

# GUJARAT TECHNOLOGICAL UNIVERSITY

## RUBBER TECHNOLOGY (40) CLEANER PRODUCTION IN RUBBER INDUSTRIES SUBJECT CODE: 2724009 SEMESTER: II

**Type of course:** (Open Elective) (M.E.Rubber Technology)

**Prerequisite:** NA

**Rationale:** NA

### 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)			
		ESE			OEP	PA	RP			
3	2#	2	5	70	30	20	10	10	10	150

### Content:

Sr.No	Course Content	Total Hrs	% Weigh tage
1.	Introduction to Cleaner Technology (CT), Technology adoption for Cleaner Production (CP), concept of CP, Role of C.P. in survival and sustainable development.	7	10
2.	Cleaner Production: The basis, necessity and potentials for rubber industries, C.P. tools, techniques, methodology and applications.	8	15
3.	Cleaner Technology (CT) Criteria for Rubber Industry with case study for CT Criteria for Latex and Block Rubber Industry	8	15
4.	CT Options for Rubber Industry with case study for Latex and Block Rubber Industry, Production Process for Latex and Block Rubber, Cost Calculation of Economic Benefits due to Reduced Loss of Rubber Content	8	15
5.	Overview of Good House Keeping, Process Modification / Changes, Process Technology Innovations, Equipment Modification, Reuse and Recycle.	7	15
6.	A study on environmental concerns and corporate social responsibility in Indian tyre industry: Tyre industry profile, Indian standards, environment concerns, CP, Recycling of Tyres, CSR activities in different tyre companies of the industries, findings and recommendations, etc	8	10
7.	Environmental Issues of Natural Rubber Processing sector with case study of CP.	8	15

### Reference Books:

- Rubber products manufacturing technology by Anil, K.B., Malcolm, M.H., H.A., Benarey, et al. (1994) Marcel Dekker, Inc.
- Environmental Impact Assessment report for Xuan Lap latex rubber processing company; Dong Nai province, Vietnam Applied Technique and Production Company (2004)..

- Cleaner Production Worldwide, 1993, United Nations Environment Programme, Industry and Environment, Paris, France, 1993
- Cleaner Production: Training Resource Package, UNEP IE, Paris, 1996

### **Course Outcome:**

After learning the course the students should be able to:

- Learn about Cleaner Technology.
- Understand the Role of C.P. in survival and sustainable development.
- Learn the Concept of CP.
- Apply Reuse and Recycle Concept and Save the Energy and Natural Resources.
- Identify the Environmental Issues of Natural Rubber Processing sector.
- Calculation of Economic Benefits due to Reduced Loss of Rubber Content.
- Understand the Role of Good House Keeping.

### **List of Experiments:**

Tutorials/Presentation/Practicals based on above topics

### **Open Ended Problems:**

1. Cleaner Production and Ecologically Sustainable Development.
2. Energy Conservation in Rubber Industry.
3. Importance of Recycle and Reuse of Rubber Products

### **List of Open Source Software/learning website:**

[www.scew.gov.au/.../anzecc-ppr-towards-sustainability-achieving-cleane](http://www.scew.gov.au/.../anzecc-ppr-towards-sustainability-achieving-cleane)  
<https://www.unido.org/fileadmin/import/userfiles/puffk/rubber.pdf>  
[www.nanhui.com.cn/en/hyxh/hyxh1.htm](http://www.nanhui.com.cn/en/hyxh/hyxh1.htm)

**Review Presentation (RP):** The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website