

MCA 305 Quantitative Techniques (OR(Operations Research)& SM(Simulation & Modeling)

Module 1 (10 Hours)

Introduction to OR

Concepts, genesis, Art of modeling, components of model, Types of OR models, effect of data availability on modeling, Computations in OR, Phases of OR study

Linear Programming (LP)

Concepts, Formulation of model, Graphical solution, Maximization / Minimization – Simplex Algorithm, Use of slack / surplus / artificial variables, BigM and Two phase method – Nature & type of solutions, Interpretation of optimal solution. Dual problem – relation between primal and dual , Dual simplex method – Interpretation of dual variables, Revised Simplex Method, Introduction to Integer programming, Developing software for LP solution methods and exposure to available LP & IP Packages.

Module 2(10 Hours)

Transportation & Assignment problems

Concepts, formulations of models, Solution procedures, Optimality checks, Balanced/Unbalanced, Maximum/Minimum problems, Prohibited case – degeneracy

Network Analysis

Network Definition, Minimal spanning tree problem, shortest route problem, Maximal flow problem concepts and solution algorithm as applied to problems. Project planning and control by PERT/CPM network, Probability assessment in PERT network.

Introduction to resource smoothing and allocation

Development of software for the techniques and exposure to Project Management Packages.

Module 3(10 Hours)

Queuing Models

Concepts relating to Queuing systems, types of queuing system (use of six character code), Basic elements of Queuing Model, Role of Poison & Exponential Distribution, Concepts of Birth and Death process, Steady state measures of performance, M/M/1

model with and without limitation of q-size M/G/1, single channel with Poisson arrival rate and general service time.

Module 4 (10 Hours)

Computer Modeling & Simulation

Use of Computer in modeling real life situations, Distribution functions, Random number generation, Selection of input probability distribution, Design of simulation models Experimental design, output analysis variance reduction techniques. Introduction to simulation languages Programming tools for developing simulation models.

Replacement & Maintenance Models

Replacement of items, subject to deterioration of items subject to random failure Group Vs. Individual replacement policies.

Module 5 (6 Hours)

Stress on Non-Linear Programming & its Applications.

(as per choice of faculty)

Portion covered can be tested through Internal evaluation only not to be included in University examination)

Books:

1. Operation Research, KantiSwaroop
2. Operation Research, V.K. Kapoor
3. Operation Research, PaneerSelvam, PHI
4. Operations Research, Hillier & Lieberman, TMH