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

Question Paper Code : 70397

M.E./M.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019
First Semester
Biometrics and Cyber Security
CP 5151 – ADVANCED DATA STRUCTURES AND ALGORITHMS
(Common to M.E. Computer Science and Engineering/M.E. Computer Science and Engineering (With Specialization in Networks)/M.E. Multimedia Technology/ M.E. Software Engineering/M.Tech. Information Technology)
(Regulations 2017)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. How do you analyze an algorithm ?
2. Write an algorithm to find the n^{th} prime number and find its time complexity.
3. Mention the properties of Red-Black tree.
4. What is the procedure to delete a key from B-tree ?
5. Give a structure for strongly connected graph.
6. How do you calculate minimum cost in a directed acyclic graph ?
7. State the elements of dynamic programming.
8. What are the complexities in Huffman codes ?
9. What is the need of a polynomial time algorithm ?
10. Define reducability.

PART – B (5×13=65 Marks)

11. a) i) Illustrate the basic principles of insertion sort. (7)
    ii) Show that $(n + 1)^5$ is $O(n^5)$, 2^{n+1} is $O(2^n)$, $n^3 \log n$ is $\Omega(n^3)$. (6)

    (OR)

    b) i) Solve the following recurrence relation by using the method of generating function, $h_n = h_{n-1} + h_{n-2}$, $n \geq 2$, $h_0 = 1$, $h_1 = 3$. (7)
    ii) Write a detailed note on asymptotic notations. (6)

70397

12. a) i) Explain how do you insert a node in B-trees, with example. (7)
ii) Write a short notes on Fibonacci heaps. (6)

(OR)

b) i) Discuss in detail about the mergeable heap operations. (7)
ii) Compare binary search tree with B-tree. (6)

13. a) i) Explain how Dijkstra's algorithm can be modified to produce a count of the number of different minimum paths from one vertex to another vertex. (7)
ii) Compare the time and space complexities of Kruskal and Prim's algorithms. (6)

(OR)

b) i) Describe the basic concepts of the Bellman-Ford algorithm, with an example. (7)
ii) Illustrate the basic concepts of the Floyd-Warshall algorithm. (6)

14. a) i) Discuss the steps involved in developing dynamic programming algorithm. (5)
ii) Illustrate the basic principles of obtaining longest common subsequence with an example. (8)

(OR)

b) i) Explain in detail about the activity selection problem, with example. (8)
ii) Write a detailed note on the elements of greedy strategies. (5)

15. a) Prove that clique decision problem is NP hard. (13)

(OR)

b) Prove that vertex cover is NP complete. (13)

PART – C (1×15=15 Marks)

16. a) Describe the concept of querying. How this is used in case of binary search tree ? How this is proceeded for implementation ? Illustrate its flow for a specific query. (15)

(OR)

b) Explain the concept of minimum spanning tree. How do you obtain the minimum spanning tree for a given tree ? Illustrate a suitable algorithm and explain the flow of algorithm, with an example. (15)