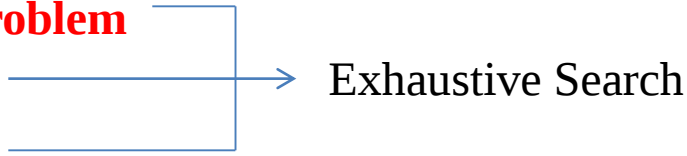


UNIT II – Brute Force and Divide and Conquer

- **Brute Force Design Technique**

- Selection Sort
 - Bubble Sort
 - Sequential Search
 - Closest pair and Convex hull problem
 - **Travelling Salesman problem**
 - Knapsack problem
 - Assignment problem
- 
- The diagram shows a blue bracket on the right side of the last four list items (Travelling Salesman problem, Knapsack problem, and Assignment problem). A horizontal blue arrow points from the center of this bracket to the text 'Exhaustive Search'.
- Exhaustive Search

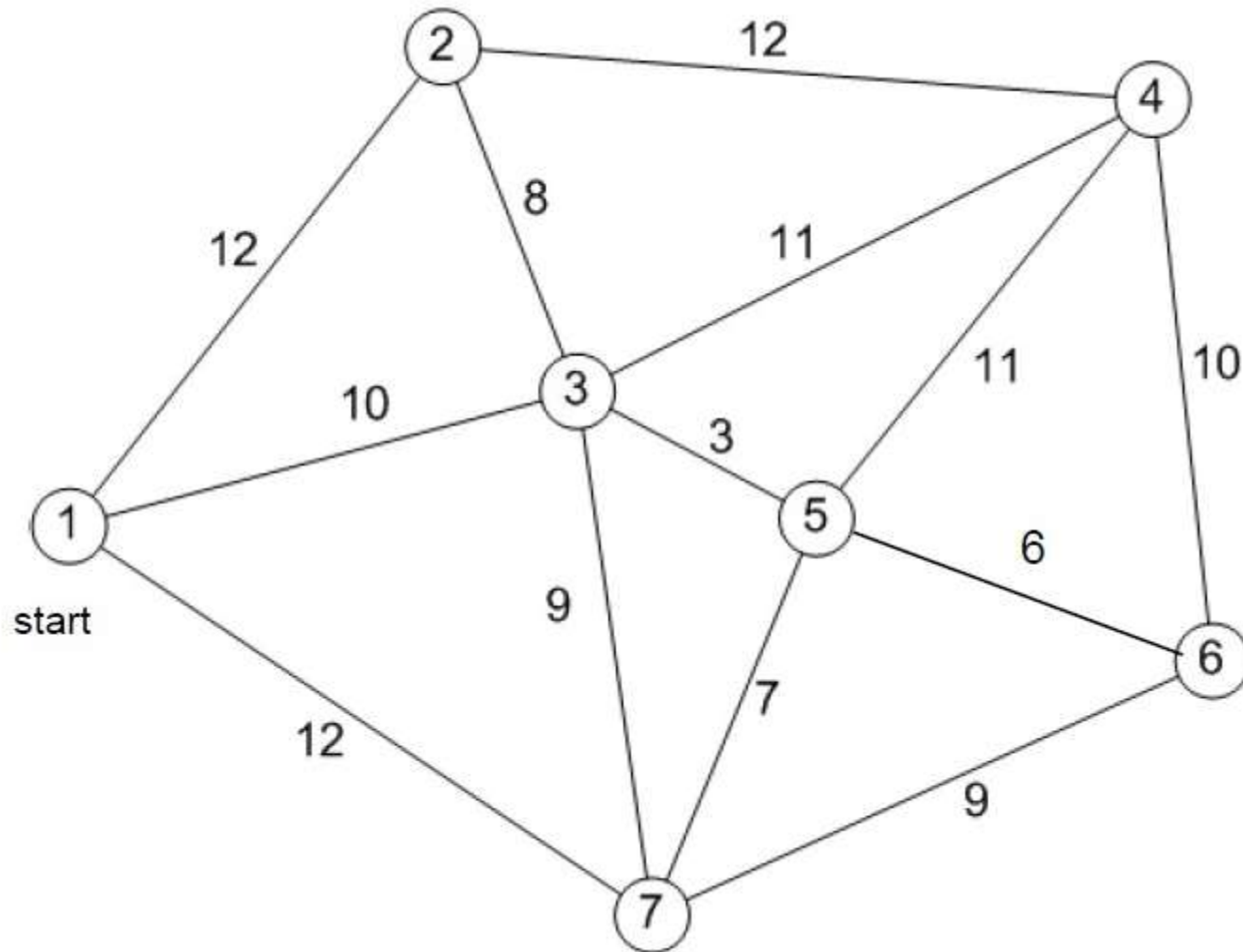
Exhaustive search – Travelling salesman problem

- Exhaustive search
 - Brute force approach –combinatorial problem
 - Permutation (all the possibilities – best solution)
- **Travelling salesman problem**

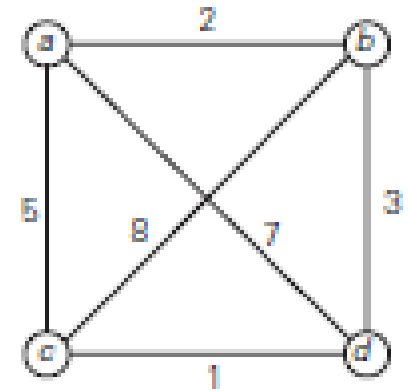
Find the shortest tour through n cities such that all the cities are visited exactly once before returning to the city where it started.

- ✓ Modeling – Graphs $\rightarrow$ vertices (city) and edge (distance)
- ✓ To find the shortest hamilton circuit
- ✓ Hamilton circuit
 - ✓ graph cycle - visits each vertex exactly once without repeats
 - ✓ Ex: Given n vertex $\rightarrow v_0, v_1, v_2, \dots, v_{n-1}, v_0$

Travelling salesman problem

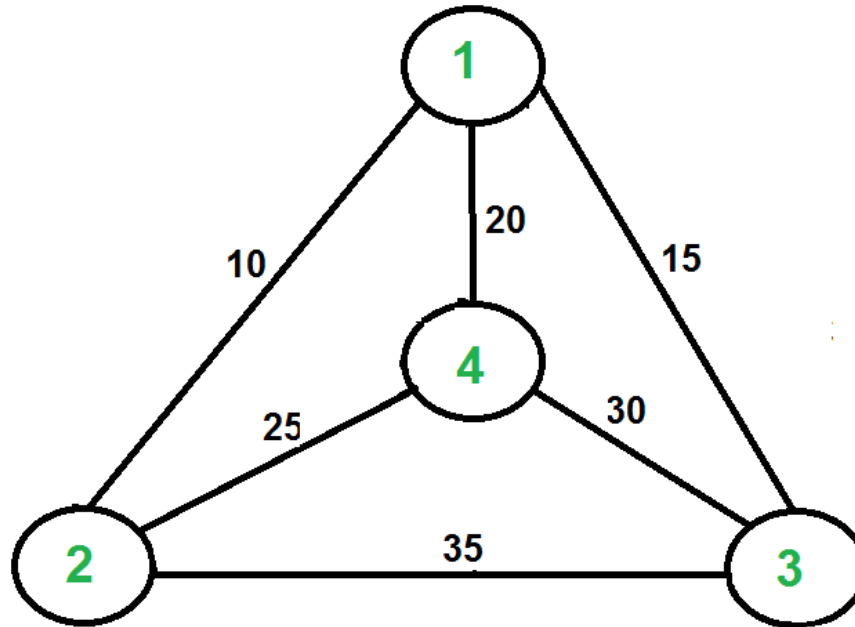


Travelling salesman problem - Example



Tour between cities starting with 'a'	Total weight
$a \rightarrow b \rightarrow c \rightarrow d \rightarrow a$	$2+8+1+7=18$
$a \rightarrow b \rightarrow d \rightarrow c \rightarrow a$	$2+3+1+5=11$
$a \rightarrow c \rightarrow b \rightarrow d \rightarrow a$	$5+8+3+7=23$
$a \rightarrow c \rightarrow d \rightarrow b \rightarrow a$	$5+1+3+2=11$
$a \rightarrow d \rightarrow c \rightarrow b \rightarrow a$	$7+1+8+2=18$
$a \rightarrow d \rightarrow b \rightarrow c \rightarrow a$	$7+3+8+5=23$

Travelling salesman problem - Example



Tour between cities starting with '1'	Total weight
1→2→4→3→1	10+25+30+15=80
1→2→3→4→1	10+35+30+20=95
1→4→2→3→1	20+25+35+15=95
1→4→3→2→1	20+30+35+10=95
1→3→4→2→1	15+30+25+10=80
1→3→2→4→1	15+35+25+20=95