



राष्ट्रीय प्रौद्योगिकी संस्थान, हमीरपुर (हि.प्र.)  
**National Institute of Technology Hamirpur (H.P.)**  
(Under Ministry of HRD, Govt. of India, New Delhi)

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Branch/ Semester: CSE (B.Tech) / V  
Subject Code: CSD-312  
Subject Name: Analysis & Design of Algorithms

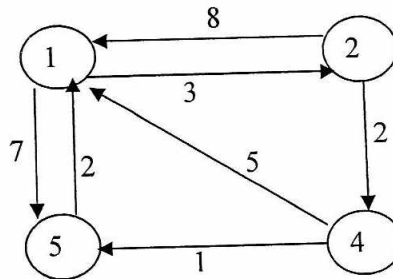
Date: 28/11/2019  
Duration: 180 Minutes  
Max. Marks: 50

(Answer all the questions from the following)

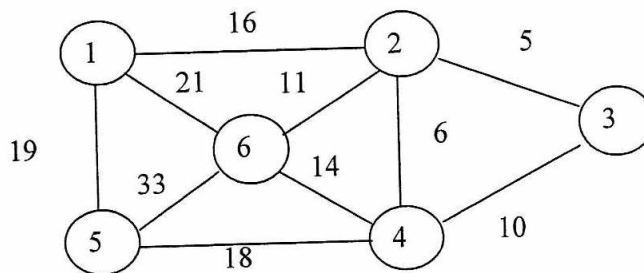
(5x10=50 Marks)

- Q. 1 a) Explain various Asymptotic notations with suitable example? (3M)  
b) Solve the following recurrence relation using substitution method. (2M)  
i)  $T(n) = 2T(n-1) + 1$   
ii)  $T(n) = 2T(n/2) + 1$   
b) Show how quick sorts the following sequences of keys in ascending order 22, 55, 33, 11, 99, 77, 55, 66, 54, 21, 32 and also analyze your algorithm. (5M)

- Q. 2 a) Write Bellman-ford algorithm to find the shortest path between two given vertices. Using this algorithm find the shortest path the shortest path from vertex 1 to 3 in the following weighted graph and find the time complexity. (5M)



- b) Write Dijkstra's greedy algorithm to find the shortest path between two given vertices. Using this algorithm find the shortest path the shortest path from vertex 1 to 3 in the following weighted graph and find the time complexity. (5M)



- Q. 3 a) Explain how matrix chain multiplication algorithm solved using dynamic programming. Consider  $A_1 = 5 \times 4$ ,  $A_2 = 4 \times 6$ ,  $A_3 = 6 \times 2$ ,  $A_4 = 2 \times 7$ . (5M)

- b) Find optimal Solution for 0/1 knapsack problem  $(W_1, W_2, W_3, W_4) = (10, 15, 6, 9)$ ,  $(P_1, P_2, P_3, P_4) = (2, 5, 8, 1)$  and  $m = 30$  using dynamic programming. (5M)

- Q 4 a) What is backtracking. Consider  $W = \{7, 11, 13, 24\}$ , draw a portion of state space tree for solving sum-of-subset problem for the above given problem. (5M)

- b) Distinguish between deterministic and non deterministic algorithms. Explain the satisfiability problem. [3+2=5M]



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Q 5. a) Explain the general method of branch and bound. Consider the travelling salesperson problem given by following cost matrix.

[inf 20 30 10 11; 15 inf 16 4 2; 3 5 inf 2 4; 19 6 18 inf 3; 16 4 7 16 inf]

Obtain the optimum tour using dynamic reduction method. Draw a portion of state space tree using least cost branch and bound. [2+8=10 M]

\*\*\*\*\*All the Best\*\*\*\*\*