2022

B.A./B.Sc.

Second Semester

CORE – 3

COMPUTER SCIENCE

Course Code: CSC 2.11

(Data Structures)

Total Mark: 70   *Pass Mark: 28*

Time: 3 hours

Answer <u>five</u> questions, taking <u>one</u> from each unit.

UNIT–I

1. (a) What is a sparse matrix? Explain the two types of representing a sparse matrix. 1+4=5

   (b) Write a C program that computes the sum of left diagonal elements and sum of right diagonal elements in a matrix. 5

   (c) MAT is a two dimensional array with 12 rows and 31 columns. Each element occupies 4 memory locations. If MAT[1][1] begins at address 7000, find the location of MAT[9][18]. The arrangement of the elements is ROW-major. 4

2. (a) Write a C program that generates the minimum and maximum values in a matrix. 5

   (b) What is a string? Explain two string built-in functions with syntax and example. 1+4=5

   (c) TABLE is a two dimensional array with 46 rows and 38 columns. Each element occupies 2 memory locations. If TABLE[1][1] begins at address 8000, find the location of TABLE[33][20]. The arrangement of the elements is COLUMN-major. 4

UNIT–II

3. (a) Write a C program to perform push and pop operations on a stack. 6

(b) Evaluate postfix expression: 7,5,3,2,^,*,9,2,2,^,-,/,+,6,4,*,+   4

(c) Write down various applications of stack.   4

4. (a) Write algorithm to convert infix expression to postfix expression.   5

   (b) Write algorithms for push and pop operations on a stack.   2+2=4

   (c) Explain two methods to implement two stacks in an array.   6

UNIT–IV

5. (a) Explain in detail self-organizing list in data structure.   4

   (b) Explain the malloc() function.   3

   (c) Write a C program that creates a singly linked list.   7

6. (a) Write down advantages and disadvantages of circular linked list.   4

   (b) Explain in detail skip list in data structure.   4

   (c) State differences between array and linked list.   6

UNIT–IV

7. (a) Explain in detail threaded binary tree.   7

   (b) Construct an AVL tree with the following nodes: 4

     14,17,11,7,53,4,13,12,8,60,19,16,20

   (c) Explain complete binary tree.   3

8. (a) What is AVL tree? Explain three types of rotation in AVL trees.

                                      1+6=7

   (b) Explain strictly binary tree.   3

   (c) Construct a binary tree from the following traversal results: 4

     In order   :   9,5,1,7,2,12,8,4,3,11

     Post order :   9,1,2,12,7,5,3,11,4,8

UNIT–V

9. (a) Explain linear loop and quadratic loop in algorithm efficiency.   4

   (b) Write a C program that performs sorting in an array using selection sort method.   6

   (c) Sort in ascending order the following numbers manually using the insertion sort method: 80,17,27,58,20,66,55   4

10. (a) What is time complexity? Write the worst-case and best-case time complexity of linear search. 1+2=3

(b) Sort in ascending order the following numbers manually using the bubble sort method: 42,29,74,11,65,58 5

(c) Write a C program that performs binary search in an array. 6

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