M.Tech Odd Semester (CBCS) Exam., December—2017

COMPUTER SCIENCE AND ENGINEERING

(1st Semester)

Course No. : MCSECF–02

(Programming and Data Structures)

Full Marks : 50
Pass Marks : 15

Time : 2 hours

Note : 1. Attempt *any* **five** questions.
2. Begin each answer in a new page.
3. Answer parts of a question at a place.
4. Assume reasonable data wherever required.
5. The figures in the margin indicate full marks for the questions.

1. *(a)* Explain Big-O notation. Give the rate of growth of common computing functions and give its graphical plot. 5

(b) Consider a doubly linked list with the following elements :

20, 30, 40, 12, 50, 60, 140, 80, 130, 100

Write a C function to delete maximum and minimum values from doubly linked list. 5

2. Explain the following with proper illustrations : 2½×4=10

(a) LL rotation

(b) LR rotation

(c) RL rotation

(d) RR rotation

3. *(a)* A certain sorting technique was applied to the following data set :

80 72 66 44 21 33

After two passes, the rearrangement of data set is given below :

21 33 80 72 66 44

Identify the sorting algorithm and justify your answer. 7

(b) Differentiate between LIFO and FIFO data structures. 3

4. *(a)* Write an algorithm to evaluate postfix expression using stack. 5

(b) Using the algorithm in **4***(a)*, evaluate the postfix expression given below, explaining the intermediate steps and also finding the contents of the stack : 5

7 2 3 2 /

5. *(a)* Construct a binary search tree for the following data entered in sequence, given as 3

70 80 60 65 50 45 55

b) Is the binary tree thus constructed in **5***(a)* an AVL tree? State the reasons for your claim. Further, if your answer is negative, balance the tree so that it becomes an AVL tree. 7

6. Describe the Dijkstra's algorithm for finding a shortest path in a given graph. 10

7. *(a)* What is hashing? Explain why we require the table size to be a prime number in double hashing. 2+2=4

(b) The following values are to be stored in a hash table :

25, 42, 96, 101, 102, 162, 197, 201

Use the division method of hashing with a table size of 11. Use the sequential method for resolving collision. 6

8. *(a)* Explain the disadvantages of implementing queue (non-circular) using array. In a circular queue, show the conditions that differentiate between empty queue and full queue. 2+2=4

(b) Write a C program/function to implement the operations of a circular queue using an array. 6

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