

Basic definitions and concept

- Optimization is the act of obtaining the best result/solution under given limitations, boundaries or circumstances,
- It can be defined as the process of finding the conditions that give the **maximum (e.g. profit) or minimum (e.g. loss, cost, time)** of a function,
 - The solution obtained here may not be the best solution of the defined problem. But it is optimum, i.e, best amongst the feasible/possible solution of that problem, as there are many factors of uncertainties and limitations.
- Mainly applied in DECISION-MAKING problems
- The optimum seeking methods are also known as ***mathematical programming techniques*** and are generally studied as a part of Operations Research.
- Operations Research is a branch of mathematics concerned with the application of scientific methods and techniques to decision making problems and with establishing the optimum solutions.
- It is an interdisciplinary branch of mathematics which uses methods like:
 - Mathematical modeling
 - Statistics
 - Algorithms to arrive at optimal or good decisions in complex problems which are concerned with optimizing the maxima (profit, faster assembly line, greater crop yield, higher bandwidth etc.) or minima (cost loss, lowering of risk, minimum time taken to complete an activity etc.) of some objective functions.
- The eventual intention behind using Operations Research is to elicit a best possible solution to a problem mathematically, which improves or optimizes the performance of any system.

Origin and development

- Term “Operations Research” coined in 1940 by McClosky and Trefthan in U,K.
- Came into existence during world War II for military projects for solving strategic and tactical problems.
- It was successful and showed remarkable progress.
- After the war, it attracted attention of Industrial managers for solutions to complex executive type problems.
- Then it gained importance in the field of Economics, Commerce, Engineering, to name a few.

Features

- Application of scientific methods, tools and techniques for finding optimum solutions to problems involving the operations of a system.
- Determines the best utilization of limited resources.
- Applied in decision-making problems.

Note to the students: Please refer to N.D. Vohra “Quantitative Techniques” for detailed study of the topic.