Optimization Techniques

Profile

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Course Objectives

Upon completion of this course, students should be able to:

1. Formulate and solve linear and non-linear optimization problems.

2. Analyze and solve transportation and assignment problems.

3. Apply network analysis tools to real-world projects.

4. Understand the principles of game theory and apply them in strategic decision-making.

5. Model and analyze queuing systems.

6. Schedule and manage projects effectively.

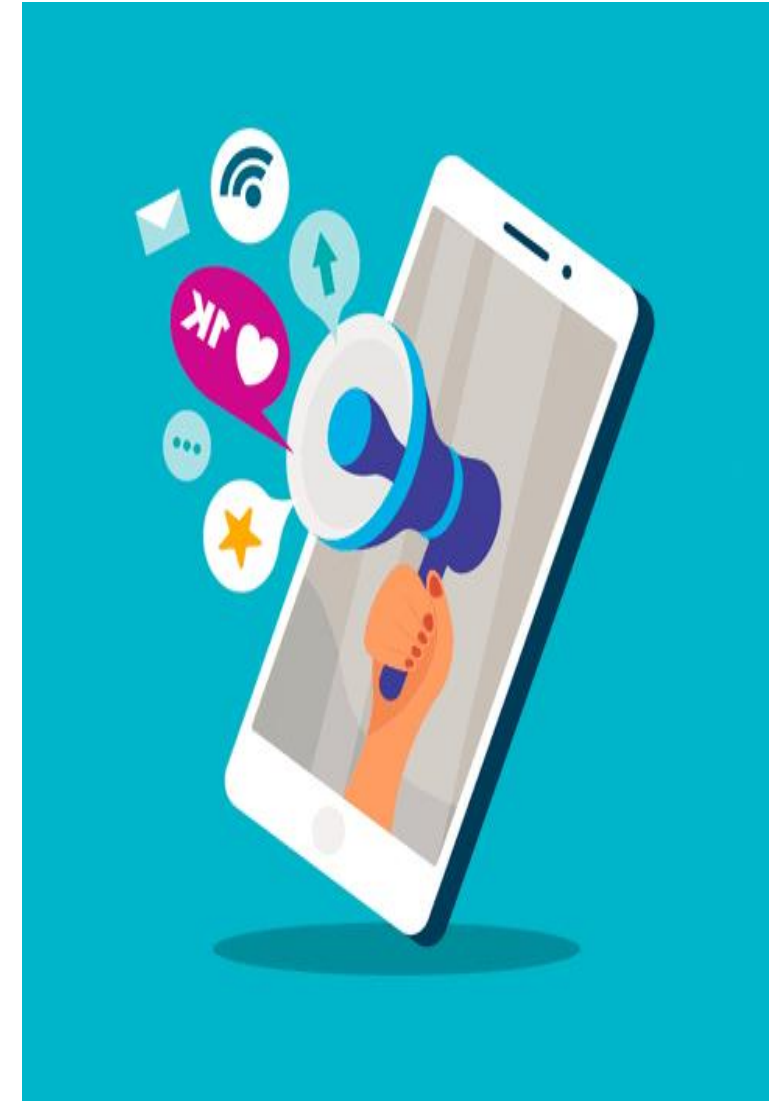7. Design and implement effective inventory control systems.

Outline

Definition of Optimization

Importance of Optimization

Types of Optimization Problems

Applications of Optimization
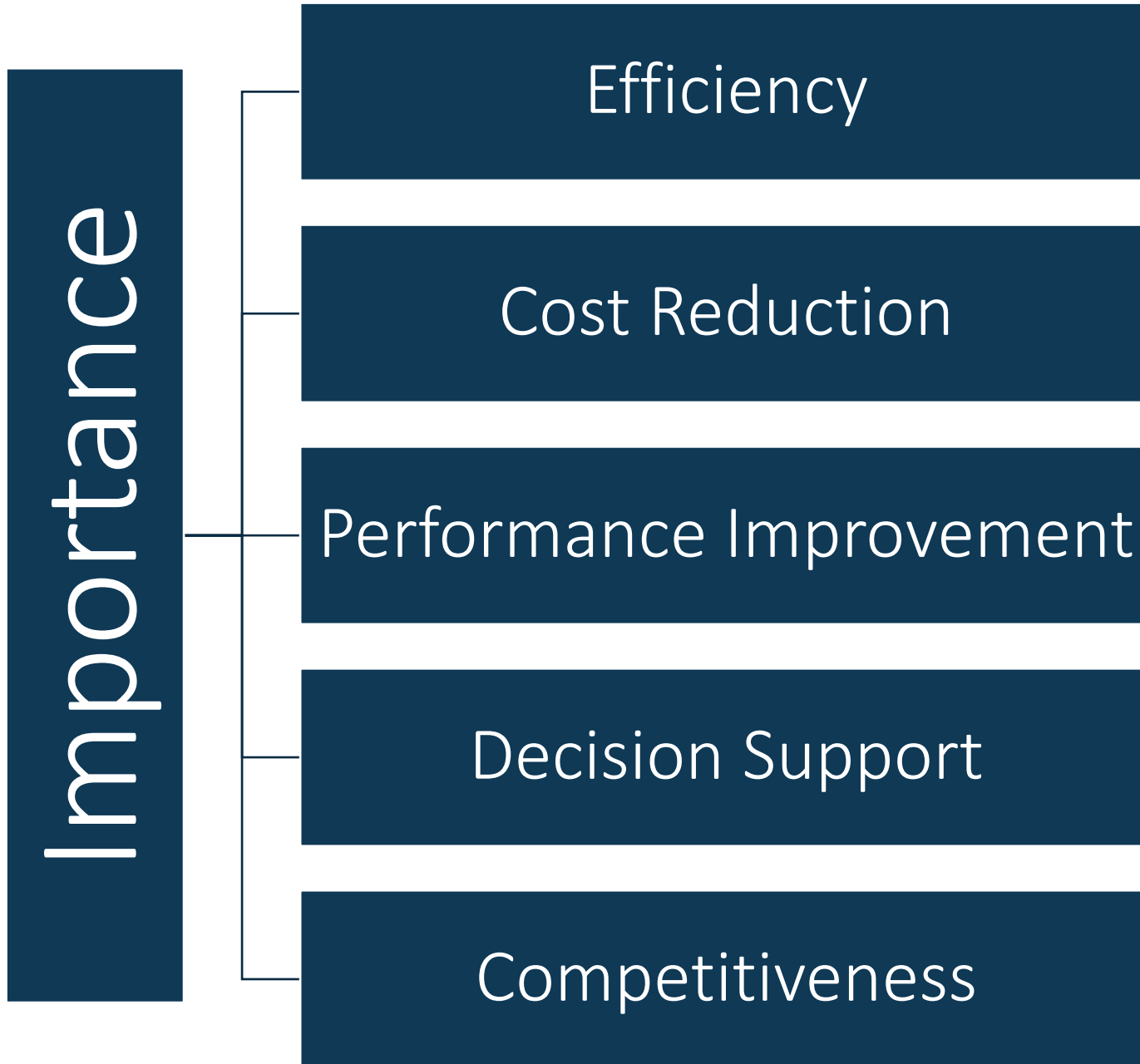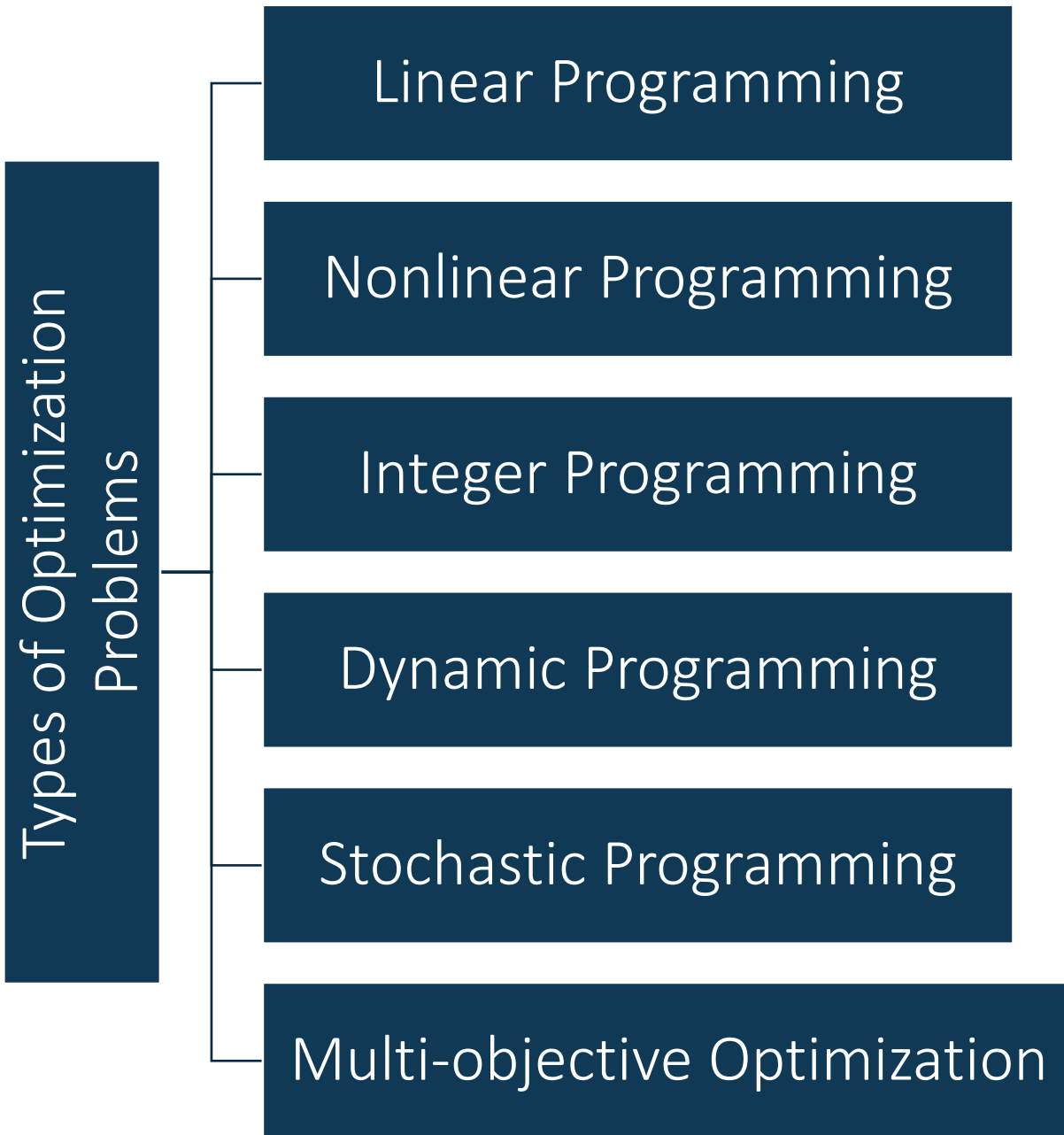
Introduction to Optimization

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Optimization technique in the field of engineering is a powerful tool to utilize the resources in an efficient way as well as to reduce the environmental impact of a process. Application of optimization process helps us achieve the most favorable operating conditions.

Optimization is the science of finding the best possible solution from a set of available alternatives, often under given constraints. It involves selecting values for decision variables to maximize or minimize an objective function — such as profit, cost, time, efficiency, or utility.

The primary focus of using optimization techniques is to measure the maximum or minimum value of a function depending on the circumstance
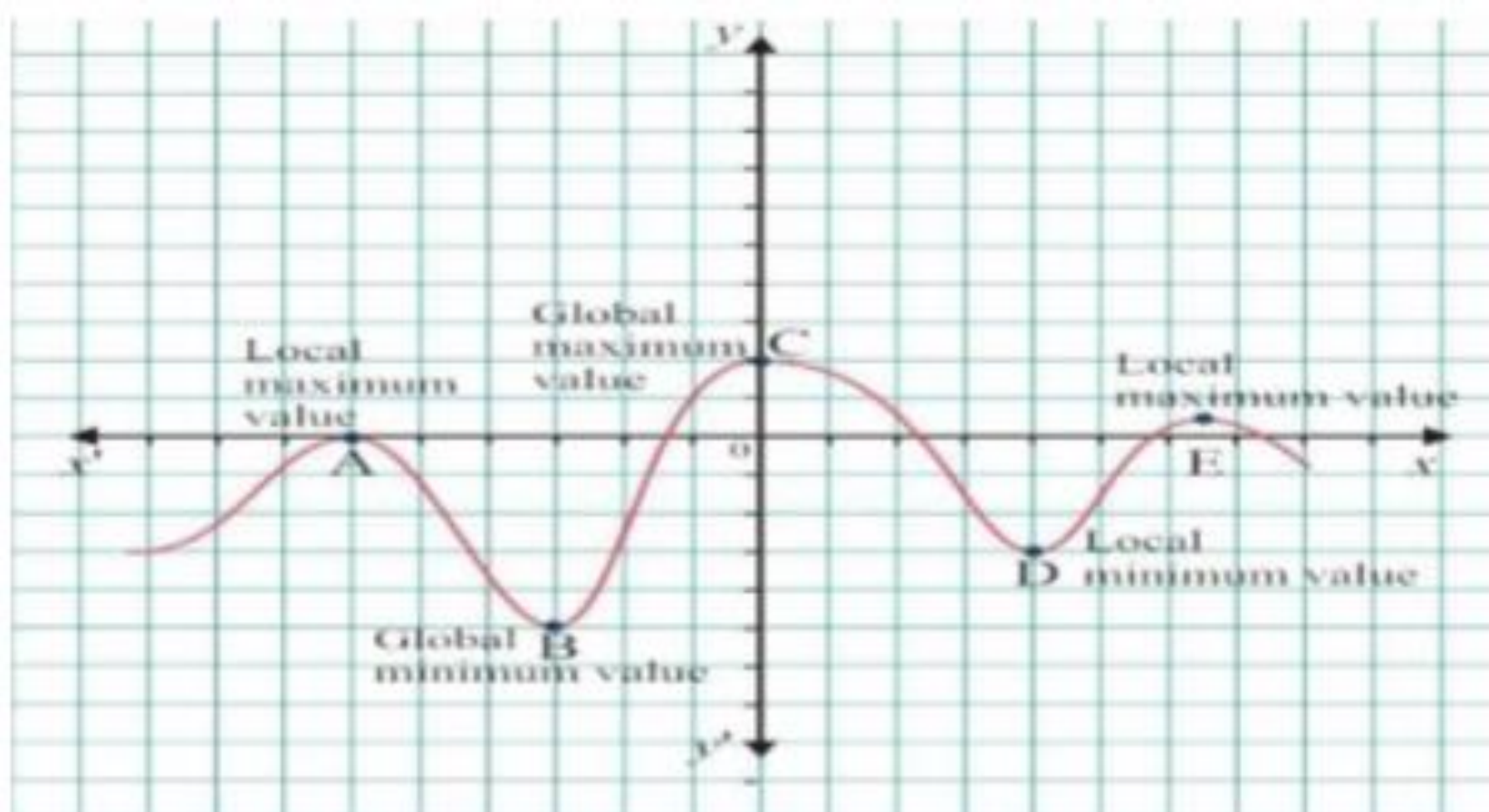
Optimization involves finding the best possible solution from a set of feasible alternatives. It is the process of maximizing or minimizing an objective function while satisfying a set of constraints.

Types of Optimization Problems

- Linear Programming
- Nonlinear Programming
- Integer Programming
- Dynamic Programming
- Stochastic Programming
- Multi-objective Optimization

Objectives to be minimized: cost, energy, loss, waste, processing time, raw material consumption....etc.

Objectives to be maximized: profit, conversion, yield, utility, efficiency, capacity... etc.