GOVERNMENT OF TAMILNADU

DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI

STATE PROJECT COORDINATION UNIT

(Established under Canada India Institutional Cooperation Project)

CURRICULUM

Course Name	**POLYMER RECYLING**
Course Code	CHE/2020/003
Course Duration	60 Hours
Minimum Eligibility Criteria and Pre-requisites(if any)	10th Std and above
Course Objectives	Training module has been designed to provide the participants • Understand Plastics Recycling industries. • Understand the job requirement while recycling various plastics scrap products in processing industries. • Operation of various types Plastics Recycling Machine. • Plastics recycling Machine Controlling and Handling. • Perform basic troubleshooting and routine maintenance of Plastics recycling machine and auxiliary equipment.
Course Outcomes	At the end of Training the participants will be able to • Understand the role of Plastics Recycling in plastic industries with cost reduction and modified properties. • Understand the man power involved for job requirement while recycling various plastics scrap products in processing industries to meet the solid waste management. • Study and Operation of various types Plastics Recycling Machine and processes. • Expertise in the field of Plastics recycling Machine instrumentation with Controlling and Handling. • Expertise in maintenance and safety precaution in processing machineries and Perform basic troubleshooting and routine maintenance of Plastics recycling machine and auxiliary equipment.
Expected Job Roles	Entrepreneur / Manager - materials / supervisor Stores Manager – Warehouse Executive / operators

TEACHING AND SCHEME OF EXAMINATION						
Course Code	Course Name	Hours		Assessment Marks		Duration of Examination
				Min	Max	
CHE/2020/003	POLYMER RECYLING	Theory	40	10	20	3 Hours
		Practical	20	40	80	
		Total	60	50	100	

CHE/2020/003- POLYMER RECYCLING

DETAILED SYLLABUS

Unit No.	Modules	No. of Hours	
		Theory	Practical
I	Fundamental	10 Hours	
1.1	To study various sources of plastic waste and its waste disposal methods.	6	4
1.2	To perform plastic waste size reduction by mechanical method.		
II	Setting up	10 Hours	
2.1	To carry out separation of plastics using float-sink method	8	2
2.2	To study various separation methods of plastic mixtures.		
III	Technology-I	15 Hours	
3.1	To perform primary recycling of plastic using granulators	10	5
3.2	To study recycling by chemical modification of plastic waste.		
IV	Technology-II	15 Hours	
4.1	To study secondary recycling by co-extrusion and co injection molding.	10	5
4.2	To study various pyrolysis reactors.		
V	TESTING	10 Hours	
5.1	To study Identification of Plastics for recycling methods.	6	4
5.2	To study recycling methods of PET, PVC & HDPE.		
	Total Theory and Practical Hours	**40**	**20**
	Total Hours	**60**	

HARDWARE REQUIREMENT

S.NO	LIST OF TOOLS /EQUIPMENTS
1.	Scrap Grinder
2	Injection Moulding Machine
3	Extruder Machine

REFERENCE WEBSITES

1. MBA Polymers • World Leader in Plastic Recycling
   mbapolymers.com
2. Plastics for Change: Reduce Plastic Pollution by Recovery ...
   www.plasticsforchange.org
3. The Association of Plastic Recyclers
   plasticsrecycling.org
4. Plastic Recycling - British Plastics Federation
   www.bpf.co.uk › sustainability › plastics_recycling
5. Swachh Bharat Mission (Urban) Plastic Waste Management Issues, Solutions and Case Studies; Ministry of Housing and Urban Affairs
   www.mohua.gov.in March 2019

REFERENCE BOOKS

S.NO	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	Recycling of Polymers: Methods, Characterization and Applications	Raju Francis	John Wiley & Sons
2	Feedstock Recycling of Plastic Wastes	Jose Aguado, David P Serrano	Royal Society of Chemistry
3	Plastic Recycling	Sati Manrich, Amélia S. F. Santos	Nova Science Publishers, 2009
4	Emerging Technologies in Plastics Recycling	Gerald D. Andrews, Pallatheri M. Subramanian	American Chemical Society
5.	Emerging Technologies in Plastics Recycling	*Issue 513 of ACS symposium series*	American Chemical Society, ISSN 0097-6156

ASSESSMENT AND CERTIFICATION

S.No	Criteria for assessment
1.	A trainee will be assessed based on the performance in End Examination for Theory and Practical conducted internally in the Project Polytechnic College for a duration of 3 hours
2.	A trainee must have 75% of attendance to appear for End examination in Theory and Practical.
3.	The assessment for theory part will be based on the marks scored in the end examination on the knowledge bank of questions (1 word/objective type questions)
4.	The assessment for practical part will be based on the marks scored in the end examination conducted by the Project Polytechnic and assessed by the Examiners approved by Strategic Plan Implementation Committee (SPIC) of the project polytechnic.
5.	The criteria for successful completion of training is every trainee should score 50% of marks in theory and practical examination.
6.	On successful completion of training , Certificate will be issued to the participants by the Directorate of Technical Education through the Project Polytechnic.

END EXAMINATION

ALLOCATION OF MARKS

S.No	Description	Max.Marks
1.	Theory Examination	20
2.	Practical Examination	
	a)Aim	5
	b)Procedure	15
	c)Observation /Calculation	15
	d)Experiment handling	15
	e)Result	10
	f)Record Note	20
	Total Marks	**100**

THEORY MODEL QUESTION PAPER

CHE/2020/003- POLYMER RECYCLING

(Maximum Marks: 20)

(N.B: Answer any Twenty questions) **20x1= 20 Marks**

1. Write any two types of sources of plastic waste.
2. Name any two types of waste disposal methods.
3. Write any two plastic waste size reduction methods.
4. Write any two materials for cutting blade for plastic scrap.
5. Write any two parts of scrap grinding machine.
6. What are the separations of plastics methods?
7. Give the advantages of float-sink method.
8. What are poly olefins?
9. How specific gravity is helps to separate plastics from mixture?
10. What are the domestic plastic materials used for home appliances.
11. Write about primary recycling of plastic.
12. Write any two Operations in granulators.
13. Write any two methods of recycling by chemical modification of plastic waste.
14. Name of the materials used to manufacture scrap grinding blade.
15. What is cold feed extruder?
16. What are the zones available in an extrusion screw?
17. What are the ingredients to be added to the plastics?
18. Write any two parts of cold feed extruder.
19. What is meant length to diameter ratio of an extruder?
20. Write any two operations performed in plastic reprocessing unit.
21. Write any two advantages of co-extrusion process.
22. Write any two advantages co injection molding.
23. Write any two maintenance in pyrolysis reactors.
24. List out the various tests for the Identification of Plastics for recycling methods.
25. Write any two recycling methods of PET, PVC & HDPE.