

OE 941 ME

**OPERATION RESEARCH  
(OPEN ELECTIVE)**

*Instruction: 3 periods per week*

*CIE: 40 marks*

*Credits: 3*

*Duration of SEE: 3 hours*

*SEE: 60 marks*

**Course Objectives**

1. To understand the dynamic programming to solve problems of discrete and continuous variables
2. To apply the concept of non-linear programming and carry out sensitivity analysis
3. To understand deterministic and probabilistic inventory control models.

**Course Outcomes**

*After the completion of this course, the students shall be able to:*

1. To understand the basics of OR, including mathematical modeling, feasible solutions and optimization
2. Able to carry out sensitivity analysis
3. Apply PERT/CPM in project management
4. Select appropriate inventory control model
5. Able to apply dynamic programming and understand the concept of non-linear programming

**UNIT I**

Development, Different Phases, Characteristics, Operations Research models and applications.

**Linear Programming Problem:**

Introduction, Basic Assumptions, Formulation, graphical method, simplex method :Big M and Two Phase method.

**UNIT II**

**DUALITY:** Duality theory, primal-dual relationships, Economic interpretation, Dual simplex method, Post optimal or sensitivity analysis,

**UNIT III**

**Project Management:**

Introduction to PERT and CPM, critical Path calculation, float calculation and its importance. Cost reduction by Crashing of activity.

  
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**Inventory models** – Economic order quantity models – Quantity discount models – Stochastic inventory models – Multi product models – Inventory control models in practice.

#### UNIT IV

**Sequencing Models** : Introduction, General assumptions, processing  $n$  jobs through 2 machines, processing ' $n$ ' jobs through  $m$  machines

**Game Theory:**

Introduction, Characteristics of Game Theory, Dominance theory, Mixed strategies ( $2 \times 2$ ,  $m \times 2$ ), Algebraic and graphical methods

**Nonlinear programming problem:** - Kuhn-Tucker conditions

#### UNIT V:

**Queuing models** - Queuing systems and structures – Notation parameter – Single server and multi server models – Poisson arrivals – Exponential service times – with finite population – Infinite population .

**Dynamic Programming:** Characteristics, principle of optimality, deterministic problems.

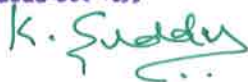
#### Suggested Reading:

1. Hamdy, A. Taha, Operations Research – An Introduction, Seventh Edition, Prentice Hall of India Pvt. Ltd., 2002.
2. Ronald L. Rardin, Optimization in Operations Research, First Indian Reprint 2002, Pearson Education Asia.
3. R. Paneerselvam, Operations Research, 2<sup>nd</sup> Edition, Prentice Hall of India Private Ltd., 2006.
4. Singiresu S. Rao, Engineering Optimization Theory of Practice, 3rd edition, New Age International (P) Ltd. Publishers, 2010.
5. S.C. Sharma, Operations Research, 1<sup>st</sup> Edition, Discovery Publishing House, 2006
6. J.C. Pant, Introduction to Optimisation: Operations Research, 7<sup>th</sup> reprinted Edition, Jain Brothers, Delhi, 2015.
7. Frederick S. Hillier, Gerald J. Lieberman, Operations Research, 10<sup>th</sup> Edition, McGraw Hill Pub. 2017.


8. Harvey M Wagner, Principles of Operations Research, 1<sup>st</sup> Edition, Prentice Hall of India

  
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