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Question Paper Code: 41382

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2016

Third Semester

Information Technology

14UIT302 - PROGRAMMING WITH DATA STRUCTURES

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. If you are using C language to implement the heterogeneous linked list, what pointer type will you use?
(a) void (b) int (c) double (d) float
2. What is a data structures used to perform recursion?
(a) stack (b) queue (c) array (d) tree
3. How many null nodes will a binary tree with 20 nodes have?
(a) 21 (b) 20 (c) 19 (d) 22
4. Which one of the following is in-order tree traversal?
(a) root- left –right (b) left-right-root
(c) left-root-right (d) right-left-root
5. A B-tree of order 'M' contains maximum of ___ keys and ___ children.
(a) M-1 and M (b) M and M+1
(c) M-1 and M (d) M-1 and M+1

6. Which is a binary heap property?

(a) full binary tree	(b) complete binary tree
(c) heap order property	(d) both (b) and (c)
7. Which one is direct access method?

(a) Linked list	(b) Array	(c) Queue	(d) Hashing
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8. Which is open hashing technique?

(a) linked list	(b) binary tree	(c) overflow block	(d) both (a) and (b)
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9. What is the data structure used in depth first traversal?

(a) stack	(b) queue	(c) array	(d) tree
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10. In a graph, a path that starts and ends with same vertices then it is said to be

(a) connected graph	(b) acyclic graph
(c) cyclic graph	(d) bi-connected graph

PART - B (5 x 2 = 10 Marks)

11. List out the applications of data structures.
12. Write the pseudo code for pre-order traversal in binary tree. Whether the in-order traversal of binary tree and binary search tree will yield the same result? Justify our answer.
13. Draw the result of inserting the following values 21, 11, 14, 15, 19, 30, 60, 17 into an empty max heap tree and show the resultant tree at the end of each insertion.
14. Classify the hashing functions based on the various methods by which the key value is computed.
15. How do you find the bi-connectivity of a graph? Give an example.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) How do you differentiate the double linked list from the singly linked list? Also, write a pseudo code to add and delete an element into the doubly linked list. (8)
- (ii) Write an algorithm for converting an infix expression into a postfix expression. Apply the same in order to obtain the postfix form of the given expression.
 $A * (B + C) / D.$ (8)

Or

- (b) (i) How circular queue differs from traditional queue? With an algorithm, explain the various operations performed on a queue ADT? (8)
- (ii) Identify the suitable data structure and write an algorithm for reversing a given string "MEPGO". (8)
17. (a) (i) Write a non-recursive algorithm for performing various binary tree traversals and explain it with an example. (10)
- (ii) Bring out the importance of threaded binary tree with an example. (6)

Or

- (b) (i) How will you find a maximum and a minimum element in a binary search tree? Write a pseudo code of it and discuss the deletion operation in such a tree. (10)
- (ii) Explain the procedure to construct an expression tree with an example. (6)
18. (a) (i) Construct a B-tree of order 3 created by inserting the following data arriving in sequence 92, 24, 6, 7, 11, 8, 22, 4, 5, 16, 19, 20, 78. Also, write a routine for inserting and deleting an element into a min heap. (8)
- (ii) Draw the result of inserting the following values 21, 11, 14, 15, 19, 30, 60, 17 into an empty min heap tree and show the resultant tree at the end of each insertion. (8)

Or

- (b) (i) Give and analyze the routine for performing insertion and search operation in B-tree of order 4. Also, explain it with an example. (8)
- (ii) Why we need rotations in AVL tree? And enumerate on various types rotations in AVL tree with suitable examples. (8)
19. (a) Given the following keys {4371, 1323, 6173, 4199, 4344, 9679, 1989} and a hash function $h(X) = X \pmod{10}$, construct
- (i) a separate chaining table
- (ii) an open addressing hash table using linear probing
- (iii) an open addressing hash table using quadratic probing
- (iv) an open addressing hash table with second hash function $h_2(X) = 7 - (X \pmod{7})$. (16)

Or

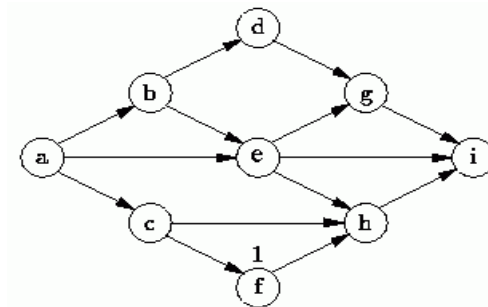
(b) Write short notes on the following

(i) Path compression (8)

(ii) Smart union algorithm (8)

20. (a) (i) What is the minimum condition that should be present in a graph in order to apply topological sorting? Check whether it is possible to find topological sort of the following graph. If yes, find the topological ordering of a given graph.

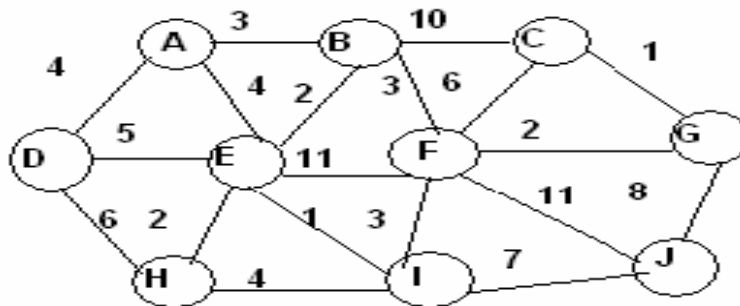
(10)



(ii) Bring out the importances of various graph representation techniques with an example. (6)

Or

(b) (i) Apply kruskal's algorithm for finding minimum spanning tree of a given graph and perform analysis to find out its efficiency. (10)



(ii) Do a comparative study on various graph traversal techniques with an example. (6)