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Question Paper Code : 86544

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Third Semester

Information Technology

CS 1201 — DATA STRUCTURES

(Common to Electrical and Electronics Engineering, Electronics and Communication Engineering and Electronics and Instrumentation Engineering)

(Regulations 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the resources deciding the efficiency of an algorithm?
2. Which of the following one is efficient? Why?
 - (a) `count = 0;`
`for (i= 1;i<100;i++)`
`count = count +i;`
 - (b) `for (count 1; count <100; count ++);`
3. What are the advantages of list implementation over array implementation?
4. What is amortized time bound?
5. What is a Binary tree?
6. What is an expression tree?
7. Define Fibonacci heap.
8. List the algorithms for finding MST.
9. What is reference count method?
10. Why is the algorithm for finding shortest distances called greedy?

PART B — (5 × 16 = 80 marks)

11. (a) (i) What are the methods for problem solving? Explain. (8)
(ii) Explain the various factors to be considered in implementing an algorithm. (8)

Or

- (b) (i) Explain Top-down design strategy in detail. (8)
(ii) For a $(n \times n)$ $(n \times p)$ matrix multiplication, analyze the complexities. (8)
12. (a) (i) What data structure is suitable for evaluating an arithmetic expression? Develop programs for evaluating the expression : $A - ((B - C) * (D/E) + F/G)$. (8)
(ii) Develop a program which changes the INFO field of k^{th} node of a singly list to the value given by the user. (8)

Or

- (b) (i) Write programs for following requirements:
(1) Delete the first node of a circular double linked list. (5)
(2) Assume a doubly linked list with elements 1, 2,5,7 (in order). Now insert node with value 4 (in order). (5)
(ii) In simple queues (implemented using array) elements are shifted towards front with every deletion. Write a program to implement this type of queue. (6)
13. (a) Explain the following in detail:
(i) Internal and external nodes. (8)
(ii) Open addressing and Rehashing. (8)

Or

- (b) Write an algorithm to insert, delete and find minimum and maximum elements from a binary search tree.
14. (a) (i) Explain the matrix representation of a graph with example. (8)
(ii) Write an algorithm for depth first traversal of a graph G. (8)

Or

- (b) (i) Write the Dijkstra's algorithm to find the shortest path with suitable example. (8)
(ii) Explain the Prim's algorithm with an example. (8)

15. (a) Define doubly linked list. Explain its operations, insert, delete and traversal with illustration. (16)

Or

- (b) Write short notes on
- (i) Reference count method in list management. (8)
 - (ii) Garbage collection and compaction. (8)
