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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Second Semester, Master of Computer Applications (MCA)

Semester End Examination; May/ June - 2019

Data Structures Using C

Time: 3 hrs

Max. Marks: 100

Note: Answer FIVE full questions, selecting ONE full question from each unit.

UNIT - I

- 1 a. Write a program to find sum of N given number using malloc and explain it. 10
- b. Explain ADT for rational numbers with the following operations : 10
making_rational, add_rational and equality_rational.
- 2 a. Write a C program to calculate GROSSPAY for the given input EMPNAME, EMPID, BASIC, HRA for N Employees using structures. 10
- b. Explain Array ADT. Illustrate 2D static integer array $a[3][5]$ row representation in memory. Assume base address of $a[3][5]$ is 2000 with integer size 4 bytes; Calculate address of $[2][3]^{\text{th}}$ element in a two dimensional array using equation. 10

UNIT - II

- 3 a. Apply relevant data structure for the following problem : 10
A collection of plates laid on top of each other of plates are there in a cafeteria. Write appropriate function for insertion and removal of plates.
- b. Identify the data structure used in compiler to evaluate the expression: $3 \ 6 \ 2 \ - \ * \ 6 \ 2 \ - \ / \ 4 \ + \ 2 \ \$$. 10
Write the algorithm and trace it. Justify your chosen data structure.
- 4 a. Explain the role of stack in recursion with example. 10
- b. Write a program / algorithm for Tower of Hanoi problem with explanation. 10

UNIT - III

- 5 a. Apply linked list algorithm for stack applications. Compare it with static stack. 10
- b. Illustrate how to insert_first, delete_inbetween, display in the linked list with diagram and memory address? 10
- 6 a. Apply linked list algorithm for queue applications. Compare it with static queue. 10
- b. Illustrate how to delete_first, insert_inbetwen, search in the linked list with diagram and memory address? 10

UNIT - IV

- 7 a. Apply four traversal functions of binary search tree for the following data : 10
100, 20, 200, 10, 30, 150, 300 and explain with diagram. Which traversal method gives the sorted values? Justify your answer.
- b. Discuss threaded binary trees with example. 10

- 8 a. Explain binary search function. Illustrate binary search for the values {10, 26, 32, 44, 50, 61, 75, 80, 97} for the key = 61. Show the tracing of low, high, mid and comparison in each iteration with explanation. 10
- b. Discuss any five methods used in Hash function. 10

UNIT - V

- 9 a. Explain simple insertion sort function and apply insertion sort for the following data : 10
12, 11, 13, 5, 6.
- b. Explain quick sort function with example. 10
- 10 a. Explain bubble sort function and apply bubble sort for the following data : 10
5, 1, 4, 2, 8.
- b. Explain heapsort function with example. 10

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