

## OPERATIONS RESEARCH

### Course Objectives:

To learn the importance of Operations Research in the design, planning, scheduling, manufacturing and business applications and to use the various techniques of Operations Research in solving such problems.

### UNIT – I

Development – definition– characteristics and phases – types of operation research models – applications.

**ALLOCATION:** Linear programming problem formulation – graphical solution – simplex method – artificial variables techniques -two–phase method, big-M method – duality principle.

### UNIT – II

**TRANSPORTATION PROBLEM:** Formulation – optimal solution, unbalanced transportation problem – degeneracy, assignment problem – formulation – optimal solution - variants of assignment problem- traveling salesman problem.

**SEQUENCING** – Introduction – flow –shop sequencing –  $n$  jobs through two machines –  $n$  jobs through three machines – job shop sequencing – two jobs through ‘m’ machines.

### UNIT – III

**REPLACEMENT:** Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement.

### UNIT – IV

**THEORY OF GAMES:** Introduction – mini. max (max. mini) – criterion and optimal strategy – solution of games with saddle points – rectangular games without saddle points –  $2 \times 2$  games – dominance principle –  $m \times 2$  &  $2 \times n$  games -graphical method.

**WAITING LINES:** Introduction – single channel – poisson arrivals – exponential service times – with infinite population and finite population models– multichannel – poisson arrivals – exponential service times with infinite population single channel poisson arrivals.

### UNIT – V

**INVENTORY :** Introduction – single item – deterministic models – purchase inventory models with one price break and multiple price breaks – shortages are not allowed – stochastic models – demand may be discrete variable or continuous variable – instantaneous production. Instantaneous demand and continuous demand and no set up cost. ABC & VED Analysis.

### UNIT – VI

**DYNAMIC PROGRAMMING:** Introduction – Bellman’s principle of optimality – applications of dynamic programming- capital budgeting problem – shortest path problem – linear programming problem.

**SIMULATION:** Definition – types of simulation models – phases of simulation– applications of simulation – inventory and queuing problems – advantages and disadvantages – simulation languages.

### TEXT BOOKS:

1. Operations Research / S.D.Sharma-Kedarnath

### REFERENCES:

1. Introduction to O.R/Hiller & Libermann (TMH).
2. Operations Research / A.M.Natarajan, P. Balasubramani, A. Tamilarasi / Pearson Education.
3. Operations Research: Methods & Problems / Maurice Saseini, Arhur Yaspan & Lawrence Friedman.
4. Operations Research / R.Pannerselvam, PHI Publications.
5. Operations Research / Wagner/ PHI Publications.

6. Operation Research /J.K.Sharma/MacMilan.
7. Operations Research/ Pai/ Oxford Publications
8. Operations Research/S Kalavathy / Vikas Publishers
9. Operations Research / DS Cheema/University Science Press
10. Operations Research / Ravindran, Philips, Solberg / Wiley publishers.

**Course Outcomes:**

After completion of the course, the student will be able to: To solve the LP and DP problems.

To solve the Transportation, assignment, game, inventory, replacement, sequencing, queuing problems.