GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering
Level: Undergraduate
Branch: Plastic Technology
Subject Code: BE05023061
Subject Name: Instrumentation, Safety & Maintanance in Plastic Industry

w. e. f. Academic Year:	2024-25
Semester:	5
Category of the Course:	Professional Elective Course - 2

Prerequisite:	Students should understand basic voltage, resistance, and how electrical signals are generated and measured. Students should also understand how to control parameters on "plastic processing machines", students should be familiar with the basic operation of core machinery (e.g., Injection Molding, Extrusion). This context is vital for the Plant Maintenance and Safety modules.
Rationale:	The parameters of various plastic processing machines are controlled with the help of pressure & temperature measuring instruments. Knowledge and functioning of these instruments is essential for a plastic technologist. At the end of this course the student will be able to know the operation of these instruments. Also, Safety and Maintenance of the machinery is equally important for having good quality products in time and avoiding unnecessary shut downs. This course will also cover the safety and maintenance aspects of the plastic processing machineries.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes
01	Understand various pressure & temperature measuring instruments.
02	Execute preventive & break-down maintenance of Plastics Processing Machines.
03	Identify safety measures in Plastic Processing machines.
04	Understand Corrosion, Wear and Lubrication in plastic processing machinery

Teaching and Examination Scheme:

Teaching - Learning Scheme (in Hours per Semester)					Total Credits = TH/30	Assessment Pattern and Marks					Total Marks
						Theory		Tutorial / Practical			
L	T	P	PBL	TH		ESE (E)	PA (M)	PA/(I)	PBL(I)	ESE (V)	
45	00	30	15	90	03	70	30	20	30	50	200

Where L = Lecture, T= Tutorial, P= Practical, PBL = Problem Based Learning, TH = Total Hours, ESE = End- Semester Examination, PA = Progressive Assessment

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction: Basic concepts and Qualities of Measurement Basic purpose of instrumentation, Measurement and its aim, The functional elements of an instrument, Performance Characteristics.	5	10
2.	Pressure Measurement Introduction, Pressure, Methods of Pressure Measurement, Manometers, Elastic Pressure Transducers, Electrical Pressure Transducers.	7	15
3.	Temperature Measurement Introduction, Temperature, Temperature Scales, Methods of Temperature Measurement, Expansion Thermometers, Filled System Thermometers, Electrical Temperature Instruments.	8	20
4.	Plant Maintenance: Introduction and Maintenance Overview ,Types of Maintenance, Maintenance of Plastics processing machines.	5	15
5.	Safety Introduction, Types of Safety, Causes of fire, Safety-Hazards in Plastic Industry, Safety measures in plastic processing machines	5	15
6.	Corrosion, Wear and Lubrication Types of Corrosion, Corrosion control and Prevention. Types of Wear, Preventive Methods for Wear Lubricant, Function of Lubricant, Types of Lubricant, Properties of Lubricants, Desirable Qualities of an Ideal Lubricants, Effect of additives on Lubricants, Methods of Engine Lubrication, Lubrication failure and factors affecting . BIS Standard- IS 11159: General Classification of Lubricants, Industrial Oils and Related Products	15	25
	Total	45	**100**

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
15	20	20	7	4	4

Suggested Specification Table with Marks (Theory):

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per

Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Industrial Instrumentation and Control- S.K. Singh
2. Maintenance Engineering – Sushil Kumar Srivastava
3. Maintenance Engineering Hand Book- Higgins & Morrow
4. Plastics Industry Safety Hand Book- Dominick V Rosato & John R. Lawrence
5. Engineering Chemistry- Jain&Jain

(b) Open source software and website:

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

Suggested Course Practical List: If any

Practical based on above topics.

- **Sustainable Development Goals:**

The Instrumentation, Safety & Maintenance in Plastic Industry course supports SDG 9 (Industry, Innovation, and Infrastructure) and SDG 12 (Responsible Consumption and Production) by teaching students to utilize precise measurement instruments and preventive maintenance to optimize production and extend machine life. Furthermore, it advances SDG 3 (Good Health and Well-being) and SDG 8 (Decent Work and Economic Growth) by emphasizing workplace safety protocols and the management of hazards and fire risks inherent in plastic processing environments.

- **ACTIVITIES FOR PROBLEM BASED LEARNING**

Sr. No.	Activity	No. of hours	Total hours claimed	Evaluation Criteria
1	Seminar based on technical topics	Duration- 10 hrs	10	Based on content, report preparation and presentation
2	Mini project	Duration-10 hrs	10	Based on content, literature review, report preparation and presentation
3	Micro project	Duration-05 hrs	05	Based on content, literature review, report preparation and presentation
4	Industry/Research laboratory visit	Visit = 5h, Report preparation = 5h	10	Based on report submitted.

5	Poster/chart/power point preparation on technical topics	Duration = 10 h	10	Based on Poster/Chart/PPT preparation and presentation skills
6	Assignment writing.	5 assignments of 2h each.	10	Based on the assignment submitted.
7	Technical Video based learning related to the subject	Duration of video = 5h Report preparation = 5h	10	Report /presentation based on the video learning outcomes.
8	Group Discussion on emerging/trending technical topics based on subject	Duration = 1 h each	--	Based on performance in group discussion, technical depth, knowledge etc.
9	Attending Expert Lecture/Webinar/Seminar	Duration- 1hr each	--	Based on Short report
10	Self-learning on-line course	Minimum duration of the course should be 10h.	10	Examination based assessment at the end of course. Basedon the certificate produced
11	Exhibition/ Conference/ Trade Fair/ Industrial exposure for 2-3 days	Visit- 15 hr Report preparation- 5 hr	20	Based on learning, observations and short report.
12	Working model on technical topics	Working = 15 h	15	Based on design, understanding & presentation of the model
13	Non-working model on technical topics	Non- working = 5 h	5	Based on design, understanding & presentation of the model
14	Videos on Industrial safety aspects based on subject	Duration of video = 5h Report preparation = 5h	10	Based on report submitted

Above activities are suggestive, faculty can choose any of these activities and cover up the Problem based learning hours. The number of hours is suggestive. Faculty can sub-divide the number of hours based on the activity. However, the total number of hours is fixed.

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