

GUJARAT TECHNOLOGICAL UNIVERSITY
M.E.in Rubber Engineering
Semester: I

Subject Name: **Modeling and Simulation of Rubber Processing**
(Major Elective-I)

Subject Code: **714004**

Sr. No	Course Content
1.	Introduction: Design, simulation and optimization: definition and differentiation with examples, applications and scope of modelling and simulation in Rubber Technology.
2.	Modelling: Definition of a model, importance of a model, different types of models, classification, step by step procedure for model development, modelling of Extruder.
3.	Simulation: Types and approaches of simulation, modes of simulation: modular, equation oriented and global equation, partitioning, tearing and recycling, system architecture for simulation.
4.	Finite Element method: Finite element analysis, terminology, material laws, FEA models, consideration of special characteristics of rubbers like: large deformations, nonlinear characteristics of load-extension (stress-strain), viscoelastic characteristics and time and temperature dependence, and nearly incompressibility for finite element analysis, boundary conditions and solution.
5.	Rubber product simulation: Static and dynamic simulation of rubber products like vehicle mount, tyre, O-ring, boot, belt, bumper, dock fender, hose etc
6.	Rubber process simulation: Simulation of mixing, extrusion, compression moulding, and curing process.
7.	Simulation of process plants: Batch Process Simulation, continuous process plant simulation, Cost Analysis and De-Bottlenecking.
8	Software tools: Introduction to tools like fluent, polyflow, Abaqus, ANSYS, MSC, Autodesk Moldflow, DEFORM etc.

Note: Practical's based on above topics

Text Books:

1. Science and practice of rubber mixing by Nobuyuki Nakajima
2. Injection Molding Handbook by Tim A.Osswald, Lih-Sheng Turng, Paul J. Gramann
3. Technology & Engineering by Hanser Verlag, 2008

Reference Books:

1. Constitutive models for rubber: proceedings of the First European Conference by Al Dorfmann, Alan Muhr
2. III European Conference on Computational Mechanics: Solids, Structures by C. A. Mota Soares, J. A. C. Martins, H. C. Rodrigues, Jorge A. C. Ambrósio, C. A. B. Pina