



THIRUTHANGAL NADAR COLLEGE

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Selavayal, Chennai-51.

A Self-Financing Co-educational College of Arts & Science

Affiliated to the University of Madras

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NAME OF THE DEPARTMENT : MATHEMATICS

SUBJECT : ELEMENTS OF OPERATIONS RESEARCH

TOPIC : LINEAR PROGRAMMING PROBLEM

STAFF NAME : R.EMMIMAL RAJATHY

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LINEAR PROGRAMMING PROBLEM

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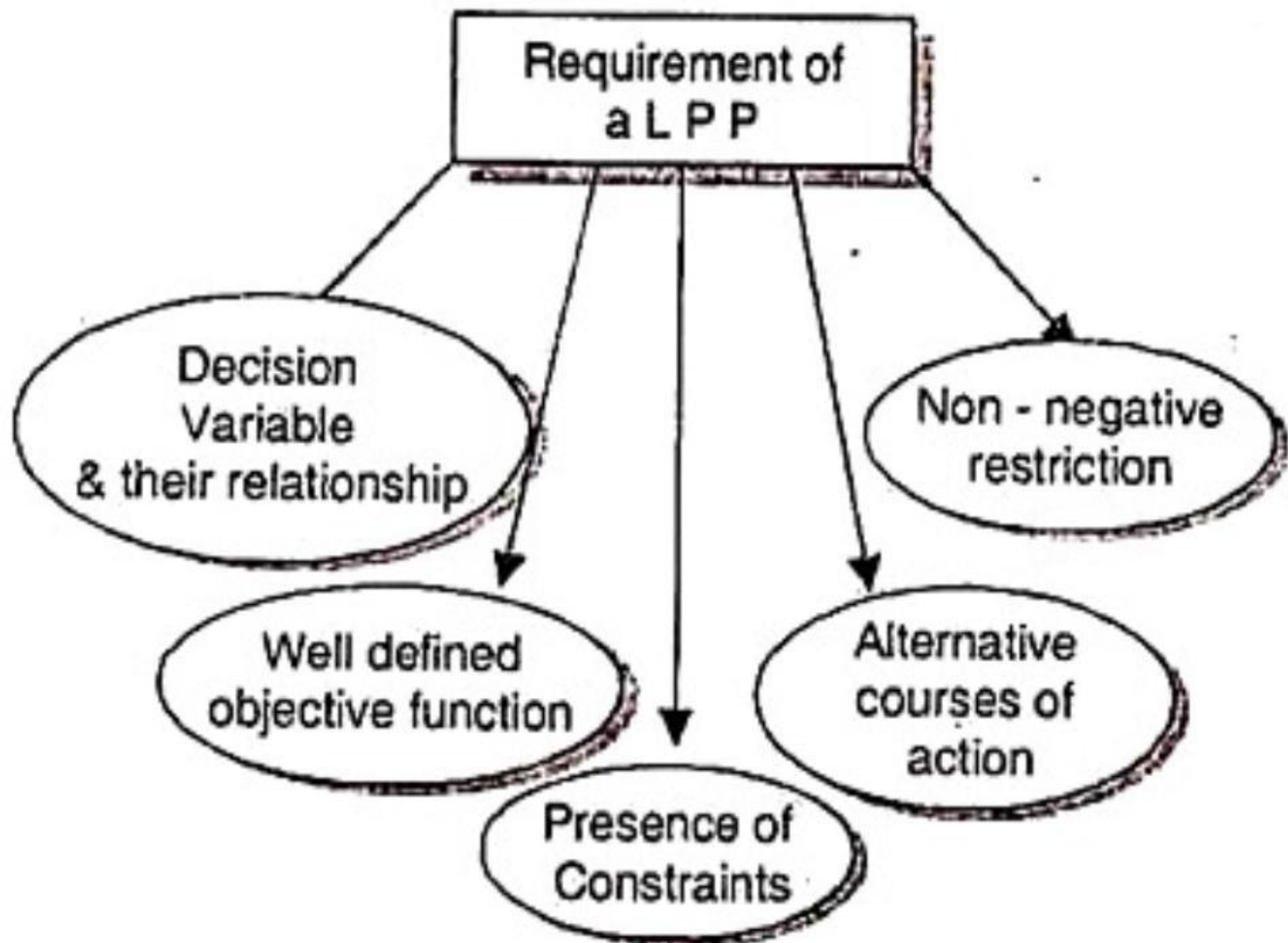
DEFINITION OF LPP

- A mathematical technique used to obtain an optimum solution in resource allocation problems, such as production planning.
- It is a mathematical model or technique for efficient and effective utilization of limited resources to achieve organization objectives (Maximize profits or Minimize cost).
- When solving a problem using linear programming, the program is put into a number of linear inequalities and then an attempt is made to maximize (or minimize) the inputs

ESSENTIALS OF LINEAR PROGRAMMING MODEL

For a given problem situation, there are certain essential conditions that need to be solved by using linear programming.

1. Limited resources : limited number of labour, material equipment and finance
2. Objective : refers to the aim to optimize (maximize the profits or minimize the costs).
3. Linearity : increase in labour input will have a proportionate increase in output.
4. Homogeneity : the products, workers' efficiency, and machines are assumed to be identical.
5. Divisibility : it is assumed that resources and products can be divided into fractions. (in case the fractions are not possible, like production of one-third of a computer, a modification of linear programming called integer programming can be used).





Applications of LPP

➤ Industry

- Product Mix
- Production Smoothing
- Blending
- Production Scheduling
- Trim Loss

➤ Miscellaneous

- Diet Problems
- Farm Planning
- Airline Routing
- Facility Location

➤ Management

- Portfolio Selection
- Financial Mix
- Media Selection
- Manpower Planning
- Transportation
- Job Allocation
- Travelling Salesman

IMPORTANT APPLICATIONS OF LP

- ▶ **Military Applications** – selecting an air weapon system against the enemy
- ▶ **Agriculture.** – farm economics and farm management. – allocating scarce resources
- ▶ **Environmental Protection** – handling wastes and hazardous materials
- ▶ **Facilities Location** – location nonpublic health care facilities
- ▶ **Product-Mix.** – the existence of various products that the company can produce and sell.
- ▶ **Production.** – will maximize output and minimize the costs.
- ▶ **Mixing or Blending.** – determine the minimum cost blend or mix
- ▶ **Transportation & Trans-shipment** – the best possible channels of distribution available to an organisation for its finished product sat

Advantages & Disadvantages

Advantages of Linear Programming:

- The main advantage of linear programming is its simplicity and easy way of understanding.
- Linear programming makes optimal use of available resources
- Linear programming is adaptive and more flexibility to analyze the problems.
- The better quality of decision is provided.

Disadvantage of Linear Programming:

- Linear programming works only with the variables that are linear.
- It deals with the problem having single Objective
- Non linear function cannot be solved over here.
- Impossibility of solving some problem which has more than two variables in **graphical method.**

Limitations of LP

- It treats all relationships among decision variables as linear.
- There is no guarantee that we will get integer value solutions. e.g. 2.5 machines
- LP does not take into consideration the effect of time & uncertainty.
- In LP parameters are assumed to be constant ; but in real life situations majority of the times they are neither known nor constant.
- LP deals with only single objective whereas in real life conflicting situations may have to be solved.

- **Methods to solve LPP :**

1. Graphical Method - for only two variables.
2. Simplex Method - Universal method.
3. Assignment Method - Special method.
4. Transportation Method - Special method.

Note : Methods (2), (3) and (4) are iterative methods.

References

- <https://youtu.be/8IRrgDoV8Eo> link to learn graphical method
- <https://youtu.be/M8POtpPtQZc> link to learn simplex method
- <https://youtu.be/rrfFTdO2Z7I> link to learn assignment Problem
- <https://youtu.be/ItOuvM2KmD4> link to learn transportation Problem.

Thank
you

