

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM COURSE TITLE: CONVERTING AND PACKAGING (COURSE CODE: 3355802)

Diploma Programs in which this course is offered	Semester in which offered
Printing Technology	5 th Semester

1 RATIONALE

In the era of packaging knowledge of various packaging techniques is necessary. Packaging is becoming one of the large segments of printing and related industry. This course intends to deal with additional knowledge of packaging requirements such as variety of substrates, finishing operations, its conversion etc.

2 LIST OF COMPETENCY:

The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competencies

- Print appropriate packages of different materials.

3 COURSE OUTCOMES:

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

- i. Select appropriate packaging technique.
- ii. Identify various types of packaging materials.
- iii. Print on latest packaging material available.
- iv. Execute quality control standards in printing of packages.

4 TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	150
4	0	2	6	70	30	20	30	

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

5 DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit –I Introduction to Packaging.	1a. Describe packaging technique 1b. Explain need and scope of packaging 1c. State selection criteria for printing of packages. 1d. List the types of packaging	1.1 Meaning and Brief idea of Packaging. 1.2 History of Packaging. 1.3 Need of Packaging 1.4 Requirement of good packaging. 1.5 Selection criteria for packaging material. 1.6 Types of packaging: primary, secondary, tertiary etc.
Unit– II Paper based packaging material	2a. Describe various paper based packaging material. 2b. Explain paper, boards and its types. 2c. Draw different listed types of carton manufacturing 2d. State its benefits 2e. Describe the automation used in above. 2f. List the printing techniques for paper based packaging	2.1 Paper and paper based packaging material. 2.2 Paper boards and its types. 2.3 Corrugated board and its manufacturing 2.4 Corrugated boards various structure and its terminology. 2.5 Layout of various carton styles- Bellows (Gusset) Tuck , Airplane Style Straight (AST) , Side/End Load, regular-slotted-carton, Folding Carton, Corrugated / Folding Carton, 2.6 Make ready for carton punching 2.7 Die making 2.8 Punching, scoring, box erecting, gluing etc. 2.9 Corrugated carton manufacturing 2.10 Advantages and disadvantages of paper based packaging 2.11 Printing techniques for paper based packaging.
Unit– III Plastic based packaging material	3a. State properties of different plastic materials 3b. Describe advantages and limitations of plastic packaging 3c. Explain blown film extrusion, co extrusion, blister packaging , shrink and stretch wrapping. 3d. List the printing methods for plastic material	3.1 Different plastic materials with their properties and applications: cellophane, PE, PS, PP, PVC, PET, polyester, nylon, multilayer. 3.2 Advantages and limitations of plastic packaging. 3.3 Blown film extrusion, co- extrusion. 3.4 Stretch blow moulded bottles. 3.5 Closures and closure liners. 3.6 Multilayer film manufacturing. 3.7 Blister packaging. 3.8 Shrink and stretch wrapping. 3.9 Dry bond and wet bond adhesive lamination. 3.10 Printing methods for plastic material.
Unit– IV Specialized	4a. Explain different specialized packaging process.	4.1 Aseptic packaging. 4.2 Bag in box packaging.

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Packaging		4.3 Tetra pack. 4.4 Sterilization process.
Unit- V Metal and glass container	5a Describe manufacturing of metal container and its printing process. 5b Explain glass manufacturing process 5c State the advantages, limitation of metal container and glass bottle 5d Describe printing methods for glass and metal container	5.1 Types of metal containers. 5.2 Metal container manufacturing process. 5.3 Metal container printing process 5.4 Lacquer for metal plates. 5.5 Aluminum foil and tubes. 5.6 Advantages and limitation of metal container 5.7 Glass bottle manufacturing 5.8 Advantages and disadvantages of glass bottle. 5.9 Printing methods for glass and metal
Unit- VI Quality Control Test	6a. Describe various quality control tests for package.	Quality control tests for package 6.1 Optical Test: Gloss, Haze, See through. 6.2 Machinability Test: Dimensional stability, slip, curl, running quality. 6.3 Mechanical Test: Burst, Impact, Tensile, Elongation, tear etc. 6.4 Package Test: Compatibility, Product loss, taste and odor, leakage, stress crack resistance, drop test, vibration test, stack load test, storage test.

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

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks (Duration – 2.5 Hours)			
			R Level	U Level	A Level	Total
I	Introduction to Packaging	4	-	2	2	4
II	Paper based packaging material	12	3	6	6	15
III	Plastic based packaging material	10	3	6	6	15
IV	Specialized Packaging	10	3	6	6	15
V	Metal and glass container	10	2	4	5	11
VI	Quality control test	10	4	3	3	10
	Total	56	15	27	28	70

Legends: R = Remember; U= Understand; A= Apply and above levels (Bloom’s Revised taxonomy)

Note: This specification table shall be treated as only general guideline for students and teachers. The actual distribution of marks in the question paper may vary from above table.

7. SUGGESTED LIST OF PRACTICALS:

The practical/exercises should be properly designed and implemented with an attempt to develop different types of cognitive and practical skills (**Outcomes in cognitive, psychomotor and affective domain**) so that students are able to acquire the competencies.

Following is the list of practical exercises for guidance.

Note: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of Programme Outcomes/Course Outcomes in affective domain as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that students also acquire those Programme Outcomes/Course Outcomes related to affective domain

Sr. No.	Unit No.	Practical / Exercise (Outcomes in psychomotor domain)	Hrs. Required
01	I	Draw different types of Packaging.	02
02	II	Draw Cartons	04
03	II	Make carton of various styles.	04
04	IV	Collect different types of Packages and examine.	02
05	II	Make Ready of Hand punching machine.	04
06	III	Laminate job	04
07	II	Prepare Corrugated carton packages.	04
08	VI	Test packaged products.	04
Total Hrs.			28

8. SUGGESTED LIST OF STUDENT ACTIVITIES

- i. Students will collect samples of various packagings used in industry and prepare a comparison chart for various facility or innovative function.
- ii. Using internet students will compare different packaging materials.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

- i. Industrial Demonstration of packagings used in system during industrial visit.
- ii. Understand different packagings functions & tasks during Industrial visit.
- iii. Video clips of packagings used in industry for easy learning.
- iv. Guest lecturers from industry experts for contemporary practices of industries.

10. SUGGESTED LEARNING RESOURCES

A. List of Books:

S. No.	Title of Books	Author
1	Plastics in Packaging	A. S. Athalye
2	Hand book of Printing and Packaging	Chakravarti
3	Package Design	Julius wiedemann

A. List of Major Equipment/ Instrument.

1. Bursting strength
2. Tear strength

B. List of Software/Learning Websites.

- i. www.masculin.com
- ii. www.abcpackaging.co.uk

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE.**Faculty Members from Polytechnics**

- **Prof. B. I. Patel**, I/C Head of Department of Printing Technology, RCTI, Ahmedabad.
- **Prof. S. D. Gohel**, Lecturer in Printing Technology, RCTI, Ahmedabad.

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. Nishith Dubey**, Professor, Department of Vocational Education and Entrepreneurship Development.
- **Prof. Joshua Earnest**, Professor, Department of Electrical and Electronics Engineering