

GUJARAT TECHNOLOGICAL UNIVERSITY

**PACKAGING TECHNOLOGY (58)
PRINTING TECHNOLOGY FOR PACKAGING
SUBJECT CODE: 715801
SEMESTER: I**

Type of Course: Major Elective 1

Prerequisite: Nil

Rationale: To familiarize the students with printing principles and processes

Teaching Scheme			Credits C	Examination Marks						Total Marks
L	Tutorial /Presentation	P		Theory Marks		Practical Marks				
			ESE(E)	PA(M)	PA(V)		PA(I)			
					ESE	OEP	PA	RP		
3	2	2	5	70	30	20	10	10	10	150

Sr. No.	Contents	Total Hours	% Weightage
1	Introduction: Introduction to different printing processes such as letterpress, lithography/offset, gravure, flexography, and screen printing. Introduction to non-impact printing; inkjet printing – types; electrophotography, magnetography, ionography, thermography, electrography and hybrid printing system, digital printing.	08	20%
2	Fundamentals of print production process: Print production workflow – typography, graphic design, page layout, prepress, printing, post press/finishing; Materials – substrates, ink; Drying methods; Recent trends.	08	20%
3	Graphic Reproduction: Line and halftone production, colour reproduction; Process photography, reproduction cameras, contact printer, enlarger, layout of a darkroom, process films, exposure, developer & their ingredients, development, colour filters, colour separation, halftone screen angles, black printer, colour correction; Digital photography and transmission scanner.	04	05%
4	Colour Science and Engineering: Attributes of color, principles of color reproduction, color measurement, tristimulus values, chromaticity diagrams, CIE color spaces, color-difference, digitizing color, color conversion and separation, tone reproduction and color balance, spectral sensitivities for color separation; Halftone dotsmurray- davis and yule-nielson equations, additivity and proportionality of densities, mathematical analysis of color correction, neugebauer equations, four-color printing and the black printer, color management system, color matching and mixing, color proof.	10	25%
5	Printing machinery: Sheet and web fed machines; Methods of plate making for letterpress, lithography, flexography and gravure printing; Pre-make-ready concepts, ink and water balance in lithography. Screen mesh, frames, degreasing, and different method of stencil preparation.	07	10%

6	Digital image processing: Digital image representation, CCD color capture, image enhancement, image manipulation, frame grabbing. Imagesetters and platesetters, Raster image processor technology (RIP), Imaging of a page, Data compression/decompression, image compression like jpeg, mpeg, fractals group; Image transform (Fourier transforms, FFT), image enhancement, spatial filtering, enhancement in frequency domain. Colour image processing.	08	20%
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Reference Books:

1. Gullichsen J. and Paulapuro H., "Papermaking Science and Technology, Book 13: Printing (Ed. Oittinen P. and Saarelma H.)", Finnish Paper Engineers' Association and TAPPI.
2. Adams J.M., Faux. D.D. and Rieber L.J., "Printing Technology" 4th ed., Delmar Publishers
3. Noemer E.F., "The Handbook of modern halftone photography" Perfect Graphic Arts.
4. Harald Johnson, "Mastering Digital Printing, 2nd ed." Cengage Learning PTR
5. Helmut Kipphan, "Handbook of Print Media", Springer Publications, 2004
6. J. Michael Adams, Penny Ann Dolin, "Printing Technology", Delmar Publishers, 2002.
7. Kaj Johansson, Peter Lundberg, Robert Ruberg, "A Guide to Graphic Print Production", Wiley, 2002
8. John Drew, Sarah Meyer, "Color Management for Packaging: A Comprehensive Guide for Graphic Designers", RotoVision, 2008

Course Outcome:

After learning this course the student will get acquainted with

1. Different printing processes
2. Graphic Reproduction and colour science
3. Printing machineries
4. Digital image processing

List of Experiments:

Case studies based on above syllabus.

Open Ended Problem (OEP):

Students are expected to take up and present the case analysis of current printing methods and future trends in printing of different industrial products.

Review Presentation (RP):

The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.