GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering
Subject Code: 3722411
Semester – II
Subject Name: Plastics Packaging Technology

Type of course: Core III

Prerequisite: Plastics Materials

Rationale:

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Introduction to Packaging – Functions of packaging – Major packaging materials viz. Polyolefins, Polystyrene, Polyvinylchloride, Polyesters, Polyamides (Nylons), Polycarbonate and Newer materials such as High Nitrile polymers, Polyethylene Naphthalate (PEN), Polyetherimide (PEI) and LCP – Properties and Applications in Packagings.	10
2	Conversion Technology-I: Extrusion – Blown film, cast film, sheet, multi-layer film and sheet, lamination, stretch and shrink wrap and heat sealing – Injection moulding for manufacturing of packaging products – Influence of process variables and its effects. Blow moulding – Extrusion blow moulding, Die shaping, Programmed parison, Injection blow moulding and Stretch blow moulding.	7
3	Conversion Technology-II : Thermoforming – Vacuum forming, Drape forming, Snap-back vacuum forming, Plug assisted vacuum forming, Pressure forming, Matched mould forming, Scrap less thermoforming, Skin pack and blister packs, Thermoform/fill/seal systems (TFFS). Advantages and disadvantages of thermoforming. Printing – Surface treatment, Printing on films and containers viz. Flexographic printing, Rotogravier printing, Pad printing, Hot stamping, Reverse printing.	10
4	Performance Evaluation of Packaging Products: Mechanical properties – Tensile properties, Impact properties, Tear strength, Burst strength, Stiffness, Crease or flex resistance, Co-efficient of friction, Blocking, Orientation and shrinkage. Optical Properties – Clarity, Haze and gloss Barrier Properties – Oxygen transmission, Water vapour transmission rate – Migration.	10

5	Environmental Consideration: Plastic waste – Classification, Segregation, Sorting and Waste Management viz. source reduction, reuse/repair, recycling related to packaging films and containers. Pollutants an outline – Chloro Fluoro Carbon (CFC), Dioxin Life cycle assessment: A case study	**7**
6	Design of Package as per applications : specific case studies for packaging of food, chemicals, pesticides, etc. products. Shelf life considerations, testing related to specific packages	**10**

Reference Books:

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Identify functions of packaging and major plastic packaging materials used in market.	20
CO-2	Understand various conversion techniques used to convert plastic raw materials into packaging products	20
CO-3	Analyze the performance evaluation of packaging products with the help of various testing techniques.	20
CO-4	Apply the knowledge of recycling of plastics waste related to packaging films and containers.	20
CO-5	PACKAGE DESIGN AND DEVELOPMENT	20

List of Experiments:

As per the above subject topics

Major Equipment: Extrusion, Injection moulding ,Thermoforming, testing machines for films, Microscopes,etc

List of Open Source Software/learning website:

1. **https://www.plasticpackagingfacts.org/plastic-packaging/plastic-packaging-by-industry/**

   http://www.bpf.co.uk/plastipedia/applications/about_plastics__packaging.aspx