SEMESTER: S8

ADHESIVE SCIENCE & TECHNOLOGY

Course Code	PEPOT861	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	Basic Understanding of Chemistry, Particularly Organic Chemistry and Polymer Chemistry	Course Type	Theory

Course Objectives:

1. Explain the Industrial manufacturing of adhesives with its development processes.
2. Introduces students to theoretical and practical aspects in formulating adhesives for commercial and speciality uses.

SYLLABUS

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Module No.	Syllabus Description	Contact Hours
1	Definition of adhesives and adhesive bonding, functions of adhesives, classification of adhesives, advantages and disadvantages of joining using adhesives, requirements of a good bond, thermodynamics of adhesive, contact angle, work of adhesion, wetting, strength of adhesion, rheology of adhesion	9
2	Surface treatments for metals and plastics, solvent cleaning, mechanical abrasion, chemical treatments, primers, plasma treatments, Methods for Evaluating the Effectiveness of Surface Preparation, theories of adhesion, Mechanical Theory, Electrostatic (Electronic) Theory, Diffusion Theory, Wetting Theory, Chemical Bonding, Acid–Base Theory, Weak Boundary Layer Theory, diffusion theory.	9
3	Classification of adhesives, adhesives from natural sources, rubber based adhesives, TPE based adhesives, poly vinyl acetates, poly vinyl alcohols, di isocyanates, cyano acrylate, anaerobic, acrylic, hot melt adhesives, pressure sensitive adhesives, structural adhesives, Phenolic resins, epoxides, wood	9

	adhesives. Adhesive applications and bonding processes, methods of adhesive application, adhesives in the electronics Industry, adhesives in the automotive and aerospace, adhesives in building construction, adhesives in electrical industry.	
4	Stresses, types of joints, selection of joint detail, joint design criteria effect of joint geometry, effect of temperature, service life prediction. Standard test methods destructive and non-destructive testing, fracture mechanics of adhesives.	**9**

Course Assessment Method

(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

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End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Outline the basics and theories of adhesion	**K2**
CO2	Summarize the different types of resins used as adhesives	**K2**
CO3	Analyze adhesive formulation for various applications	**K4**
CO4	Explain applications of adhesives	**K2**
CO5	Design different adhesive joints	**K6**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2		1						1	1
CO2	2	1	2	3		1						1
CO3	2		2		2							1
CO4	2	1		2							2	1
CO5	1	3		1		1	2					1

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Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Handbook of Adhesives and Sealants	Edward M. Petrie	McGraw Hill Handbook	2nd Edn. (2007
2	Handbook of Adhesives	I. Skeist	Chapman and Hall,	3rd Edn. (1990

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Handbook of Adhesive Technology	A. Pizzi, K.L. Mittal	Marcel and Dekker Inc.,	2nd Edition2003
2	Adhesive and Coating Technology	P. Ghosh	Tata McGraw-Hill	2008
3	Handbook of Adhesives	Shields	Butterworths	1984

Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	https://youtu.be/VFn83lMJ7Cg?si=RqSUDNh8-csqN9C4
2	https://youtu.be/KrUBlycxmk0?si=mtglirscAtFlbJ7k https://youtu.be/GJQKYq7fFHg?si=yCxkkt5Qatk6swTg
3	https://youtu.be/FTrFKPaOpm8?si=b8hN0666RV-vjJFX
4	https://youtu.be/MEhuwjMH7FM?si=rJCyk8B1kmohU5y3

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