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## Third Semester B.E. Degree Examination, Aug./Sept. 2020 Data Structures and Applications

Time: 3 hrs.

Max. Marks: 80

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

### Module-1

- 1 a. Differentiate between structures and unions. (04 Marks)
- b. Write function to:
  - (i) Insert an element into an array. (06 Marks)
  - (ii) Delete an element from an array. (06 Marks)
- c. Explain dynamic memory allocation in detail. (06 Marks)

OR

- 2 a. Define data structure. Give its classification. (06 Marks)
- b. Consider the following polynomial:  
 $A(x) = 4x^{15} + 3x^4 + 5$  and  $B(x) = x^4 + 10x^2 + 1$   
 Show diagrammatically how these two polynomials can be stored in a 1-D array. Also give its C representation. (04 Marks)
- c. Give the ADT of sparse matrix and show with suitable example. Sparse matrix representation storing as triplet. (06 Marks)

### Module-2

- 3 a. Define stack. Implement push and pop functions for stack using arrays. (08 Marks)
- b. Write the postfix form of the following expression using stack:
  - (i)  $((6 + (3 - 2) \times 4) \$ 5 + 7)$
  - (ii)  $(a + b) * d + e / (f + a * d) + c$  (08 Marks)

OR

- 4 a. List the disadvantages of linear queue and how is it solved in circular queue. Give the algorithm to insert and delete an element in a circular queue. (08 Marks)
- b. Write a function to evaluate postfix expression and convert the following expression to postfix expression and trace for the given data  $a = 6, b = 3, c = 1, d = 2, e = 4$ .  
 $((a / (b - c + d)) * (e - a) * c)$ . (08 Marks)

### Module-3

- 5 a. Write the following function for singly linked list,
  - (i) insert front
  - (ii) delete end(08 Marks)
- b. List out the difference between the doubly linked list and singly linked list. Explain with example the following operations on doubly linked list.
  - (i) Insert a node at the beginning.
  - (ii) Deleting a node with given value. (08 Marks)

OR

- 6 a. Define linked list. Explain in detail the primitive operation performed on singly linked list. (08 Marks)
- b. Write C program to implement linked stack. (08 Marks)

**Module-4**

- 7 a. What is tree? With suitable example define  
 (i) Binary tree (ii) Level of tree (iii) Complete binary tree. (08 Marks)  
 b. Draw the binary tree for the following expression  $3+4*(7-6)/4+3$ . Traverse the generated tree using inorder, postorder and preorder. (08 Marks)

OR

- 8 a. Given inorder : DJGBHEAFKIC and  
 Postorder : JGDHEBKITCA construct binary tree and give its preorder traversal. (08 Marks)  
 b. Write a function to insert an item into an ordered binary search tree (Duplicate item not allowed). (08 Marks)

**Module-5**

- 9 a. Define graph. Give adjacency matrix and adjacency linked list for the given weighted graph in Fig. Q9 (a). (08 Marks)

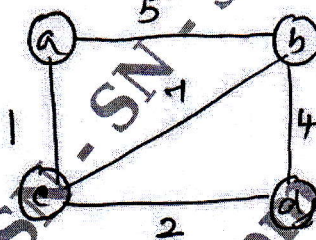


Fig. Q9 (a)

- b. What are the methods used for traversing the graph. Explain one with example. (08 Marks)

OR

- 10 a. How insertion sort works? Trace the insertion sort algorithm for the following data in ascending order:  
 77, 33, 44, 11, 88, 22, 66, 55 (08 Marks)  
 b. What is collision? What are the methods used to resolve collision? Explain linear probing with an example. (08 Marks)

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