AE-418: Packaging Technology										
L	**T**	**P**	Credit	Area		**CWS**	**PRS**	**MTE**	**ETE**	**PRE**
3	0/1	2/0	4	DEC		15/25	25/-	20/25	40/50	-

Objectives: To familiarize the students with packaging as intregral process, packaging materials, testing standards and quality.

AE-418: Packaging Technology		Contact Hours
Unit-1	Introduction: Packaging as an integral process in production and marketing, Packages, Packaging characteristics, Physical properties. Mechanism of spoilage, degradation, corrosion& Their prevention. Compatibility-permissible plasticizers and their migration to food products. Package design	**8**
Unit-2	Packaging Materials: Papers and specialty papers, cellulosic films and laminates. Plastic-PE, PP PS, PVC, PVDC, Nylon, Polyester and their combinations. Expanded PE,PS and bubble films. Glass containers, ampoules and vials. Composite containers, drums and paper tubes. Aluminium foils, laminates and coating. Single layer and multilayer polymer packaging	**6**
Unit-3	Ancillary materials: Adhesives, Adhesive tapes. Cushioning materials and properties, reinforcements. Stitching methods. Seals and enclosures. Lining compounds and lacquers. Labels and instant labeling. Ink jet printing and bar coding. Graphic design. Printing techniques Printing inks and print evaluations	**6**
Unit-4	Testing, Standards and Quality control: Mechanical testing, resistance to light, insect and mould. Barrier testing for air, oxygen etc., shelf life, worthiness of filled packages. Seal tests	**8**
Unit-5	Standards- basic concepts for rigid and non-rigid and ancillary materials standards for export packages, ISO 9000 and implications. Eco packaging and regulations	**8**
Unit-6	Process machinery and equipment: Machinery and equipment for manufacture of bottles, carry-bags and laminates	**6**
	Total	**42**

Reference Books:	
1	Daniel Lu,"Materials for Advanced Packaging", Publisher – Springer(ISBN-13: 9780387782188),2008
2	Brody " Encyclopedia of PackgingTechnolgy" ,Publisher - John Wiley
3	Piringer& Bauer "Plastics Packaging",publisher - , Wiley Interscience (ISBN-13: 9783527314553), 2008
4	Selke "Plastics Packaging",Publisher –Hanser(ISBN-13: 9781569903728),2004
5	Morris ,"Nano Packaging" ,publisher - Springer(ISBN:9780387473253),2008

Course Outcomes

CO1	To study basics of Packaging, Packaging characteristics, Physical properties and Package design.
CO2	To discuss different packaging materials.
CO3	To explain adhesives, stitching methods. seals and enclosures, labeling. ink jet printing and bar coding
CO4	To analyze testing, standards and quality control of packaging materials.
CO5	To describe different standards, rules and regulations for eco packaging.
CO6	To apply machinery and equipment for manufacture of bottles, carry-bags and laminates.

CO-PO/PSOMatrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2	0	0	0	0	0	0	2	2	1	1
CO2	3	3	2	3	1	0	0	0	0	0	0	1	2	1	1
CO3	3	3	3	3	1	0	0	0	0	0	0	2	3	3	2
CO4	3	3	3	3	1	0	0	0	0	0	0	1	3	3	2
CO5	2	2	2	2	2	0	0	0	0	0	0	1	2	2	2