



GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering

Subject Code: 3724003

Semester – II

Subject Name: Optimization in Rubber Industries

Type of course: Core-III (M.E.Rubber Technology)

Prerequisite:

Rationale:

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No	Course Content	Total Hrs
1.	Introduction to Optimization: Basic concept of optimization, formulation of optimization problems, problem dressing, feasible region, Classification of Optimization Problems: single variable- multivariable problems, optimization without constraints - with constraints, Maximization and minimization problems, Convex and concave functions, unimodal-multimodal, single objective-multiobjective optimization.	9
2.	Analytical Optimization Techniques: Stationary points, Optimization of unconstrained Functions One-dimensional Search, direct substitution, constrained variation, penalty function, Lagrangian Multiplier, Kuhn-Tucker theorem, Simplex Method of Linear Programming, Duals in optimization, Quadratic programming, Geometric Programming.	9
3.	Numerical Optimization Techniques: General principles of numerical search, region elimination techniques, direction of search, final stage in search, direct search, pattern search, acceleration in direct search, gradient methods, the complex method of Box.	8
4.	Application of Optimization In Rubber Industries: Design of product mixes, optimization in mould design, product shape-size design, screw	10



GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering

Subject Code: 3724003

	design, optimization in Mixing, Extrusion, Curing.	
5.	Optimal design and scheduling: Single product batch plants, Multiple product batch plants, Parallel units and intermediate storage, Sizing in batch plants, Inventories, flow shop and jobshop plants, constraints and formulation of design models for optimization, formulations for discrete sizes.	8
6.	Advanced Optimization Techniques: Genetic Algorithm, Mematic Algorithm, Simulated Annealing, Differential Evolution, Ant Colony Optimization, Particle Swam Optimization and recent developments.	10

Reference Books:

- Optimization Theory and Practice by Gordon S.G. Beveridge and Robert S. Schechter, by Mc-GrawHill Publication.
- Product and Process Design Principles by Warren D Seider, J. D. Seader, Daniel R Lewin, by John Wiley and Sons, Inc.
- New optimization techniques in engineering by Godfrey C. Onwubolu and B. V. Babu.

Course Outcome:

Sr. No.	CO Statement	Marks % weightage
CO-1	Students are able to understand the Basic concept of optimization.	05
CO-2	Identify the Classification of Optimization Problems.	10
CO-3	Learn the General principles of numerical search, Simplex method of Linear programming and Quadratic programming, Geometric Programming etc.	25
CO-4	Design & Analyze the Single product batch plants & Multiple product batch plants etc.	20
CO-5	Learn about advanced Optimization Techniques	20
CO-6	Able to do the Optimal design and scheduling	20

List of Experiments:

Tutorials/Presentation/Practicals based on above topics.



GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering
Subject Code: 3724003

Major Equipment:

Computers, Different Software etc.

List of Open Source Software/learning website:

- www.iiste.org/Journals/index.php/MTM/article/download/2603/2618
- <http://www.crcpress.com>
- <http://penerbit.uthm.edu>



GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering
Subject Code: 3724003