Reg. No. : | | | | | | | | | | |

Question Paper Code: 43202

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Third Semester

Computer Science and Engineering

14UCS302 - DATA STRUCTURES

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. A mathematical-model with a collection of operations defined on that model is called

   (a) data structure (b) abstract data type
   (c) primitive data type (d) algorithm

2. A queue is a

   (a) FIFO (b) LIFO (c) FILO (d) LOFI

3. What is the postfix form of the following prefix expression -A/B*C$DE?

   (a) ABCDE$*/- (b) A-BCDE$*/- (c) ABC$ED*/- (d) A-BCDE$*/

4. The post order traversal of a binary tree is DEBFCA. Find out the pre order traversal

   (a) ABFCDE (b) ADBFEC (c) ABDECF (d) ABDCEF

5. Which amongst the following cannot be a balance factor of any node of an AVL tree?

   (a) 1 (b) 2 (c) 0 (d) -1

6. The process of accessing data stored in a serial access memory is similar to manipulating data on a

(a) heap (b) queue (c) stack (d) binary tree

7. If h is any hashing function and is used to hash *n* keys in to a table of size *m*, where *n*<=*m*, the expected number of collisions involving a particular key *x* is

(a) less than 1 (b) less than n (c) less than m (d) less than n/2

8. A union find data-structure is commonly applied while implementing

(a) A depth-first search traversal of a graph
(b) A breadth-first search traversal of a graph
(c) Computing the minimum spanning tree of a graph using the Kruskal algorithm
(d) Computing the all-pairs shortest path in a graph

9. In breadth first search of graph, which of the following data structure is used?

(a) stack (b) queue (c) linked List (d) none of the above

10. The spanning tree of connected graph with 10 vertices contains

(a) 9 vertices (b) 11 edges (c) 10 edges (d) 9 edges

PART - B (5 x 2 = 10 Marks)

11. Mention the advantages of representing stacks using linked lists than arrays.

12. What is the use of threaded binary tree?

13. What do you mean by balance factor of a node in AVL tree?

14. Define an equivalence relation.

15. What is meant by strongly connected and weakly connected in a graph?

PART - C (5 x 16 = 80 Marks)

16. (a) Develop an algorithm to implement a stack ADT. Give relevant example and diagrammatic illustrations. (16)

Or

(b) Write an algorithm to convert infix to postfix notation and prefix notation using stack. (16)

17. (a) (i) A binary tree *T* has 10 nodes. The in-order and preorder traversals of *T* yield

The following sequence of nodes:

Inorder	D	B	H	E	A	I	F	J	C	G
Preorder	A	B	D	E	H	C	F	I	J	G

Draw the tree *T*. (8)

(ii) Define a threaded binary tree. Write an algorithm for in-order traversal of a threaded binary tree. (8)

Or

(b) List the different types of tree traversal. Develop an algorithm for traversing a binary tree. Validate the algorithm with a suitable example. (16)

18. (a) (i) Show the result of inserting 2, 1, 4, 5, 9, 3, 6, and 7 into an initially empty AVL tree. (8)

(ii) Define Splay trees. Explain the rotations in Splay trees. (8)

Or

(b) (i) What are expression trees? Represent the following expression using a tree. Comment on the result that you get when this tree is traversed in Preorder, Inorder and Postorder. *(a-b) / ((c*d)+e).* (8)

(ii) What is a Binary Search Tree (BST)? Make a BST for the following sequence of numbers. 45, 36, 76, 23, 89, 115, 98, 39, 41, 56, 69, 48. (8)

19. (a) Create extendible hash structure to insert the following key elements 2, 3, 5, 7, 11, 17, 19, 23, 29, 31. Show the extendable hash structure for this file if the hash function is h(x) = x mod 8 and buckets can hold three records. (16)

Or

(b) (i) Illustrate the smart union algorithm with suitable example. (8)

(ii) Discuss about the dynamic equivalence problem with example. (8)

20. (a) Describe the process of depth first traversal and breadth with an example. (16)

Or

(b) (i) Write an algorithm to implement Depth-first search? How is Depth-first search differing from Breadth-first search? (8)

(ii) Discuss about Euler circuit with suitable example. (8)
