GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

DECORATING AND FINISHING OF PLASTIC PRODUCT

(Code: 3372302)

Diploma Programme in which this course is offered	Semester in which offered
Plastic Engineering	7th Semester

1. RATIONALE

The changing demands of customers with respect to aesthetic looks, applications, properties, protection, etc led the plastic engineers for developing various kinds of decorating processes. A diploma plastic engineer has to select appropriate process, machines and monitor operations of decorating and finishing machineries. This competency requires the knowledge of decorating process, assembling of plastic parts, use of fastening techniques and application of painting and printing. Hence the course has been designed to develop these competencies and its associated-cognitive, practical and affective domain learning outcomes.

2. COMPETENCIES

The course should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- Identify requirements of decoration and finishing of plastics products.
- Select appropriate decorating and finishing process to satisfy demand of end user.

3. COURSE OBJECTIVES:

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

1. Select suitable fasteners.
2. Identify appropriate bonding material and techniques.
3. Apply proper surface treatment method.
4. Compare various painting processes.
5. Distinguish the printing processes.
6. Outline the hot transfer methods.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	200
4	0	4	8	70	30	40	60	

Legends: L-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** - Practical; **C** – Credit **ESE** - End Semester Examination; **PA** - Progressive Assessment.

5. COURSE DETAILS

Unit	Major Learning Outcomes	Topics and Sub-topics
UNIT 1: MECHANICAL FASTENERS FOR PLASTIC	1.a Identify proper fastenings 1.b Use require screw 1.c Classify the fastenings	Definition, Types and Applications of: 1. Screws 1.1 Self tapping screws 1.1.1 Thread forming screws 1.1.2 Thread cutting screws 2. Post Molded inserts and Molded-in inserts 3. Hinges 4. Rivets 5. Nuts and bolts
UNIT 2: JOINING AND ASSEMBLING TECHNIQUES	2.a Apply require cementing techniques 2.b Justify joining methods 2.c Compare thermal bonding processes. 2.d Demonstrate the welding techniques	1. SOLVENT CEMENTING TECHNIQUE 1.1 Basic principle of solvent bonding 1.2 Factors to be considered for good cementing 1.3 Types of solvents use for plastic solvent bonding 1.4 Different methods for applying solvents for solvent cementing 2. ADHESIVE BONDING 2.1 Basic principle of adhesive bonding 2.2 Types of adhesives used for plastics 2.3 Method of applying adhesives 2.4 Applications of adhesives 3. THERMAL BONDING TECHNIQUES 3.1 Introduction of plastic welding 3.2 Basic principle, equipment, working, merit, demerit and applications of : 3.2.1 Hot gas welding 3.2.2 Hot plate welding 3.2.3 Ultrasonic bonding 3.2.4 Ultrasonic spot welding

Unit	Major Learning Outcomes	Topics and Sub-topics
		3.2.5 Ultrasonic swaging 3.2.6 Ultrasonic Heat sealing 3.2.7 Vibration welding 3.2.8 Spin welding/friction welding 3.2.9 Induction welding 3.2.10 Electromagnetic Induction bonding 3.2.11 Heat sealing / Induction cap sealing 3.2.12 Dielectric heat sealing 3.3 Applications of thermal bonding
UNIT 3: SURFACE TREATMENT	3.a Compare surface treatment method. 3.b Apply surface treatment method	1. Significance of surface treatment 2. Plastic materials which necessitates surface treatment 3. Technical reasons for non-sticking of printing ink on surfaces of film/moldings 4. Surface treatments 4.1 Washing and cleaning 4.2 Mechanical abrasion 4.3 Chemical etching 4.4 Priming 4.5 Flame treatment 4.6 Corona discharge 4.7 Plasma treatment
UNIT 4: PAINTING AND COATING	4.a Select proper painting method 4.b Differentiate the painting and coating application. 4.c choose appropriate coating method	1. PAINTING 1.1 Types of paint materials 1.2 Process, Equipment and Applications of: 1.1.1 Conventional spray 1.1.2 Electrostatic spray 1.1.3 Spray and wiping 1.1.4 Roller coating 2. COATING 2.1 Materials for Powder coating 2.2 Process, Equipment and Applications of: 2.2.1 Fluidized bed coating 2.2.2 Electrostatic deposition
UNIT 5: PRINTING	5.a Classify printing process. 5.b choose appropriate printing method 5.c distinguish types of ink	Process, Merit, Demerit And Applications of: 1. Screen printing 2. Flexography printing 3. Gravure printing 4. Pad printing 5. Offset printing 6. Laser printing 7. Vinyl banner printing

Unit	Major Learning Outcomes	Topics and Sub-topics
UNIT 6: HOT TRANSFER PROCESS	6.a Use require hot transfer process 6.b Select proper hot transfer process 6.c Judge best hot transfer application.	Process, Merit, Demerit And Applications of: 1. Electroplating 2. Vacuum metalizing 3. Hot stamping 4. Labels and decals 5. Water transfer process 6. Flocking 7. Laser marking 8. Embossing and Surface Texturing

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	**Mechanical Fasteners For Plastic**	8	2	2	2	6
II	**Joining And Assembling Techniques**	13	4	8	4	16
III	**Surface Treatment**	7	4	4	4	12
IV	**Painting and Coating**	10	3	5	4	12
V	**Printing**	10	4	4	4	12
VI	**Hot Transfer Process**	8	2	6	4	12
Total		**56**	**19**	**29**	**22**	**70**

7. SUGGESTED LIST OF EXERCISES/PRACTICALS

S. No.	Unit Number	Description of Laboratory Experiment	Hours
1	I	Perform any one mechanical fastening technique.	

			2
2	II	Perform the adhesive bonding process on different plastic material and products	4
3		Perform the solvent cementing process on different plastic material and products	4
4		Perform ultrasonic bonding technique.	4
5		Perform hot gas welding process.	4
6	III	Perform surface treatment method on different plastic materials.	6
7	IV	Perform the any painting method as per the product and plastic material.	6
8		Perform the any coating method as per the product and plastic material.	6
9	V	Perform the printing process as per product shape and form.	6
10		Operate the different printing machine and suggest the proper process for proper product	6
11	VI	Perform the hot transfer process as per requirement.	8
		Total	**56**

8. SUGGESTED LEARNING RESOURCES

(A) List of Books:

SR. NO.	TITLE OF BOOK	AUTHORS	PUBLICATION
1	Handbook of Plastic Technology	Rosato/Rosato	Allen & Baker
2	Plastic Materials and Processes	Norman Lee	Goodman
3	Plastic Engineering Handbook	Fisher	J.L.Frados

4	SPI Plastic Engineering Handbook	James L. Throne	Bearins
5	Plastic Blow Moulding Handbook	Peter Klein	

(B) List of Software/Learning Websites:

1. www.ptonline.com/zones/decorating
2. www.esterline.com/Portals/13/.../WP_InMoldDecorating_6Page.pdf
3. speplasticsindustryresource.com/.../Decorating_and_Finishing/3335

9. SUGGESTED LIST OF STUDENT ACTIVITIES

1. Students will collect different shaped and different material articles and analyze the type of process for that product for decorations and finishing.
2. Students will collect information related to process through internet.
3. Students will visit nearby mould making industry.

10. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics:

1. **Prof. A.S.Amin, LPE, Government Polytechnic, Ahmedabad.**
2. **Prof. J.R.Desai, LPE, Government Polytechnic, Valsad.**
3. **Smt. S.R.Shah, LPE, Government Polytechnic, Valsad.**
4. **Prof. B.I.Oza, LPE, Government Polytechnic, Ahmedabad.**
5. **Prof. N.C.Suvagya, LPE, Government Polytechnic, Chhotaudepur.**

Coordinator and Faculty Members from NITTTR Bhopal

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