

## 1/3 MCA Second Semester

CA2T2

OPERATIONS RESEARCH

Credits : 4

Lecture Hours : 4 periods / week

Internal assessment : 30 Marks  
Semester and Examination: 70 Marks

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### Course Description:

The course is intended to provide students with a knowledge that can make them appreciate the use of various research operations tools in decision making in organizations. At the end of the Course, the participants are expected to demonstrate a working knowledge of the various OR tools in making decisions as well as being able to formulate organizational problems into OR models for seeking optimal solutions.

Operations research helps in solving problems in different environments that needs decisions. Analytic techniques and computer packages will be used to solve problems facing business managers in decision environments.

### Course Objective:

- To introduce students to use quantitative methods and techniques for effective decision making.
- Model formulation
- Applications that are used in solving business decision problems.
- Basic construction of a N/w diagrams
- Application of a simplex method in real business firms
- Decisions to maximize profits & to Minimize loss
- Assigning jobs to Men/Machine in order to reduce the completion time.
- Finding optimal strategies in games involving 2 or more persons (Tossing a coin game)
- How to take inventory decisions regarding raw materials, inventory etc.,
- Replacement decisions
- Taking decisions involving queuing lines.

### UNIT I:

**Development Definition** - Introduction to O.R, Characteristics and phases of O.R, Scientific Method, General methods for solving, Operations Research models.

## **UNIT II:**

**Linear Programming Problems** - Introduction, Linear programming Formulation, Graphical solution – Maximum problem, Minimum problem, Exceptional cases, Simplex method, ARTIFICIAL VARIABLE TECHNIQUE- Two phase method.

## **UNIT III:**

**Replacement Models** - Introduction, replacement of items that deteriorate when money value is not counted & replacement of items that deteriorate when money value is counted, replacement items that fail completely i.e., group replacements problems.

## **UNIT IV:**

**Transportation Problem** - Formulation, optimal Basic Feasible solution (OBFS)-NW corner method, Voggles Approximation method(VAM),Optimal solution-MODI Method,un-balanced transportation problem, Degeneracy in transportation problems. Assignment problem: formulation, optimal solution, HUNGARIAN Method, Degenerate assignment problem - a non-square ( $m \times n$ ) Matrix, Restrictions.

**JOB SEQUENCING:** Introduction, optimal solution for processing each of  $n$ -jobs through TWO machines, optimal solution for processing each of  $n$ -jobs through THREE machines.

## **UNIT V:**

**Waiting Lines** - Introduction, Structure of a waiting system,Queing model-Queuing model with a single channel, Poisson arrivals, exponential service times, with infinite population and unrestricted queue.

## **UNIT VI:**

**Inventory Model** - Introduction, single item deterministic models, production is instantaneous or at a constant rate and withdrawals from stock is continuous, shortages are allowed & production is instantaneous or at a constant rate and withdrawals from stock is continuous & shortages are not allowed, Inventory model –Ignoring ordering cost& Inventory model – Considering ordering cost, PRICE BREAKS: purchase inventory model with one price break, Instantaneous production rate & demand Rate inventory model.

## **UNIT VII:**

**Theory Of Games** - Introduction, Minimax (maximin) criterion and optimal strategy, solution of games with saddle points, rectangular games without saddle points, Algebraic method to solve  $2 \times 2$  games, rectangular games without saddle points-other than  $2 \times 2$  games, Sub games- $2 \times n$  games.

## **UNIT VIII:**

**Project Management** - PERT & CPM, Difference between PERT & CPM, PERT/CPM Network Components, Finding Critical route or path, Critical events, Total Floats, Variance using PERT/CPM.

## **Learning Resources**

### **Text Books:**

1. Operations Research, S.D.SHARMA, kedarnath, ramanath & Co. Meerut 11<sup>th</sup> edition 2002
2. Operations Research, P.K.GUPTA & D.S.HIRA sultan Chand & Sons 8/e 2000
3. OR an Introduction, TAHA, Pearson, 8/e 2008

### **Reference Books:**

1. Operations Research: Applications and Algorithms, Wayne L Winston, Indian University, 4th edition, 2004.
2. Operations Research, Hiller, Libwerman, 8th edition TMH 2005.
3. Operations Research, R.D.ASRHEDKAR & R.V.KULKARNI, Dhanpat rai & Co 4/e, 1998.

