

GUJARAT TECHNOLOGICAL UNIVERSITY
Information Technology /
Information and Communication Technology
B. E. SEMESTER: VI

Subject Name: **Modelling, Simulation and Operation Research**
 Subject Code: **161601**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
4	0	2	6	70	30	50

Sr. No	Course Content	Total Hrs.
1.	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	05
2.	Linear Programming (LP) : Concepts, Formulation of model, Graphical solution, Maximisation / Minimisation – 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, Introduction to Integer programming, Developing software for LP solution methods and exposure to available LP & IP Packages.	15
3.	Transportation & Assignment problems: Concepts, formulations of models, Solution procedures, Optimality checks, Balanced/Unbalanced, Maximum/Minimum problems, Prohibited case – degeneracy	06
4.	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 CPM network, Probability assessment in PERT network.	07

5.	Introduction to resource smoothing and allocation: Development of software for the techniques and exposure to Project Management Packages.	05
6.	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.	12
7.	Computer Modelling & Simulation : Use of Computer in modelling 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.	04
8.	Replacement & Maintenance Models : Replacement of items, subject to deterioration of items subject to random failure Group Vs. Individual replacement policies.	

Text Books:

1. Quantitative Techniques in management, N.D. Vora – Tata McGraw Hill
2. Operations Research – An Introduction – Fifth edition by Hamdy A Taha- Prentice Hall of India , New Delhi.
3. Principles of Operations Research : With Applications to Management Decisions, Wagner, H.M. , Prentice-Hall of India, New Delhi, 1982.

Reference Books:

1. Hillier, F.S. and Lieberman, G.J., Operations Research, Holden Day Inc., San Francisco, 1974.
2. Littlechild, S.C. (ed), Operational Research for Managers, Philip Allan, Oxford, 1977.
3. Mitchell, G.H. (ed), Operational Research Techniques and examples, The English Universities Press Ltd., London ,1972. Moder, J.J. and Elmaghraby, S.E. (ed.), Handbook of Operations Research : Models and Applications, Van Nostrand Reinhold Co., New York, 1987.
4. Payne, T. A. , Quantitative Techniques for Management : A Practical Approach, Reston Publishing Co. Inc., Virginia, 1982. Wilkes, F.M., Baum, P. and Smith, G.D., Management Science : An introduction, John Wiley and Sons, Santa Barbara, 1979.

