Hall Ticket Number:

Code No. : 21903

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

M.Tech. (CSE: CBCS) I-Semester Main Examinations, January-2018

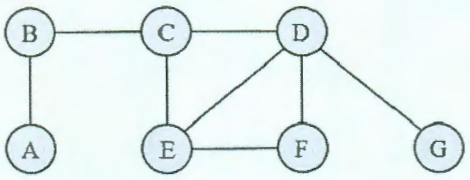
Advanced Algorithms

Time: **3** hours Max. Marks: **60**

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

1. Indicate whether *true* or *false*: $2^{2n+3} = \Theta(4^n)$.
2. Determine the minimum possible height of a binary search tree possible with the keys 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100.
3. What is *optimal substructure* property of an optimization problem?
4. Give a DFS traversal of the following graph.



5. Define bipartite graph and give an example.
6. State max-flow min-cut theorem.
7. How many nonempty prefixes of the string P = " aaabbaaa " are also suffixes of P?
8. State Fermat's little theorem.
9. Define convex hull.
10. What is satisfiability problem?

Part-B (5 ×8 = 40 Marks)

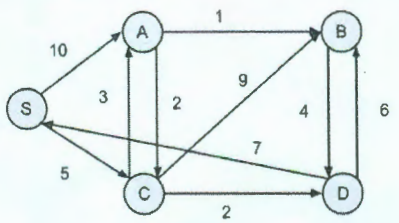
11. a) What is a collision in hashing? Explain with a suitable example a collision handling scheme. [4]

    b) Construct (2,4) tree by considering the keys in order : 10;40;30;20;70;50;45;80 and 90. [4]

12. a) Solve the optimal solution to the fractional knapsack instance n = 3, m = 20, (P1,P2,P3) = (25,45,15) and (w1,w2,w3) = (18,15,10). [3]

    b) Draw a simple, connected, undirected graph with eight vertices and thirteen edges. Give four different Depth First Search traversals of it. [5]

13. a) Apply Dijkstra's algorithm to the following graph by considering vertex S as source. [4]



    b) Define the following terms and give an example for each. [4]
    i) Flow network ii) Minimum cut and iii) Maximum flow.

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14. a) Write short notes on the Secure Electronic Transaction (SET) Protocol. [4]

    b) Draw a standard trie for the following set of strings:
    {abab, baba, ccccc, bbaaaa, caa, bbaacc, cbcc, cbca}. [4]

15. a) Explain Quad trees with an example. [4]

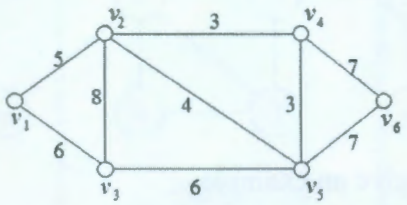
    b) Show that CLIQUE is NP-complete. [4]

16. a) What is amortization? Explain accounting method with an example. [4]

    b) Explain with an example algorithm of stack. [4]

17. Answer any ***two*** of the following:

    a) Define Minimum Spanning Tree (MST)? Find an MST of the following graph by applying Prim's algorithm. [4]



    b) Draw a figure illustrating the comparisons done by the brute-force pattern matching algorithm for the case when the text is " aaabaadaabaaa" and the pattern is" aabaaa ". [4]

    c) Define the following complexity classes and give an example for each. [4]

    i) P ii) NP iii) NP-Hard iv) NP-complete.