

Chapter 1 : Introduction to Management Science: A Modeling and Case Studies Approach with Spreadsheets

*Addressing the needs of readers interested in both management science and business administration careers, the book emphasizes the role of management science techniques in the larger context of business decision-making.*

The Shortest Route Problem 8 The shipping company manager wants to determine the best routes for the trucks to take to reach their destinations. This problem can be solved using the minimal spanning tree. TRUE 13 In a minimal spanning tree, the source and destination nodes must be connected along a single path. FALSE 16 The shortest route network problem could help identify the best plan for running cables for televisions throughout a building. The Maximal Flow Problem Key words: TRUE 19 To determine the maximum possible flow of railroad cars through the rail system they should first select the longest path from origin to destination and ship as much as possible on that path. FALSE 20 The shortest route problem requires that there be a branch from each destination to every other destination. FALSE 24 A traffic system could be represented as a network in order to determine bottlenecks using the maximal flow network algorithm. Network Models 26 In a network flow problem, to another. This problem can be solved using the solution technique. Minimal Spanning Tree Problem an origin to a destination. Maximal Flow Problem 1 A network model could be used to represent the capacity of a series of dams for flood control. The vehicle will begin from its docking area, visit each department, and return to the docking area. Cost is proportional to distance traveled. The type of network model that best represent this situation is Main Heading: Shortest route 33 Determining where to build roads at the least cost within a park that reaches every popular sights represents a spanning tree outwork model. Shortest route 35 Determining where capacity needs to be added within a series of one way roads within a park represents a model. Delivery Routes branch is the distance in miles between the respective nodes. What is the shortest route from the source node node 1 to nodes 2, 3, and 4. Indicate the total distance for each route. Assume that the amount on each route from the source node node 1 to nodes 5 and 6. Assume that the amount on each branch is the distance in miles between the respective nodes. Also assume that it is not possible to travel from a node with a higher number to a node with a lower number. Write the constraint associated with the second node node 2 for the integer linear programming formulation of the shortest route problem. Assume that the amount on each number. Write the constraint associated with the fifth node node 5 for the integer linear programming formulation of the shortest route problem. Assume that he numbers on the branches indicate the length of cable in miles six nodes on a telecommunication network. What is the minimum number of miles of cable to be used to connect all six nodes? The network diagram given in the Figure below shows the possible routes and travel times in minutes from the carpet plant to the various warehouses or retail outlets. State the total completion time in minutes or each route Answer: Valparaiso " Portage " Marseille: Xii- 45 Draw the network associated with the following constraints for a shortest route robber. In order to preserve the natural beauty of the camp and to minimize the construction time and cost , the directors want to determine which paths should be constructed. Use this network to determine which paths should be built. Minimal spanning tree shown in bold. What is the shortest route from B to C? There is a swampy area between facility A and E. In order to preserve determine which paths should be built. They usually clean up facilities C, E, A and F on the same day and therefore want the shortest route from D to each facility.. Recommend a route for the crew to leave from D, clean up each facility one after the other, and return to facility D. Assume all paths are accessible. This is really a small version of the traveling salesman problem. Doing the minimal spanning tree prior to this problem may be helpful. Dif 2 Page Ref: They usually clean up facilities B and A on the same day and therefore want the shortest route from F to each facility. Recommend a route for the crew to leave from F, clean up each facility A and B, and then return to facility D. This is a small version of the traveling salesmen problem. The clean up crew may want to add additional facilities on the days they clean up A and B if they have time. Refer to the figure below to answer the following questions. Figure 3 51 Consider the network diagram given in Figure 3 with the indicated flow capacities along each branch. Determine the maximal flow from source node 1 to destination Dif. Determine the maximal flow on the following path: What is the objective function for the integer linear programming

formulation of the maximal flow problem?

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