GUJARAT TECHNOLOGICAL UNIVERSITY

RUBBER TECHNOLOGY (26)
RUBBER EQUIPMENT DESIGN-I
SUBJECT CODE: 2162603
B.E. 6thSEMESTER

Type of course: B. E. Rubber Technology

Prerequisite: NA

Rationale: NA

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)	
					PA	ALA	ESE	OEP		
3	0	3	6	70	20	10	20	10	20	150

Content:

Sr. No	Course Content	Total Hrs	% Weightage
1.	Design of Mixing Equipments: Mixing mills & internal mixer, Control of mixing newer methods including continuous mixing, relative merits & their uses, Design aspects of mixing mills & internal mixers, automation controls, dispersion requirements & characteristics, Safety-human aspects, machine aspects, Mixing equipments lay-out, organization & capabilities, Capital & running costs of various systems, Exercises in design & drawing of mixing mills.	15	25
2.	Design of Hydraulic Press: Major components, Process design & Mechanical design, part design.	12	25
3.	Design of Calendering Machines: Process controls. Temp. Controls by use of cold water, hot water, steam etc, centrally & paripheraling drilled rolls, control of product thickness, non Newtonian behaviors of rubber comp. methods used for thickness control, Roll design, Calculation of roll separating force, Calculation of roll deflection Specification of calender machine.	15	25
4.	Design of Autoclave: Major components, Process design & Mechanical design.	12	25

Suggested specification table with marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
14	14	14	14	14	0

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:

1. Rubber Products Manufacturing Technology -By: Anil K. Bhowmick
2. Mixing of Rubber -By Groossmen
3. Rubber Processing & Production Organisation -By: Philip K. Freakley.
4. Calendering & Extrusion Technology -By: Arun V. Apte

Course outcome:

After learning the content of the subject the students will be able to:

1. Able to learn about theory of Mixing Process.
2. Compare the quality of mixing by using different types of Mixing Equipments.
3. Know about the Safety- human aspects & machine aspects.
4. Understand the non Newtonian behaviors of rubber compound during Calendering Process.
5. Understand the importance of wing and wing design in Internal Mixer.
6. Learn about the process design & mechanical design of Hydraulic Press.
7. Able to learn about importance of Calculation of roll separating force in Calender Machine.
8. Learn about the process design & mechanical design of Autoclave.
9. Able to learn about the Calculation of roll deflection in Calender Machine

List of Experiments:

Tutorials/Presentation/Practicals based on above topics

Design based Problems (DP)/Open Ended Problem:

- Importance of Sandwich Mixing.
- Studies about Calender Gauge Control .
- Fluid Flow & Heat Transfer in Calendering.
- Modern Development in Hydraulic Press.

Major Equipments:

Mixing Mill, Calender Machine , Vulcaniser, Semi Hydraulic Press, etc.

List of Open Source Software/learning website:

1. http://www.chicagorubbergroup.org/
2. http://facts-inc.com/
3. http://www.polydynamics.com/
4. http://www.smithassoc.com/

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.