CBCS SCHEME

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
Data Structure and Applications

Time: 3 hrs.　　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 100

**Note: Answer any FIVE full questions, choosing
ONE full question from each module.**

Module-1

1　a. Define data structure. List and explain data structure operations. (05 Marks)
　b. Write the bubble sort algorithm. (05 Marks)
　c. List and explain in detail, three types of structures used to store the strings. (10 Marks)

OR

2　a. Explain dynamic memory allocation. (05 Marks)
　b. Explain about the representation of two dimensional arrays in memory. (05 Marks)
　c. What do you mean by pattern matching? Let P and T be strings with lengths R and S respectively and are stored as arrays with one character per element. Write a pattern matching algorithm that finds index P in T. Also discuss about this algorithm. (10 Marks)

Module-2

3　a. Define stack. Write the procedure for two basic operations associated with stack. (05 Marks)
　b. Write a short note on priority queues. (05 Marks)
　c. Define recursion. What are the properties of recursive procedure? Write recursive procedure for : i) Tower of Hanoi ii) Factorial of a number. (10 Marks)

OR

4　a. Define queues. Write QINSERT and QDELETE procedures for queues using arrays. (10 Marks)

　b. Write the postfix form of the following expression.
　　$A + (B *C - D/E \uparrow F) *G) * H$. (05 Marks)
　c. Write a note on Ackermann function. (05 Marks)

Module-3

5　a. Write the following algorithm for singly linked list.
　　i) Inserting ITEM as the first node in the list
　　ii) Deleting the node with the given ITEM of information. (10 Marks)
　b. Write the node structure for linked representation of polynomial. Write the function to add two polynomials represented using linked list. (10 Marks)

OR

6 a. Write the functions to perform the following :
    i) Inverting a singly linked list
    ii) Concatenating the singly linked list
    iii) Finding the length of a circular list. **(10 Marks)**
  b. Write a note on header linked list. **(05 Marks)**
  c. For the given sparse matrix, write the diagrammatic linked list representation.

$$\begin{bmatrix} 2 & 0 & 0 & 0 \\ 4 & 0 & 0 & 3 \\ 0 & 0 & 0 & 0 \\ 8 & 0 & 0 & 1 \\ 0 & 0 & 6 & 0 \end{bmatrix}.$$

(05 Marks)

Module-4

7 a. What is a tree? write the routines to traverse the given string using
    i) Pre-order traversal
    ii) In-order traversal
    iii) Post-order traversal. **(10 Marks)**
  b. Define binary search tree. Write the recursive search and iterative search algorithm for a binary search free. **(10 Marks)**

OR

8 a. Write the routines for :
    i) Copying binary trees
    ii) Testing for equality of binary trees. **(10 Marks)**
  b. List the rules to construct the threads. Write the routines for inorder traversal of a threaded binary tree. **(10 Marks)**

Module-5

9 a. Write an algorithm for an insertion sort. Also discuss about the complexity of insertion sort. **(10 Marks)**
  b. Write an algorithm for : i) Breadth first search ii) depth first search. **(10 Marks)**

OR

10 a. Define graph. Explain in detail about directed graphs. **(10 Marks)**
  b. Explain in detail about static and dynamic hashing. **(10 Marks)**

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