



# GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code:3172608

Semester – VII

Subject Name: Rubber Adhesion and Adhesion Science

Type of course: Professional Elective course -V

Prerequisite:

Rationale:

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)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1.	<b>Introduction to Adhesives and role of adhesives in the economy:</b> Different Terminology, Definition of Adhesion & Adhesive Joint, advantage of Adhesive Bonding, Adhesive Action, Development of Adhesive Strength, Physical & Chemical factors influencing Adhesive Action, Types of Adhesives, Applications & Setting, The Adhesives in the Economy, The Adhesive using Industries, Construction, Abrasives & Friction Materials	08
2.	<b>Water Based &amp; Solvent Based Adhesives:</b> Introduction, Water based adhesives, Properties, Solvent based adhesives, Comparison between Water based Vs Solvent based Vs Hot melts, Adhesive requirements etc.	06
3.	<b>Resins for Rubber Based Adhesives and Epoxy Resin Adhesives :</b> Types of Rubber based Adhesives, Function of Resins in rubber based adhesives, Adhesive Test Methods, Introduction of epoxy resin, Characteristics, Compounding.	06
4.	<b>Natural Rubber &amp; Reclaimed Rubber Adhesives:</b> Introduction, Raw materials, Formulation of solution adhesives from natural rubber, Mastics, Asphaltic & Sealants, use of grafted copolymer Heveaplus MG etc.	06
5.	<b>Butyl Rubber, Polyisobutylene and Neoprene Adhesives:</b> Introduction, Basic properties, General compounding-Sealants, Adhesives & coatings, Application areas & Formulations, Introduction of Neoprene Adhesives, Disadvantages, solvent- based adhesives, Manufacturing procedures & Equipments, Properties & Testing of Neoprene Adhesive, Methods of applications, End users , Neoprene latex adhesives	06
6.	<b>Nitrile and Styrene-Butadiene Rubber Adhesives:</b> Introduction, Commercial processes & Applications, The commercial Nitrile rubbers employed as Adhesives, Nitrile Rubber Latex Adhesives, General properties of SBR in	06



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	Adhesives, Types of SBR available for adhesive use, Typical formulations & application of SBR solvent base Adhesives, Latex & Dispersions of SBR as Adhesives etc.	
7.	<b>Thermoplastics Rubber (A-B-A Block Copolymers) and Cyanoacrylate Adhesives:</b> Introduction, Basic Concepts-Morphology & Compatibility, Physical properties of TPE-alone & in simple mixtures, Formulating Ingredients, Mixing & Applications, Formulating for specific application, Introduction of cyanoacrylate adhesives, Preparation & Properties of Alkylz- cyanoacrylates, Formulation of Cyanoacrylate Adhesives, Theory of Adhesive action, applications, Properties of Cyanoacrylate Adhesive Bonds etc	07

### 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
10	10	20	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:

- Handbook of Adhesives (second Edition) by IRVING SKEIST
- Rubber Technology Handbook, by Werner Hofmann; Hanser Publishers
- Rubber Engineering, by IRI.
- Rubber Technology & Manufacture by Blow & Hepburn.

### Course Outcomes:

After learning this course students will be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	Explain the importance of Adhesives and mechanism of adhesion	15
CO-2	Classify the types of adhesives test & its applications.	15
CO-3	Compare water based and solvent based adhesives	15
CO-4	Classify different types of rubber based adhesives	15
CO-5	Explain different types of resins used in adhesives with their functions	10

### List of Experiments:



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Tutorials/Presentation/Practicals based on above topics.

**Major Equipment:**

Mixing Mill, UTM, Semi Hydraulic Press, Adhesion Tester, Split Tester, Hardness Tester, Tack Tester etc.

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

- <http://www.sciencedirect.com/>
- <http://www.caplinq.com/>
- <https://www.threebond.co.jp/>



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