GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code:3172611
Semester – VII
Subject Name: Rubber Product and Process Computer Aided Design

Type of course: Professional Core Course

Prerequisite:

Rationale:

Teaching and Examination Scheme:

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

Content:

Sr. No.	Content	Total Hrs
1	**Introduction: Introduction to CAD- Design, optimization and simulation.**	04
2	**Optimization:** Objectives, methods of optimization- graphical method, linear programming simplex method, dual simplex. Modeling, fitting models to data, Least square method	07
3	**Algorithms :** for interpolation, extrapolation, curve fitting of polynomials, numerical differentiation & integration, solution of engineering/technological/design problems relating to polymer/monomer synthesis, polymeric reactions, polymer & Rubber processing, Rubber & polymer products etc. Newton's method, secant method.	06
4	**Genetic Algorithm:** Introduction, concept, theory, history, methods and applications specifically to Rubber extruder design.	06
5	**Finite Element Analysis:** Introduction, history, general description of the method, advantages & disadvantages of FEA. Application of FEA in Rubber products and process design	06
6	**Artificial Neural Network:** Introduction, Concept, methods and its application in rubber technology especially to rubber properties prediction.	06
7	**Software for Data Acquisition & Analysis :** Applications of Data Acquisition in a Rubber Factory, Device Drivers, MenuDriven Software, "Virtual Instrument" Software, Turn-Key Software, Data Reduction Software, Errors in Data Acquisition & Analysis, Evaluating Test Instrumentation, Networking Microcomputers, Applications of LANs to Rubber Factories, Attaching a LAN to Laboratory Information Management System(LIMS), Incorporating Microcomputers into a	10

	Laboratory	

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
12	**12**	**16**	**10**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

- Rubber Products Manufacturing Technology By : Anil K. Bhowmick
- Numerical Methods in Science and Engineering By : Dr. B. S. Grewal

Course Outcome:

After learning this course students will be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	Explain the importance of design, optimization and simulation	15
CO-2	Interpret and Apply appropriate algorithms in rubber industries	15
CO-3	Outline the concept and application of GA in rubber industries	15
CO-4	Summarize the use of FEA and ANN in rubber product and process design	15
CO-5	Apply proper usage of Software for Data Acquisition & Analysis	10

List of Experiments:

Tutorials/Presentation/Practicals based on above topics.

Major Equipment:

Computers, Software etc.

List of Open Source Software/learning website:

- http://www.sciencedirect.com/
- https://joblesssale8263.wordpress.com
- http://www.byggmek.lth.se/
- http://pubs.acs.org/