CBCS SCHEME

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18CS32

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Data Structures 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. What is data structure? What are the various types of data structure? Explain. **(05 Marks)**

b. What is structure? How it is different from array? Explain different types of structure declaration with examples and give differences between Union and Structure. **(10 Marks)**

c. Define pointers. How to declare and initialize pointers, explain with example. **(05 Marks)**

OR

2 a. Explain dynamic memory allocation functions in detail. **(06 Marks)**

b. Write the Knuth Morris Pratt pattern matching algorithm and apply the same to search the pattern 'abcdabcy' in the text: 'abcxabcdabxabcdabcdabcy' **(08 Marks)**

c. Write a C program to:
(i) Comparing strings
(ii) Concatenate two strings **(06 Marks)**

Module-2

3 a. Define stack. Give the implementation of push, pop and display functions. Include check for empty and full conditions. **(07 Marks)**

b. Write the postfix form of the following expressions using stack:
(i) A $ B * C – D + E|F|(G + H)
(ii) A – B | (C * D $ E) **(06 Marks)**

c. Write an algorithm to evaluate a postfix expression and apply the same for the given postfix expression. ABC – D * + E$F + and assume A = 6, B = 3, C = 2, D = 5, E = 1 and F = 7. **(07 Marks)**

OR

4 a. Define recursion. Write a recursive functions for the following:
(i) Factorial of a number
(ii) Tower of Hanoi **(07 Marks)**

b. What is the advantage of circular queue over ordinary queue? Write a C program to simulate the working of circular queue of integers using array. Provide the following operations:
(i) Insert
(ii) Delete
(iii) Display **(08 Marks)**

c. Write a note on Dequeue and priority queue. **(05 Marks)**

Module-3

5 a. What is a linked list? Explain the different types of linked lists with neat diagram. **(07 Marks)**

b. Write a C function to insert a node at front and delete a node from the rear end in a circular linked list. **(08 Marks)**

c. Write a C function for the concatenation of two doubly linked lists. **(05 Marks)**

OR

6 a. Describe the doubly linked lists with advantages and disadvantages. Write a C function to delete a node from a circular doubly linked list with header node. **(08 Marks)**

b. For the given sparse matrix, give the diagrammatic linked representation.

$$a = \begin{bmatrix} 0 & 1 & 2 \\ 3 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$ **(04 Marks)**

c. Write a C function to add two-polynomials represented as circular list with header node. **(08 Marks)**

Module-4

7 a. What is a tree? With suitable example, define:
(i) Binary tree
(ii) Level of the binary tree
(iii) Complete binary tree
(iv) Degree of the tree **(09 Marks)**

b. Write the C routines to traverse the tree using:
(i) Pre-order traversal
(ii) Post-order traversal. **(06 Marks)**

c. For the given data, draw a binary search tree and show the array and linked representation of the same: 100, 85, 45, 55, 110, 20, 70, 65. **(05 Marks)**

OR

8 a. What is the advantage of the threaded binary tree over binary tree? Explain the construction of threaded binary tree for 10, 20, 30, 40 and 50. **(07 Marks)**

b. Define expression tree. For a tree given in Fig.Q8(b) traverse the tree using in-order, preorder and post-order traversals.

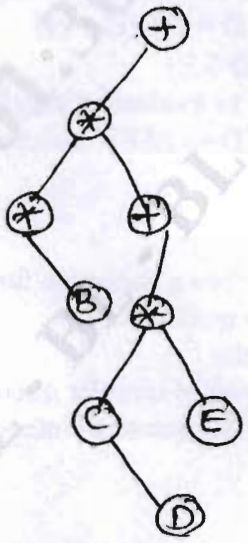

Fig.Q8(b) **(07 Marks)**

c. Construct a binary search tree by using the following in-order and preorder traversals:
Inorder : BCAEDGHFI
Preorder : ABCDEFGHI **(06 Marks)**

Module-5

9 a. Define graph. For the given graph, show the adjacency matrix and adjacency list representation of the graph [Ref. Fig.Q9(a)]

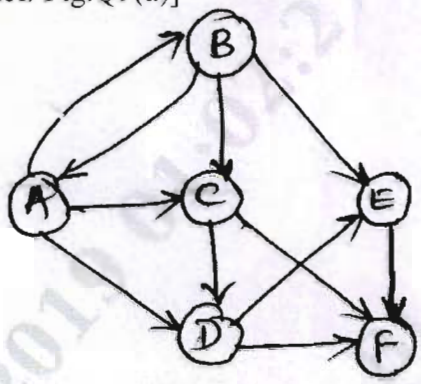

Fig.Q9(a) **(05 Marks)**

b. What are the methods used for traversing a graph? Explain any one with example and write C function for the same. **(08 Marks)**

c. Write a C function for insertion sort. Sort the following list using insertion sort:
50, 30, 10, 70, 40, 20, 60 **(07 Marks)**

OR

10 a. What is collision? What are the methods to resolve collision? Explain linear probing with an example. **(07 Marks)**

b. Explain in detail about static and dynamic hashing. **(06 Marks)**

c. Briefly explain basic operations that can be performed on a file. Explain indexed sequential file organization. **(07 Marks)**

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