B. Tech. 3rd Semester
Data Structure (BCS 301)

CO Number	Course Outcomes
CO1	Define [L1:Remember] facts, terms and basic concepts of various data structures like Array, List, Stack, Queue, Tree and Graph using C as the programming language with static or dynamic implementations.
CO2	Express [L2:Understand] the basic understanding using programming techniques for illustrating solution of problems.
CO3	Employ [L3:Apply] different operations on data structures by applying knowledge and facts gained.
CO4	Analyze [L4:Analysis] the performance of data structures and algorithms to solve problems and also to draw conclusions regarding the best data structure for the problem.

Time: 1.5 Hrs.

M. M. 20

Section A

Q1. Attempt all questions: (1X5 = 5 Marks)

a)   Define Data Structure.   CO1

b)   Describe the Big-Oh (O) notation to represent time and space complexity.   CO2

c)   Examine $n^3 + 2n^2 + 5 \neq O(n^2)$.   CO4

d)   Describe the representation of 2-Dimensional array in memory.   CO2

e)   Underline the features of algorithm.   CO1

Section B

Q2. Attempt all questions: (2.5X4 = 10 Marks)

a i)   Explain about multi-dimensional array. Consider a multi-dimensional Array A[-10:9, 5:14, -3:6] with base address start at 1000. Calculate the address of A[5][10][2] in row major and column major order. Assume the each element take 4 Bytes.   CO2

Or

ii)   Demonstrate binary search Algorithm and use it to find item 35 in the sorted array: 2, 9, 11, 13, 20, 22, 33, 35, 49, and 52. Also write the complexity of binary search in all cases.   CO2

b i)   Define the various asymptotic notations with examples.   CO1

Or

ii)   Define the function in C language for Linear Search and also write its complexity in all cases.   CO1

c i)   Apply Selection sort algorithm to sort given elements 23, 10, 16, 7, 81, 13and 20. Also,   CO3

write the run-time complexity of selection sort algorithm.

Or

ii) Apply counting sort algorithm to sort given elements 5, 3, 5, 3, 4, 1, 3, 8 and 4. Also, write the complexity of counting sort algorithm.   CO3

d i) Analyze run-time complexity of insertion sort algorithm in all cases.   CO4

Or

ii) Analyze run-time complexity of Bubble sort algorithm in all cases.   CO4

Section C

(5X1 = 5 Marks)

Q3
i) Apply quick sort algorithm to sort given array A [3, 8, 6, 2, 15, 7, 12]. Also, write quick sort algorithm and explain its run-time complexity.   CO3

Or

ii) Apply merge sort algorithm to sort given array A[11, 10, 3, 6, 12, 18, 16, 13]. Also, write merge sort algorithm and explain its run-time complexity.   CO3