

# GUJARAT TECHNOLOGICAL UNIVERSITY

## B. E. SEMESTER: V

### RUBBER TECHNOLOGY

Subject Name: **Vulcanisation**

Subject Code: **152601**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
3	0	2	5	70	30	50

Sr. No.	Course content (Introduction)
1	Introduction
2	<b>Sulphur Vulcanization:</b> Practical systems for Natural & Synthetic Olefin Rubber-Theory of Sulphur vulcanization.
3	Non-sulphur vulcanizing systems for olefin Rubbers.
4	<b>Non Sulphur Vulcanizing Agents for Non-Olefin Rubbers:</b> Metallic oxides, Polyfunctional amines, Peroxides for polyacrylates, Silicone rubbers, Fluorocarbon rubbers.
5	<b>Types of Vulcanizing Agents:</b> 1. Sulphur 2. Sulphur donors 3. Accelerated sulphur vulcanization 4. Peroxides 5. Metal oxides 6. Phenolic curatives, benzoquinone derivatives, bis-maleimides.
6	Vulcanization by triazine accelerators.
7	Urethane cross-linking.
8	Moisture curing.
9	Conventional, EV and Semi EV system in rubber.
10	Accelerator system selection & adjustment.
11	Dynamic vulcanization.
12	Vulcanization of rubber blends and filled systems.
13	Shrinkage and post vulcanization reaction.

14	<b>Curing Techniques:</b> Continuous vulcanization, Microwave curing process and equipment, Ultrasonic vulcanization, Electron beam vulcanization, emerging methods of rubber vulcanization.
15	<b>The Assessment of State of Vulcanization:</b> Theoretical study of degree of cross-linking - Practical assessment of state of cure. Determination of state of cure: Methods and techniques: 1. Chemical method 2. Physical test method 3. Continuous method 4. Relation between structure and properties of vulcanizates.
16	Discussion of methods of measuring cure.
17	Calculation of cure in thick articles.
18	The relation between curing system type & properties (Sulphur - poly olefins Rubbers)
19	Vulcanization process by rheometer curve.
20	Prediction of state of cure.
21	Cure simulation instruments.
22	Time-Temperature-Fractional Conversion charts.
23	Prediction of state of cure by Arrhenius equation.
24	Cure modeling.

### **Practical and Term Work:**

Based as per the syllabus prescribed.

### **Reference Books:**

1. Rubber Technology & Manufacture by Blow & Hepburn.
2. Rubber Processing & Production Organization by Philip K. Freakley.
3. Rubber Product Manufacture Technology by Anil K. Bhowmick.