(Mater of Science in Statistics) (Master of Science) (M.Sc.) (Statistics) Semester (II)

Course Code	PS02ESTA52	Title of the Course	Operations Research
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	• Develop critical thinking and problem-solving skills through real world application of Operations research techniques. • Equip students with methods and models for making optimal decisions in complex systems. • To enhance skills through discussing case studies and practical problems.

Course Content		
Unit	Description	Weightage* (%)
1.	Linear Programming: Simplex method, Duality in linear programming, duality theorems, Dual simplex method with justification, Sensitivity analysis, Integer Programming problem: Introduction, Gomory's Cut method, Branch and Bound method.	25
2.	Network Analysis: Definition and formulation, critical path method, Project Evaluation and Review Technique (PERT), Resource Analysis in Network scheduling: time cost optimization algorithm.	25
3.	An Inventory control problem, reasons for carrying inventory, Deterministic inventory control models with and without shortages, Problem of EOQ with quantity discounts, Inventory problems with uncertain demand: single period problem without set-up cost and single period model with set-up cost (s, S)) policy.	25
4.	Queueing Theory: Introduction, structure of Queuing system, performance measures of a queuing system, steady state solution of M/M/C/∞/FIFO and M/M/C/N/FIFO with associated distributions of queue length and waiting time. (C=1 as particular case). Non-linear Programming, Quadratic Programming, Kuhn-Tucker conditions.	25

Teaching-Learning Methodology	• Traditional lectures covering theoretical concepts and problem-solving techniques. • ICT tools such as projector, smart board etc. will also be used for better explanations with problem solving demonstrations and class discussions.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the fundamental concepts of linear programming and its application in optimization problems.
2.	Design and implement project scheduling techniques like PERT and CPM.
3.	Manage inventory levels to minimize costs and meet demand fluctuations.
4.	Analyze queuing systems to optimize resource utilization and waiting times.

Suggested References:	
Sr. No.	References
1.	Hillier, Frederick S., and Gerald J. Lieberman (2018). Introduction to Operations research (11th Edition, McGraw Hill Education India).
2.	Taha, H. A. (1997). Operations Research (6th Edition, Prentice-Hall India Ltd.)
3	Searl, S. R. (1982). Matrix Algebra Useful for Statistics, John Wiley.
4	Hadley, G. (1961). Linear Programming, Addison-Wesley.
5	Sharma, J. K. (2002). Operations Research: Problems and Solutions, Macmillan India Ltd.

On-line resources to be used if available as reference material
On-line Resources: https://www.udemy.com/topic/operations-research/ https://onlinecourses.nptel.ac.in/noc19_ma29/preview https://www.edx.org/learn/operations-management