GUJARATTECHNOLOGICALUNIVERSITY

Program Name: Master of Engineering
Level: PG
Branch: Plastics Engineering
Subject Code: ME02084071
Subject Name: Adhesives and Sealants

w.e.f. Academic Year:	2024-25
Semester:	2
Category of the Course:	Professional Elective Course

Prerequisite:	Plastic Processing Technology 1 and 2
Rationale:	Nil

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+(PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial/ Practical		
L	T	PR	C	ESE (E)	PA/ CA (M)	PA/CA(I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No.of Hours	%of Weightage
1.	**Introduction** to polymeric foams and adhesive, adhesion and adhesive joints, Advantages and Disadvantages of adhesive bonding over conventional joining techniques, theory and mechanism of adhesion	4	3
2.	**Surface characterization**, surface preparation and surface treatments for various substrates. Techniques for evaluation of adhesives	4	5
3.	**Principle of adhesives formulation and production techniques**, Adhesives formulation for various industries viz. construction, packaging, textiles, automotive, consumer, abrasives and friction material shoes, electrical, aerospace, etc. types of polymeric foams, viz. expanded polystyrene, polyurethanes, polypropylene, etc.	5	7
4.	**Hot melt, polymerizing, solution**, solvent-activated anaerobic and pressure sensitive adhesives, etc. Bonding of polymeric materials to	7	7

	various substrates Sealants, caulks, Mastics, Type of sealants, curing of sealants, properties and formulation relevant to different application.		
5	**Natural Adhesive Materials:** Animal glue, casein and mix protein adhesives, starch base adhesives	3	3
6	**Rubber Base Adhesive Material:** Natural rubber adhesive, butile rubber and polyisobuteline, nitrile rubber adhesive, styeren butadiene rubber adhesive, thermoplastic rubber in adhesive, carboxylic polymers in adhesive, neo prene based solvent and latex adhesive, polysulfide sealant and adhesives.	5	5
7	**Resin Based Adhesives**: Phenolic resin adhesive, amino resin adhesive, epoxy resin adhesive, Polyurethane & isocyanate based adhesive,	3	5
8	**Polyvinyl Based Adhesive**: Polyvinyl acetate emulsions for adhesives, polyvinyl alcohol for adhesives, polyvinyl acetal adhesive.	3	3
9	**High Performance Based Adhesive**: polyester and polyamide high performance hot melt adhesives, high temperature organic adhesives, silicone adhesives sealants and abrasives, organ o functional si lane coupling agents, non-silance coupling agents, resins for elastomer based adhesives, polyolefin and ethylene copolymer based hot melt adhesives, acrylic adhesives, anaerobic adhesives, cyanoacrylate adhesives	7	5
10	**Adhesives For Industrial Application**: Adhesives for building construction, adhesives in electrical industry, conductive adhesives, structural adhesives in aerospace industry, adhesives in automobile industry, Meter, Mix & dispersing equipments-basic design, robotic dispersing of sealants and adhesives,	7	5
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
15	15	20	10	5	5

WhereR:Remember;U:Understanding;A:Application,N:AnalyzeandE:EvaluateC:Create(asper Revised Bloom's Taxonomy)

References/Suggested Learning Resources:
Books:

1. Adhesives, by Skiest
2. Industrial Cold Adhesive, by Roga Dulac
3. Handbook of Adhesives Raw material, by Ernest W. Flick
4. Sealants & Adhesives, by H.A. Perry

Open source software and website:

1) https://nptel.ac.in/

2) https://www.bpf.co.uk/

Suggested Course Practical List: : As per the above syllabus topics

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