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# **INTRODUCTION TO OPERATIONS RESEARCH**

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# Programme Educational Objectives

*Our program will create graduates who:*

- 1. Will be recognized as a creative and an enterprising team leader.*
- 2. Will be a flexible, adaptable and an ethical individual.*
- 3. Will have a holistic approach to problem solving in the dynamic business environment.*

# Operations Research Course Outcomes

- CO1-Given a verbal descriptive problem (management, industry or miscellaneous) with numerical data, the student manager will be able to define the variables, establish the inter-relationships between them, formulate the objective function and constraints and solve the problem graphically for optimization.
- CO2-Given/ specified the competition scenario between two players and their payoffs in advance, the student manager will be able to identify the saddle point and/ or determine the optimum strategies of both the players that would result in optimum payoff (gain or loss) to both the players.
- CO3-Given a set of limited resources, a set of limited activities and related cost/ profit matrix, the student manager will be able to assign one resource to one activity so as to maximize or minimize the given measure of effectiveness.

CO4-Given a business situation containing the transportation costs from  $n$  sources to  $m$  destinations, the student manager will be able to associate one source to one destination to minimize the cost of transportation.

CO5-In a decision making environment that is represented by numerical data, the student manager will be able to apply relevant operations research technique for managerial decision making and problem solving.

# Unit I SYLLABUS

- Operation Research- Definition
- Main phases of operation research
- Problem solving and Decision Making
- Application of operation research in business.

# Unit Objectives

1. To make the students understand the meaning of Operations Research.
2. To make the students understand the application of OR in business.
3. To make the students understand OR as a tool of Problem solving and Decision Making

# INTRODUCTION TO OPERATIONAL RESEARCH

- ❖ Operational Research is a systematic and analytical approach to decision making and problem solving.
- ❖ O.R. is an Branch of applied mathematics that uses techniques and statistics to arrive at Optimal solutions to solve complex problems.
- ❖ It is typically concerned with determining the maximum profit, sale, output, crops yield and efficiency and minimum losses, risks, cost, and time of some objective function. It have also become an important part of INDUSTRIAL ENGINEERING PROFESSION.



# Main Phases of Operations Research

## 1. JUDGEMENT PHASE:

- Determination of the problem
- Establishment of the objectives
- Determination of measures of effectiveness

## 2. RESEARCH PHASE:

- Observation and data collection
- Formulation of hypothesis
- Hypothesis testing
- Prediction of results\generalization

## 3. ACTION PHASE:

- Implementation of the tested results of the model



# Day-to-day applications of OR

- Package delivery
- Match making in online matrimony
- Traffic signal synchronization
- Ola/ Uber

# Scope

- **Industrial management:**

1. Purchase of raw material to Dispatch of goods
2. Production,
3. Blending
4. Product Mix
5. Inventory control
6. Sales and purchase
7. Scheduling and sequencing
8. Controlling of projects

- **Agriculture:**

1. Optimum allocation of land
2. Optimum distribution of water

# Scope and Applications of OR in management

1. Allocation and Distribution- 5M, Distribution
2. Production and Facility planning
3. Procurement: Bidding, Vendor rating
4. Marketing: Product Selection, Ad media
5. Finance- Cash Management, Capital Budgeting
6. Personnel- job assignment
7. Research and Development- selection of projects

# **Importance of Operations Research in Decision-Making and problem Solving**

- ❖ **Better Control**
- ❖ **Better Co-ordination**
- ❖ **Better Decision making**
- ❖ **Increased Productivity**
- ❖ **Optimum use of resources**

# **LIMITATIONS OF OPERATIONAL RESEARCH**

- ❖ **Non-Quantifiable Factors**
- ❖ **Distance between User and Analyst**
- ❖ **Time and Money Costs**
- ❖ **Too many factors**
- ❖ **Magnitude of Computation**

# References:

- Operations Research by Gupta and Hira, S Chand Publication, PP 1 -43

The background features a vertical strip on the left side containing a grid pattern, a line graph with a red line, and several yellow pencils. The rest of the background is a smooth gradient from yellow at the top to light green at the bottom.

# **Assessment Questions**

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# Fill in the blanks

1. \_\_\_\_\_ techniques has been used in planning, scheduling and controlling of dams, bridges and development of aircrafts etc.
2. \_\_\_\_\_ is used in solving problems of assigning jobs to machines and advertising media selection.
3. The problems of traffic congestion, repair of broken down machines can be solved by \_\_\_\_\_ theory.

# State True or False

- Formulation of relevant hypotheses is formulated in the research phase of OR
- For analysing a problem , decision makers should study both- Quantitative aspects and qualitative aspects.
- The main limitation of operations research is that it often ignores the human element in the production process.
- The application of operations research stated as a job which can be executed by unskilled professionals.



**THANK YOU** 😊

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# Reference Books

- Operations Research Theory and Applications by J.K. Sharma, Macmillan India Ltd.