



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Business Administration

Level: Post Graduate

Course / Subject Code : MB03092071

Course / Subject Name : Quantitative Research Methods

w. e. f. Academic Year:	2025-26
Semester:	3
Category of the Course:	Specialization Advanced Business Research (Major 2)

Prerequisite:	Any Graduate
Rationale:	Quantitative Research Methods equips students with analytical tools for data-driven decision-making in business. It enables them to model and solve real-world problems using techniques such as linear programming, decision theory, and inventory management. The course strengthens the ability to apply operations research in diverse managerial contexts. Emphasis is placed on using tools like Excel Solver and TORA for practical problem-solving. Students learn to interpret results and optimize resources effectively. This subject bridges theoretical research and practical business application, preparing students for informed strategic decisions.

Course Outcome:

After Completion of the Course, Student will able to:

No.	Course Outcomes	RBT Level
01	Define key concepts and principles of operations research, modeling approaches, and problem-solving methodologies.	Remember
02	Explain quantitative techniques such as linear programming, decision analysis, queuing theory, and inventory models.	Understand
03	Apply suitable operations research methods and optimization tools to solve real-world business problems.	Apply
04	Analyze business scenarios using decision models and interpret the outcomes for managerial decision-making.	Analyze
05	Evaluate quantitative research models and select appropriate techniques for resource allocation, scheduling, and strategic planning.	Evaluate

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR		C	Theory		Tutorial / Practical	
			ESE (E)		PA / CA (M)	PA/CA (I)	ESE (V)	
3	1	0	4	70	30	50	0	150



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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	<p>Operations Research: Operations Research Approach to Problem Solving, Conceptual Questions, Models and Modelling in Operations Research, Classification Based on Structure, Classification Based on Function ,Classification Based on Time Reference, Classification Based on Degree of Certainty, Classification Based on Method of Solution or Quantification, Advantages of Model Building , Methods for Solving Operations Research Models,Methodology of Operations Research ,Advantages of Operations Research Study, Opportunities and Shortcomings of the Operations Research Approach, Features of Operations Research Solution, Applications of Operations Research , Operations Research Models in Practice</p> <p>Linear Programming Nature of OR problem, steps in OR problem, Formulation of LP problems Solution of L.P.P. by Simplex Method, Solution of LPP by Graphical Method and Solving through Computer Software like Excel Solver, etc. Duality and its implications, Introduction to sensitivity analysis in LPP solution</p>	8	17
2.	<p>Integer programming problems Types of Integer Programming Problems, Enumeration and Cutting Plane Solution Concept, Gomory's All Integer Cutting Plane Method , Gomory's Mixed-Integer Cutting Plane Method, Branch and Bound Method, Applications of Zero-One Integer Programming</p> <p>Goal Programming Difference Between LP and GP Approach, Concept of Goal Programming, Goal Programming Model Formulation,</p> <p>Transportation Problem Mathematical Model of Transportation Problem, The Transportation Algorithm, Methods for Finding Initial Solution, Test for Optimality, Variations in Transportation Problem,Maximization Transportation Problem,Trans-shipment Problem</p>	12	18



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3.	<p>Assignment Problem Mathematical Models of Assignment Problem, Solution Methods of Assignment Problem, Variations of the Assignment Problem, Travelling Salesman Problem</p> <p>Decision Theory and Decision Trees Steps of Decision-Making Process, Types of Decision-Making Environments, Types of Decision-Making Under Uncertainty, Types of Decision-Making Under Risk, Posterior Probabilities and Bayesian Analysis, Decision Trees Analysis, Decision-Making with Utilities.</p> <p>Theory of Games Two-Person Zero-Sum Games, Pure Strategies (Minimax and Maximin Principles): Games with Saddle Point, Mixed Strategies: Games without Saddle Point, The Rules (Principles) of Dominance, Solution Methods Games without Saddle Point</p> <p>Project Management: PERT and CPM Basic Differences Between PERT and CPM, Phases of Project Management, PERT/CPM Network Components and Precedence Relationships, Critical Path Analysis, Project Scheduling with Uncertain Activity Times, Project Time-Cost Trade-Off, Updating of the Project Progress, Resource Allocation</p>	13	17
4.	<p>Deterministic Inventory Control Models The Meaning of Inventory Control, Functional Role of Inventory, Reasons for Carrying Inventory, Factors Involved in Inventory Problem Analysis, Inventory Model Building, Single Item Inventory Control Models without Shortages, Single Item Inventory Control Models with Shortages, Multi-Item Inventory Models with Constraints, Single Item Inventory Control Models with Quantity Discounts, Inventory Control Models with Uncertain Demand, Information Systems for Inventory Control, Selective Inventory Control Techniques, Probabilistic Inventory Control Models</p> <p>Queuing Theory The Structure of a Queuing System, Performance Measures of a Queuing System, Probability Distributions in Queuing Systems, Classification of Queuing Models, Single/Multiple-Server Queuing Models, Finite Calling Population Queuing Models, Multi-Phase Service Queuing Model.</p>	12	18



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	Markov Chains Characteristics of a Markov Chain, Applications of Markov Analysis, State and Transition Probabilities, Multi-Period Transition Probabilities, Steady-State (Equilibrium) Conditions, Absorbing States and Accounts Receivable Application		
5.	Visit to the Manufacturing industry should be done. Students may assign to build appropriate model for demand, supply or resource allocation issues.	15	CEC (30 Marks)
	Total	60	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	20	20	20	20	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Operation Research; Theory & Applications by J K Sharma, Trinity Publication
2. G. Srinivasan Operation Research Prentice-Hall India
3. Barry Render, Ralph M. Stair, Jr., Michael E. Hanna, Quantitative Analysis for Management Pearson.
4. Harmdly TAHA Operations Research Pearson Education

(b) Open source software and website:

1. LINDO student's edition from MIT
2. TORA

(C) Suggested Case Study:

1. Optimizing Production Mix at Tata Steel Using Linear Programming
2. Decision Analysis for Launching a New Product at HUL
3. Inventory Optimization at Big Bazaar (Future Retail)
4. Queuing System Optimization at Apollo Hospitals
5. Project Scheduling and Time-Cost Trade-Off in Delhi Metro Project



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CO- PO Mapping:

Semester 3	Course Name : Quantitative Research Methods				
	POs				
Course Outcomes	PO1	PO2	PO3	PO4	PO5
CO1	3	2	1	-	-
CO2	3	3	-	1	-
CO3	3	3	1	-	2
CO4	2	3	-	2	2
CO5	3	3	-	2	2

Legend: '3' for high, '2' for medium, '1' for low and '-' for no correlation of each CO with PO.

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