# GLS University
# Faculty of Computer Applications & IT
## 0301302 DATA STRUCTURES
## BCA Sem – III
## Theory Assignment – I

**Q-1 True or False**

1. An array is linear data structure.
2. The smallest element of an arrays index is called its lower bound.
3. A matrix which contain most of non zero elements is called sparse matrix.
4. Matrix represnts the use of two dimenssional array.
5. Data can be organized in a linear or non-linear form.
6. In linear data structure all the data elements are arranged in a particular sequance.
7. Data structures are a method of representing of logical relationships between individual data elements related to the solution of a given problem.
8. Space complexity is measured in only one ways compile time or run time.
9. int, string,characters are known as primitive data types.
10. The data types that are derived from primary data types are known as non-Primitive data types.
11. ADT stands for abstract data type.
12. Graph is a Primitive Data structure.
13. PAC is a problem analysis chart.
14. An Algorithm which takes the maximum times of steps is known as best case algorithm.
15. Linked list is non linear data structure.
16. Sparse Matrix store the maximum non zero elements.
17. In diagonal matrix all diagonal elements must be a non zero.

**Q-2 Fill in the Blanks**

1. Data is a _____.
2. Age: 22 is _____ (Data or Information)
3. _____ are the most convenient way to handle data of different types.
4. The Solution of the Problem Analysis is _____.
5. _____ and _____ are the analysis of the algorithm.
6. The Algorithms are measured in terms of _____ and _____ complexity.
7. Integer is _____ data type in the data structure.
8. The base address of an array is the memory location where the _____ element of an array is stored.
9. Types of the Sparse Matrix : _____ & _____.

10. The data types that are derived from primary data types are known as _____.
11. Tree data structure is an example of a _____ data structure.
12. _____ is defined as the storage requirements ofa program at compile time.
13. _____ is the time taken by a program that is sum of its compile and execution times.
14. The _____ Complexity of an algorithm is the function defined by the minimum number of steps taken on any instances of size n.
15. There are _____ and _____ data types in the data structure.
16. PAC sands for_____.
17. _____ is known as step by step solution of problem.
18. An Algorithm which required minimum step is _____ case.
19. Time complexity is measured by_____.
20. _____ complexity is concern with space.
21. _____ is a data structure that is made up of a finite set of edges and vertices.
22. A square matrix is called _____ if all the entries above the main diagonal are zero.
23. square matrix is called _____ if all the entries below the main diagonal are zero.
24. A matrix that is both upper and lower triangular is called a _____.
25. A _____ matrixis a square matrix with zero entries except possibly on the
26. A square matrix in which all the main diagonal elements are 1's and all the remaining elements are 0's is called an _____.

**Q-3 Answer the following questions:**

1. What is data? Explain.
2. Explain the concept of Problem Analysis.
3. Explain Space Complexity and Time Complexity.
4. What is Primitive ad Non-Primitive data types? Explain in detail.
5. Explain the types of Data Structure with pictorial representation.
6. What is Array? Explain representation of single and multidimensional array.
7. What is Sparse Matrix? Explain its types with pictorial representation.
8. An array int a[5][4] in C++. If the base address is 2050, find the address of element a[3] [2] using row major and column major representation of an array.
9. An array float b[6][5] in C++. If the base address is 3365, find the address of element b[4][4] using row major and column major representation of an array.
10. Differentiate Data v/s Information.
11. Explain the best case, average case and worst case in Algorithm Analysis.
12. Differentiate Linear and Non-Linear data structure.
13. Draw the graphical representation of stack and linked list.
14. Explain the PAC chart with example.
15. Differentiate priori and posterior analysis.

16. Explain Algorithm complexity
17. Explain in detail ADT.
18. Differentiate Array and linked list.
19. Explain representation of multidimensional array.
20. Differentiate between one-dimensional and two-dimensional arrays.
21. Consider the linear array A[-15;5], B[625:682], C[10].
    (a) Find the number of elements in each array
    (b) Suppose base (A)=100 and word size (A)=4 words, find the addresses of A[-10], A[-4], A[3]
22. An array Arr[50][100] is stored in the memory along the row with each element occupying 2 bytes of memory. Find out the base address of the location Arr[20][50], if the location of Arr[10][25] is stored at the address 10000.
23. Given the base address of an array B[12.....20] as 1000 and size of each element is 8 bytes in the memory. Find the address of B[17].
24. Given an array [3...6,2...8] of integers. Calculate address of element T[4,6], where BA=600 and width is 4 bytes. Perform rowmajor and column major both.

Q.4 Solve following Sums.

1. An array int a[5][4] in C++. If the base address is 2050, find the address of element a[3] [2] using row major and column major representation of an array.

2. An array float b[6][5] in C++. If the base address is 3365, find the address of element b[4][4] using row major and column major representation of an array.

3. An array Array[20][15] is stored in the memory along the column with each element occupying 8 bytes of memory. Find out the Base address and address of the element Array [2][3], if the element Array [10][25] is stored at the address 1000.

4. An array X[7][20] is stored in the memory with each element requiring 2 bytes of storage. If the base address of array is 2000, calculate the location of X[3][5] when the array X is stored in column major order.

5. An array Arr[15][20] is stored in the memory along the row with each element occupying 4 bytes of memory. Find out the Base address and address of the element Arr[3][2], if the element Arr[10][25] is stored at the address 1500.

6. An array X[10][20] is stored in the memory with each element requiring 4 bytes of storage. If the base address of array is 1000, calculate the location of X[5][15] when the array X is stored in column major order.

7. An array VAL[1..15][1..10] is stored I the memory with each element requiring 4 bytes of storage. If the base address of array VAL is 1500, determine the location of VAL[12][9] when the array VAL is stored (i) Row wise (ii) Column wise

8. An array ARR[5][5] is stored in the memory with each element occupying 4 bytes of space. Assuming the base address of ARR to be 1000, compute the address of ARR[2] [4], when the array is stored: (i) Row wise (ii) Column wise.

9. Each element of an array DATA[1..10][1..10] requires 8 bytes of storage. If base address of array DATA is 2000, determine the location of DATA[4][5], when the array is stored (i) Row-wise (ii) Column-wise.

10. An array Arr[40][30] is stored in the memory along the column with each element occupying 4 bytes. Find out the base address and address of the element S [22][15], if the element S[15][10] is stored at the memory location 7200.

11. Given the base address of an array B[13.....19] as 1020 and size of each element is 2 bytes in the memory. Find the address of B[18].

12. Given the base address of an array B[5] as 501 and size of each element is 4 bytes in the memory. Find the address of B[4].

13. Given the base address of an array B[-10:10] as 400 and size of each element is 2 bytes in the memory. Find the address of B[-2], B[4] and B[7].

**Note: All the students have to attempt Q-1, Q-2 complusory. Attempt Q-3 as discussed in class:**