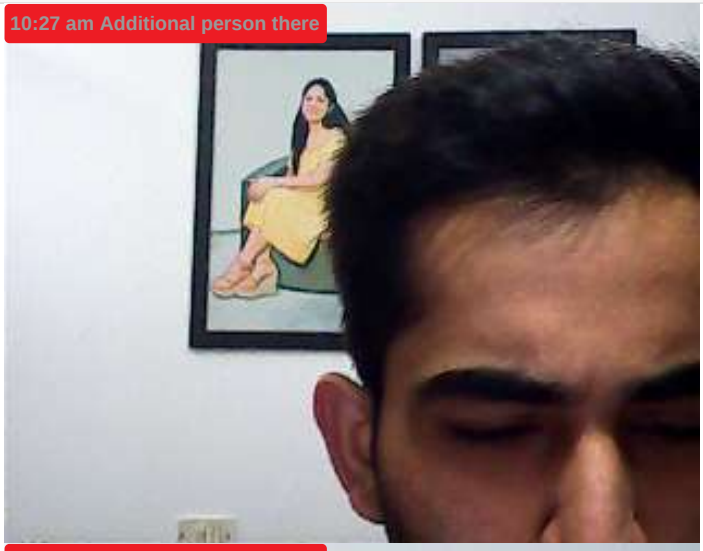
Test Log

Images of the test taker

10:23 am Candidate Face Partially Visible



10:27 am Additional person there

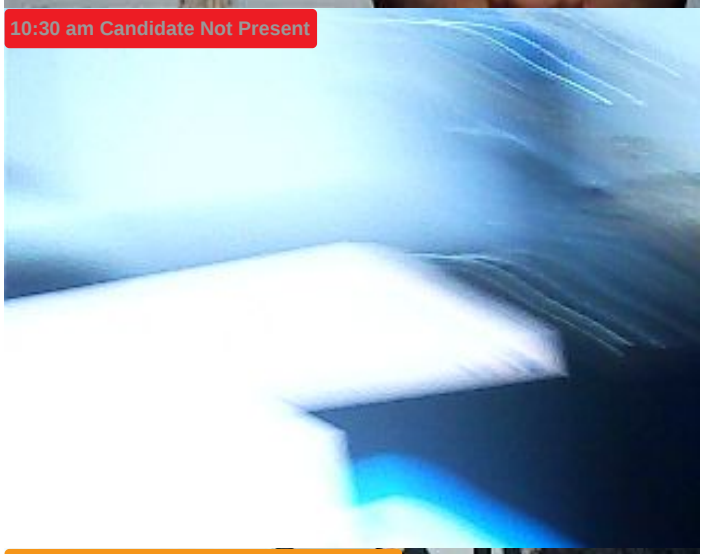


10:27 am Additional person there

10:28 am Additional person there

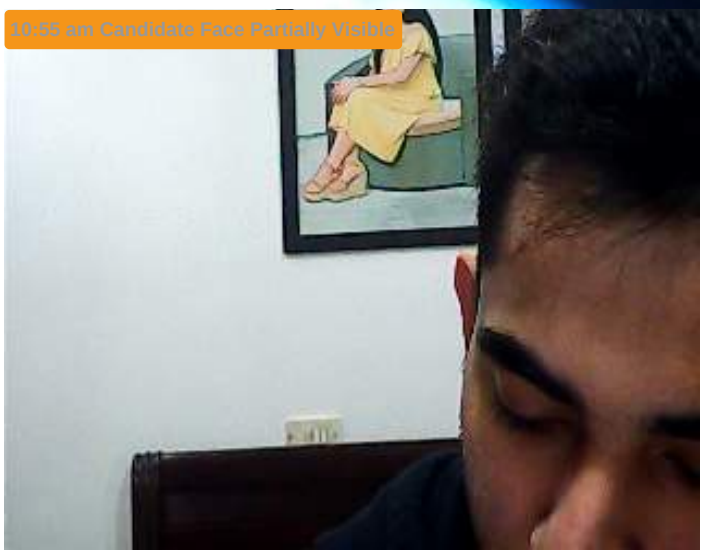
10:30 am Candidate Not Present

10:30 am Candidate Not Present



10:46 am Candidate Face Partially Visible

10:55 am Candidate Face Partially Visible




11:11 am Candidate Face Partially Visible


11:29 am Candidate Looking Away from Screen


11:57 am Candidate Face Partially Visible


12:04 pm Candidate Not Present

24 Dec,2020

10:22 am	Candidate submitted the Registration details for Authorization
10:22 am	Examination Cell authorized the candidate
10:23 am	Started the test with Section #1
10:23 am	Candidate gave us right to the following feeds
	- camera
	- microphone
10:23 am	Candidate Face Partially Visible for 02 mins
10:24 am	Went to Section #2 of the test
10:26 am	Proctor (TRIBHUWAN KUMAR TEWARI) : stay away frm the screen
10:26 am	Candidate Face Partially Visible
10:26 am	Proctor (TRIBHUWAN KUMAR TEWARI) : and tilt ur camera down a bit
10:26 am	Candidate : it is like that only
10:27 am	Candidate Face Partially Visible
10:27 am	Proctor (TRIBHUWAN KUMAR TEWARI) : u r too close
10:27 am	Additional person there
10:28 am	User Test Paused by Remote proctor: TRIBHUWAN KUMAR TEWARI, tribhuwan.tewari@jiit.ac.in
10:28 am	Proctor (TRIBHUWAN KUMAR TEWARI) : first follow d instructions then only Iwill allow
10:29 am	Candidate : i have an external webcam which i have pasted on an object on my table
10:29 am	Candidate : if u want i can show you 360
10:29 am	Proctor (TRIBHUWAN KUMAR TEWARI) : go ahead
10:29 am	Candidate : the webcam is lik this
10:29 am	Candidate : it has small angle
10:30 am	Candidate Not Present
10:30 am	Proctor (TRIBHUWAN KUMAR TEWARI) : show 360 degree view
10:30 am	Candidate : is it fine
10:31 am	Candidate : the time is ticking...
10:31 am	User Test Resumed by Remote proctor: TRIBHUWAN KUMAR TEWARI, tribhuwan.tewari@jiit.ac.in
10:32 am	Went to Section #1 of the test
10:32 am	Went to Section #3 of the test
10:33 am	Candidate Face Partially Visible for 02 mins
10:36 am	Candidate Face Partially Visible
10:37 am	Candidate Looking Away from Screen
10:37 am	Candidate Face Partially Visible
10:44 am	Went to Section #4 of the test
10:46 am	Candidate Face Partially Visible
10:46 am	Candidate Looking Away from Screen
10:48 am	Candidate Face Partially Visible
10:48 am	Candidate Looking Away from Screen
10:49 am	Candidate Face Partially Visible
10:49 am	Candidate Looking Away from Screen
10:49 am	Candidate Face Partially Visible
10:50 am	Candidate Looking Away from Screen
10:51 am	Candidate Face Partially Visible
10:52 am	Candidate Face Partially Visible for 01 min
10:53 am	Candidate Looking Away from Screen
10:54 am	Candidate Face Partially Visible for 01 min
10:56 am	Candidate Looking Away from Screen
10:59 am	Candidate Face Partially Visible
11:00 am	Candidate Looking Away from Screen
11:01 am	Candidate Face Partially Visible
11:02 am	Candidate Face Partially Visible
11:06 am	Candidate Looking Away from Screen
11:08 am	Went to Section #5 of the test
11:08 am	Went to Section #4 of the test
11:09 am	Candidate Face Partially Visible

11:10 am	Candidate Looking Away from Screen
11:11 am	Candidate Face Partially Visible
11:13 am	Candidate Face Partially Visible
11:16 am	Candidate Face Partially Visible
11:16 am	Went to Section #3 of the test
11:16 am	Went to Section #2 of the test
11:16 am	Candidate Face Partially Visible
11:16 am	Went to Section #4 of the test
11:18 am	Candidate Looking Away from Screen
11:18 am	Candidate Face Partially Visible
11:22 am	Candidate Looking Away from Screen
11:22 am	Candidate Face Partially Visible
11:23 am	Candidate Face Partially Visible
11:26 am	Went to Section #5 of the test
11:26 am	Went to Section #4 of the test
11:27 am	Away from test window
11:28 am	Candidate : my battery is low ,can i join again
11:28 am	Candidate : there is no light here
11:28 am	Candidate : my pc might turn off
11:29 am	Candidate Looking Away from Screen
11:30 am	Candidate Looking Away from Screen
11:34 am	Got disconnected from Server
11:40 am	Candidate submitted the Registration details for Re-authorization
11:43 am	JITENDRA MOHAN authorized the candidate
11:43 am	Resumed Test
11:43 am	Candidate gave us right to the following feeds - camera - microphone
11:47 am	Went to Section #5 of the test
11:48 am	Candidate Face Partially Visible
11:49 am	Candidate Looking Away from Screen
11:49 am	Candidate Face Partially Visible
11:50 am	Went to Section #2 of the test
11:50 am	Went to Section #1 of the test
11:50 am	Went to Section #2 of the test
11:50 am	Went to Section #3 of the test
11:51 am	Went to Section #4 of the test
11:51 am	Went to Section #2 of the test
11:52 am	Went to Section #3 of the test
11:52 am	Went to Section #2 of the test
11:54 am	Went to Section #4 of the test
11:55 am	Went to Section #2 of the test
11:55 am	Went to Section #4 of the test
11:57 am	Candidate Face Partially Visible
11:58 am	Candidate Face Partially Visible
11:59 am	Went to Section #5 of the test
11:59 am	Went to Section #3 of the test
11:59 am	Went to Section #2 of the test
11:59 am	Went to Section #1 of the test
11:59 am	Went to Section #4 of the test
12:00 pm	Candidate Face Partially Visible
12:00 pm	Candidate Face Partially Visible for 01 min
12:02 pm	Candidate Looking Away from Screen
12:03 pm	Candidate Face Partially Visible
12:04 pm	Candidate Face Partially Visible
12:04 pm	Candidate Not Present
12:05 pm	Candidate Face Partially Visible

12:07 pm	Candidate Face Partially Visible
12:07 pm	Test ended due to time over