GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

Competency-focused Outcome-based Green Curriculum-2021 (COGC-2021)
Semester -III

CourseTitle: Binding and Finishing Process
(Course Code: 4335806)

Diploma programmes in which this course is offered	Semester in which offered
Printing Technology	Third

1. RATIONALE

Binding and finishing processes are required in order to transform printed sheets into a usable product such as books, brochures, note books etc. In today's state of art print houses, most of the finishing operations are carried out using machines, the working and principle of these machines is also a part of the course. Hot foil stamping, numbering, perforating, embossing, die cutting, are the various finishing processes that student should know in order to understand how these processes increase the utility and beauty of the product. Printing engineers are required to supervise the binding and finishing process and hence they should also develop skills in this area. Skill development in binding and finishing will also enable them in starting a small scale industry of bindery operation.

2. COMPETENCY

The purpose of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- **Plan and supervise the binding and finishing process for different types of print jobs.**

3. COURSE OUTCOMES (COs)

The practical exercises, the underpinning knowledge and the relevant soft skills associated with the identified competency are to be developed in the student for the achievement of the following COs:

a) Understand the importance of binding and finishing process.
b) Select the various raw materials used for binding and finishing.
c) Identify all the stages involved in book making.
d) Evaluate effectively of different types of cutting and folding machine
e) Compare various types of binding styles.
f) Choose required finishing process for printed job.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P/2)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	CA	ESE	CA	ESE	
3	-	4	5	30*	70	25	25	150

(*):Out of 30 marks under the theory CA, 10 marks are for assessment of the micro-project to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for the assessing the attainment of the cognitive domain UOs required for the attainment of the COs.

***Legends: L**-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** -Practical; **C** – Credit, **CA** - Continuous Assessment; **ESE** -End Semester Examination.*

5. SUGGESTED PRACTICAL EXERCISES

The following practical outcomes (PrOs) are the sub-components of the COs.*Some of the **PrOs** marked **'*'** (in approx. Hrs column) are compulsory, as they are crucial for that particular CO at the 'Precision Level' of Dave's Taxonomy related to 'Psychomotor Domain'*.

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Identify tools used for book binding	I	02
2	Identify different equipments used in book binding.	I	02
3	Perform pre forwarding operations knocking-jogging and counting.	III	02
4	Perform folding operations using different hand folding methods.	III	02
5	Perform pre forwarding operations like gathering and collating.	III	02
6	Prepare reinforced end paper.	III	02
7	Prepare cloth joint end paper.	III	02
8	Prepare made end paper and zig-zag end paper.	III	02
9	Perform forwarding operations like removing swell, rounding, gluing and fixing end paper.	III	02
10	Prepare quarter bound cut flush book.	VI	02
11	Prepare quarter bound cut flush turn-in book	VI	02
12	Prepare quarter bound french stitch.	VI	02
13	Prepare lump binding books	III	02
14	Prepare tear-off and perforated pad.	VI	02
15	Prepare loose leaf file, pocket diary	V	02
16	Prepare half bound book kettle stitch	VI	02
17	Prepare full bound book french stitch	VI	02
18	Perform stitching operations using wire stitching machine.	V	02
19	Identify difference in between case making & casing in machine.	VI	02
20	Perform sewing operations using tapes.	III	02
21	Perform sewing operations using cords.		
22	Identify working of perfect binding machine	III	02
23	Identify working of paper bag making machine	III	02
24	Identify working of buckle folding	III	02
25	Identify working of knife folding	IV	02
26	Identify working of gathering machine.	IV	02
27	Identify working of lamination machine	IV	02
28	Perform finishing operations using different process such as foil stamping embossing etc.	IV	02
	Minimum 28 Practical Exercises		**56 Hrs.**

Note

*i. More **Practical Exercises** can be designed and offered by the respective course teacher to develop the industry relevant skills/outcomes to match the COs. The above table is only a suggestive list.*

*ii. The following are some **sample** 'Process' and 'Product' related skills(more may be added/deleted depending on the course) that occur in the above listed **Practical Exercises** of this course required which are embedded in the COs and ultimately the competency.*

S. No.	Sample Performance Indicators for the PrOs	Weightage in %
1	Interpretation of given data and its presentation.	10
2	Perfection in work	30
3	Able to answer the questions	30
4	Individual work and working in groups	20
5	Submission of assigned work in time	10
Total		**100**

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

This major equipment with broad specifications for the PrOs is a guide to procure them by the administrators to usher in uniformity of practical's in all institutions across the state.

S. No.	Equipment Name with Broad Specifications	PrO.No.
1	Tabletop folder • Heavy volume • 500 sheet hopper • Paper size 3.5" x 5" to 11" x 17"	1 to 20
2	Paper cutting machine • Cutting width820mm • Cutting depth820mm • Clamp opening130mm • multi-function touch panel • Knife stroke: 42times/min • Knife dimensions: 995×130×11.1mm • Main motor: 2.2kw	1 to 20
3	Table top perfect binder • Binding Type: cover binding, tape binding, pad binding • Book block size: spine length x fore-edge length Max. 315 x 210 mm or 12.4" x 8.2" Min. 210 x 148 mm or 8.3" x 5.9" • Book block thickness: max. 25 mm or 0.9" • Cover size: length × width Max. 315 x 445 mm or 12.4" x 17.5" Min. 210 x 297 mm or 8.3" x 11.7" • Cover weight range: 82 to 210 gsm, 22 to 60 lb	4 to 6

S. No.	Equipment Name with Broad Specifications	PrO.No.
	• Cycle speed: 22 seconds per cycle (cover binding)	
4	Nipping press & different binding tools • Nipping press material: Cast Iron • Platen size of 18" x 14", with daylight of 2 to 5". • Binding tools like: folder, needle, saw, bodkin, eyelet punch, brushes, hammer, scale, L-square, scissors, binder's knife, fillet.	1 to 20
5	Laminating machine • Type: hot pouch laminator • Maximum laminating width: ≈ 320mm (A3 Size) • Laminating thickness: ≈ 75 microns to 250 microns • Lamination speed: ≈ 1000mm/minute	19 & 20
6	Mechanical binding: spiral, comb, twin loop binding machines. • Machine dimension: 460 x 430 x 205 mm • Punching capacity: 15 sheets (32/34 holes wire), 20 sheets (19/21 holes comb), 2 sheets (PVC 0.2mm cover) • Binding capacity: o-wire 5-28 mm (250 sheets), plastic comb 6-51 mm (500 sheets)	1 to 10
7	Perforation machine • Material: metal • Automation grade: manual	1 to 20

7. AFFECTIVE DOMAIN OUTCOMES

The following ***sample*** Affective Domain Outcomes (ADOs) are embedded in many of the above mentioned COs and PrOs. More could be added to fulfill the development of this competency.

a) Work as a leader/a team member.
b) Follow safety practices.
c) Adopt Ethical Practices.
d) Manage Time
e) Realize the importance of green energy.

The ADOs are best developed through the laboratory/field based exercises. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

i. 'Valuing Level' in 1st year
ii. 'Organization Level' in 2nd year.
iii. 'Characterization Level' in 3rd year.

8. UNDERPINNING THEORY

The major underpinning theory is given below based on the higher level UOs of *Revised Bloom's taxonomy* that are formulated for development of the COs and competency. If required, more such higher level UOs could be included by the course teacher to focus on attainment of COs and competency.

Unit	Unit Outcomes (UOs) (4 to 6 UOs at different levels)	Topics and Sub-topics
Unit – I Introduction to binding & finishing	1a. Choose binding process required for particular job 1b. Identify tools required in finishing process with their purpose.	1.1 Introduction to binding and its type. 1.2 Introduction to finishing and its application areas. 1.3 Introduction to tools, machinery, equipment's used, and application of each of its type.
Unit – II Materials used in binding	2a. List British & ISO paper sizes 2b. Suggest suitable adhesive according to theory of adhesion 2c. Enlist application of adhesives in various finishing process. 2d. List various materials used in book making process with its applications	2.1 Paper- British standard and ISO paper sizes. 2.2 Multiples and subdivisions of a given size. 2.3 Advantages and limitations of different measurement standards. 2.4 Securing materials – thread, wire, tape, cord etc. 2.5 Covering materials – binding cloth, mull cloth, Rexene, Leather etc. 2.6 Adhesives – glue, paste, PVA, hot melt and their properties
Unit– III Operations in binding	3a Enlist different pre-forwarding operations 3b List forwarding operations 3c Justify purpose steps in forwarding operations	3.1 Pre – forwarding operations like: jogging, knocking, counting, folding, bundling, gathering, collating, sewing etc. 3.2 Forwarding operations – removing the swell, fixing end papers, fraying out the slips, gluing the back, trimming, rounding and backing, fixing head & tail bands, lining the back, edge decoration, cutting the boards, capping up, squaring the board, lacing, covering, setting the joints, pasting down, pressing, jacketing.
Unit– IV Machinery and equipment's in	4a. Enlist different equipment's used in finishing process. 4b. Describe various functions and operations of cutting machines. 4c. Compare functions and operations of various types of folding machines	4.1 Cutting machine and its types 4.2 Parts of cutting machine and their functions 4.3 Safety devices, trim disposal system used in cutting machine 4.4 Straw board cutter. 4.5 Construction and working of knife folding; buckle folding,

binding		combination folding. 4.6 Hand folding – methods, merits and demerits
Unit– V Various binding styles	5a. Compare and select various types of gluing techniques. 5b. Compare different styles of bindings. 5c. Execute book repair.	5.1 Equipment – gatherer, feeder, spine cutter, gluer, cover feeder, trimmer 5.2 burst binding, notch binding 5.3 Perfect binding, two shot wet on wet binding 5.4 Stationary binding 5.5 Loose leaf binding - spiral binding, wire o binding, Inter screw binding, metal ring binding, thong binder, metal back binder, comb binding 5.6 Rebinding of old books
Unit– VI Securing methods, covering style and finishing operations	6a. Describe preparation of book block for different styles of book binding. 6b. Enlist type of lamination with their applications. 6c. Identify applications of foil stamping & embossing. 6d. Explain applications of miscellaneous finishing operations.	6.1 Wire stitching machine – parts, function 6.2 Thread securing methods 6.3 Book sewing machine – parts, function 6.4 Case binding, case making – manual and machine 6.5 Covering – quarter, half, full, limp and library binding 6.6 Boarding methods – pasting down, split drawn in work, cut flush, extra square, ASTI (All side turned in) 6.7 Types and applications of lamination and varnishing operations. 6.8 Miscellaneous finishing process like: blocking, numbering, perforation, creasing, die cutting, edge decoration, index cutting, foil stamping, varnishing etc.
Unit– VII Environment friendly binding materials	7a. Identify various Eco-friendly binding materials	7.1 Eco-friendly linen thermal covers 7.2 Eco-friendly papers 7.3 Recyclable coils 7.4 Biodegradable ring binders

9. SUGGESTED SPECIFICATION TABLE FOR QUESTIONPAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction to binding & finishing	06	03	04	03	10

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
II	Materials used in Binding	06	04	02	06	12
III	Operations in Binding	06	02	06	04	12
IV	Machinery and equipment's in binding	06	04	02	04	10
V	Various binding styles	08	04	04	04	12
VI	Securing methods, covering style and finishing operations	06	02	04	04	10
VII	Environment friendly binding materials	04	02	02	00	04
Total		**42**	**21**	**24**	**25**	**70**

Legends: *R=Remember, U=Understand, A=Apply and above (Revised Bloom's taxonomy)*

Note*: This specification table provides general guidelines to assist student for their learning and to teachers to teach and question paper designers/setters to formulate test items/questions assess the attainment of theUOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may varyslightly from above table.*

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related ***co-curricular*** activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

a) Prepare list of different covering materials used in book binding.
b) Collect information on spot lamination.
c) Prepare report on estimation of book binding.
d) Prepare list of machine manufactures of paper bag machine.
e) Collect information on different adhesion techniques used in book binding adhesives
f) Collect information on carton making machine manufactures.
g) Collect information regarding different covering materials used in book binding
h) List developments in die punching operations
i) List developmental stages in modern book binding.
j) Collect data on eco-friendly book binding.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

a) Massive open online courses (***MOOCs***) may be used to teach various topics/sub topics.
b) Guide student(s) in undertaking micro-projects.
c) ***'L' in section No. 4***means different types of teaching methods that are to be employed by teachers to develop the outcomes.
d) About ***20% of the topics/sub-topics*** which are relatively simpler or descriptive in nature is to be given to the students for ***self-learning***, but to be assessed using different assessment methods.

e) With respect to ***section No.10***, teachers need to ensure to create opportunities and provisions for ***co-curricular activities***.
f) Demonstrate students thoroughly before they start doing the practice.
g) Encourage students to refer different websites to have deeper understanding of the subject.
h) Observe continuously and monitor the performance of students in Lab.
i) Demonstrate students thoroughly before they start doing the practice.
j) Encourage students to refer different websites to have deeper understanding of the subject.

12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project are group-based (group of 3 to 5). However, **in the fifth and sixth semesters**, the number of students in the group should ***not exceed three.***

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The duration of the micro project should be about **14-16** ***(fourteen to sixteen) student engagement hours*** during the course. The students ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. This has to match the competency and the COs. Similar micro-projects could be added by the concerned course teacher:

a. Collect ten different samples of covering materials used in book binding and prepare report on it.
b. Collect ten different samples of securing material used in book binding prepare report on it.
c. Collect ten different samples of reinforcing materials used in book binding prepare report on it.
d. Collect brochure of different lamination machine manufacturer and materials supplier and also prepare report on it.
e. Collect information of different types of board supplier and collect their products with specification
f. Collect samples of different types of paper used in binding.
g. Visit binding unit & collect information of work flow.
h. Collect different types of foil used in foil stamping
i. Prepare estimation sheet for different binding materials.
j. Collect different samples of book finishing done.
k. Collect information of different tools used in book binding.
l. Collect information regarding different advanced equipment used in binding.
m. Collect information regarding paper bag making machine.
n. Collect information regarding carton creasing & cutting machine.
o. Collect information on spot lamination.
p. Collect data on eco-friendly book binding Process.

q. Collect data on eco-friendly book binding materials available in market.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	Handbook of Print Media	Kipphan, Helmut	Heidelberger Druckmaschinen AG, Springer Heidelberg,, 2001, ISBN 3-540-67326-1
2	Binding & Finishing	Ralp Lyman	GATF Press, 1993, ISBN-13: 978-0883621639
3	Finishing Process in Printing	A.G. Martin	Hastings House, Publisher, 1972 ISBN-13: 978-0803822894
4	Book Binding with Adhesives	Tony Clark	McGraw-Hill Publishing Co., 1994, ISBN-13: 978-0077094041

14. SOFTWARE/LEARNING WEBSITES

a. Binding tools https://www.youtube.com/watch?v=dE_S7auPz48
b. Binding tools https://www.youtube.com/watch?v=kOFtlLg-NAo
c. Gold embossing https://www.youtube.com/watch?v=mC6XPHu1xCw
d. Stitching machine https://www.youtube.com/watch?v=lezUpWtANvI
e. Sewing machine https://www.youtube.com/watch?v=WmIyffh3ev8
f. Perfect binding Machine https://www.youtube.com/watch?v=Lm5XtUxMfUw
g. Gathering machine https://www.youtube.com/watch?v=P_3Ul9xHVNc
h. Folding machine https://www.youtube.com/watch?v=af5662g5zg4
i. Lamination machine https://www.youtube.com/watch?v=3DW2uS1rfYs
j. Foil stamping machine https://www.youtube.com/watch?v=s8zHQSPcUmU

15. PO-COMPETENCY-CO MAPPING

Semester I	Fundamentals of Electrical Engineering (Course Code:)						
	POs						
Competency & Course Outcomes	PO 1 Basic & Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation &Testing	PO 5 Engineering practices for society, sustainability & environment	PO 6 Project Management	PO 7 Life-long learning
Competency .	Plan and supervise the binding and finishing process for different types of print jobs.						

Course Outcomes							
A) Understand the importance of binding and finishing process.	2	2	-	-	-	2	2
B) Select the various raw materials used for binding and finishing.	2	2	2	2	2	-	-
C) Identify all the stages involved in book making.	2	-	-	2	-	2	2
D) Evaluate effectively of different types of cutting and folding machine	2	2	-	-	-	2	2
E) Compare various types of binding styles.	2	-	2	-	-	2	2
F) Choose required finishing process for printed job	2	2	2	-	-	-	2

*Legend: '**3**' for high, '**2**' for medium, '**1**' for low and '**-**' for no correlation of each CO with PO.*

16. COURSE CURRICULUM DEVELOPMENT COMMITTEE

GTU Resource Persons

S. No.	Name and Designation	Institute	Contact No.	Email
1	V. B. Patel	R. C. Technical Institute, Sola, Ahmedabad	9825219434	vinita_printing@yahoo.com
2	D. D. Raval	R. C. Technical Institute, Sola, Ahmedabad	9879551606	ravaldevang9@gmail.com
3	S. D. Gohel	R. C. Technical Institute, Sola, Ahmedabad	8460609775	sandy_printmedia@yahoo.com

NITTTR Resource Persons