GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

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

Course Title: Costing and Estimating for Printing
(Course Code: 4355804)

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

1. RATIONALE

Printing sector has extremely competitive market, its sustainability and growth of printing industry depends on commercial viability of print processes. Further the survival of entire industry the estimating and costing of a printing jobs/ product need to be done. The prerequisite for the subject is knowledge of printing processes and operations. The course is intended to develop skills of estimating, cost control, operation scheduling and effective resource utilization activities and its significant commercial benefits in future for printing industry.

2. COMPETENCY

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

- **Prepare competitive estimation for the given job.**

3. COURSE OUTCOMES (COs)

The practical exercises, the underpinning knowledge and the relevant soft skills associated with this competency are to be developed in the student to display the following COs:

a. Differentiate between estimating and costing.
b. Identify factors controlling estimation and cost.
c. Estimate pre-printing operations for the given job.
d. Estimate raw material requirement for the given job.
e. Calculate finishing and transportation costs for the given job.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T/2+P/2)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	CA	ESE	CA	ESE	
3	-	-	3	30*	70	00	00	100

(*):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) that are the sub-components of the COs. *Some of the **PrOs** marked **'*'** 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
	Not applicable		
Total			

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 %
	Not applicable	
Total		

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

These major equipments with broad specifications for the PrOs is a guide to procure them by the administrators to usher in uniformity of practicals in all institutions across the state.

S. No.	Equipment Name with Broad Specifications	PrO. No.
	Not applicable	

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 ethical practices.
c) Follow safety practices.
d) Practice good Housekeeping.
e) Practice environmental friendly methods and processes.

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

Only the major Underpinning Theory is formulated as higher level UOs of *Revised Bloom's taxonomy* in order development of the COs and competency is not missed out by the students and teachers. 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 Application and above level)	Topics and Sub-topics
Unit – I Introduction to Costing	1a. Differentiate between various costing techniques. 1b. State factors affecting profitability. 1c. Describe depreciation and its methods. 1d. Explain hourly cost rate, machine cost rate, variable cost etc. 1a. Select the relevant type of rate system according to job	1.1 Outline of costing in Printing Industries. Definition of cost, prize, profit 1.2 Elements of cost, Direct Cost and Indirect Cost, Material Cost and Labor Cost, Factory Expenses and Overheads, Examples from printing industry, 1.3 Difference between costing and estimating 1.4 Purpose of costing, purpose of estimating 1.5 Major factors in determination of Selling Price of product, Factors affecting profitability, Depreciation – Meaning and types, simple numerical on depreciation 1.6 Time rate and Work rate system, Major factors in determining hourly rate of operations in printing, foundation of costing system, Allocation of expenses. 1.7 Fixed cist and variable cost 1.8 Budget centers – Cost recovery and Service. 1.9 Comparison of Actual and Budget Expenses. 1.10 Forecast life of assets. 1.11 Depreciation and its methods. 1.12 Cost control system and cost reduction.

Unit	Unit Outcomes (UOs) (4 to 6 UOs at Application and above level)	Topics and Sub-topics
Unit – II Job instructions and Costing	2a. Identify technical specifications of various jobs 2b. Select appropriate cost elements according to job 2c. Prepare Statement ofSummary. 2d. Prepare work instruction ticket, cost sheet, requisition format 2e. Prepare estimate through estimation software.	2.1 Works Instruction Ticket or Job Card- contents and example for offset printing & label printing. 2.2 Standard press routine 2.3 Preparing job cards for various jobs 2.4 Statement Summary of Expenses. 2.5 Daily dockets, statement of recorded cost of production, office work ticket, progress slip, Invoice, Cost sheet, Requisition of paper, ink, bindingmaterials etc. 2.6 Shift Production Report 2.7 Estimate form , Delivery and Sales Report, Quality control Report, return form 2.8 GST – Meaning and rates for raw materials, 2.9 Print services Tender document – Meaning, contents, examples of tenders (simple overview) by (a) large scale non-printing organizations for printing work and (b) raw materials by printing companies 2.10 Liability, Customer's Property, Terms and condition 2.11 Disputes about cost variation and delayedpayments 2.12 Taxes and handling or delivery charges. 2.13 Variation in quality. 2.14 Local organization and rules 2.15 Introduction of different costing and estimating software. 2.16 Advantages of Software
Unit – III Estimation of Substrates	3a. Estimate paper and film required for job 3b. Elaborate factors affecting estimation of job	3.1 Estimation of paper- Paper size (British & ISO), Multiples and sub-divisions, Ream, Quire, Gross, wastage allowance. Simple Numerical of Estimation. 3.2 Calculation of weight of web & sheets, calculation of number of pages, reams, reels, plates, impressions, time and cost required

Unit	Unit Outcomes (UOs) (4 to 6 UOs at Application and above level)	Topics and Sub-topics
		for printing and plate making. Simple Numerical on Weight, costing of printing and plate making 3.3 Polymer film roll weight calculations when material density and thickness (calliper) are given (screen printing, flexography and gravure printing), calculating number of rolls required 3.4 Determination of rate for design, DTP, 3.5 Qualification of estimator, additional requirement , tools of estimator
Unit – IV Estimation of Printing Operations	4a. Estimating Flexography printing charges 4b. Estimating Gravure printing charges 4c. Estimating offset printing charges 4d. Calculate ink consumption	4.1 Flexography plate making process operations, -ve making and processing, Simple numerical for plate making charges according to plate type and sizes. 4.2 Offset plate making charges, printing charges, estimation of offset printing charge 4.3 Estimation of screen printing charge 4.4 Gravure cylinder plating for nickel, copper, chrome. Simple numerical for plating charges 4.5 Ink consumption - SPANKS formula, Selection of Anilox roll volume for various jobs in flexography, Simple numerical on Ink consumption and Roll volume
Unit– V Finishing and Transportation	5a. Estimation for post press operations 5b. Costing of Transportation	5.1 Post printing operations -Binding material calculation - cloth, board, lamination film, case making. 5.2 Factors affecting output rate of machines used for finishing operations like folding, perfect binding, cutting / trimming, punching (die cutting), Calculating area of board required in cartons, Simple numerical on operation costing. 5.3 Transportation: Containers, type of containers, numerical on costing for shipping, pallet capacity, Pallets: classification, types, numerical on pallet arrangement of goods,

Unit	Unit Outcomes (UOs) (4 to 6 UOs at Application and above level)	Topics and Sub-topics
		according to payload capacity of pallets, pallet setting on containers

***Note**:TheUOs need to be formulated at the 'Application Level' and above of Revised Bloom's Taxonomy' to accelerate the attainment of the COs and the competency.*

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 Costing	10	4	8	4	16
II	Job instructions and Costing	12	2	10	4	16
III	Estimation of Substrates	8	4	6	4	14
IV	Estimation of Printing Operations	6	2	6	4	12
V	Finishing and Transportation	6	2	6	4	12
Total		**42**	**14**	**36**	**20**	**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 the UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary slightly 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 journals based on tutorials practiced.
- **b.** Give seminar on relevant topic.
- **c.** Undertake micro-projects.
- **d.** Visit Press setups in Local area to observe job costing activities.

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 assessedusing different assessment methods.
e) With respect to ***section No.11***, teachers need to ensure to create opportunities and provisions for ***co-curricular activities***.
f) Guide student(s) in undertaking micro-projects
g) Arrange visit to nearby Printing Press for understanding various production activities.
h) Use of video/animation films to explain various printing and post printing processes.
i) Use different instructional strategies in classroom teaching.

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. However, in the fifth and sixth semesters, it should be preferably be ***individually*** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, 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 total duration of the micro-project should not be less than ***16 (sixteen) student engagement hours*** during the course. The student 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. List down direct and indirect expenses involved in printing job in local commercial press also give the reasons and compile report.
b. Collect specification and requirement of Tenders for purchase of Institute stationery items as A4 paper, Note Books, Office Files.
c. Collect rates of minimum 5 types of paper, boards, Ink, Chemicals and other consumables available in local or online market and procurement process
d. Collect minimum 3 tender published in local area and calculate given product costing.
e. Collect Pictorial images of post operations performed in local area and their costing methods.
f. Collect information about Local Publication house and calculate costing of their anyone of product with excel sheet for costing of jobs.
g. Collect information about Local Commercial printer and calculate costing of their anyone of product with excel sheet for costing of jobs.
h. Collect information about Local label or Plastic or Film Printing press and calculate costing of their anyone of product with excel sheet for costing of jobs.
i. Collect information about rates of label stock, Lamination rolls available in local or online market and procurement process
j. Collect information about Local Bindery and calculate costing of their anyone of product with excel sheet for costing of jobs and rates of consumables.

k. Collect information about Printed products required by institute and calculate estimation for jobs.
l. Collect information about Pallet types and load carrying capacity of pallets for handling finished products
m. Collect information about Container types and charges for transportation of finished products.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication with place, year and ISBN
1.	Print Estimator's Handbook	Hugh M. Speirs.	Pira International Ltd., United Kingdom, 2004 ISBN: 85802 922 8
2.	Printer's Costing & Estimating	B.D. Mendiratta	Arihant Prakashan Pvt. Limited, India, 2010, ISBN - 8190982877, 9788190982870
3.	Printing Estimating	Philip Kent Ruggles	Delmar Publishers, USA, 1990, ISBN : 978-0827338050
4.	Printing Estimating Primer	Don Merit	Printing Industries Press, USA, 1996, ISBN: 978-0883623138
5.	Estimating for Printers	Hugh M. Speirs	British Printing Industries Federation, UK, 1989, ISBN: 978-0-85168-166-5

14. SOFTWARE/LEARNING WEBSITES

a) www.youtube.com/watch?v=kor-0DFEpuI – calculation of printed job
b) www.youtube.com/watch?v=UqWtCjFAXLc - bill book costing
c) https://www.youtube.com/watch?v=PbuiIhr0LVA – different plastics
d) https://www.youtube.com/watch?v=oKO3VOsrmsA - wide format costing
e) https://www.youtube.com/results?search_query=watch%3Fv%3DoWhCY-hcb3g – digital printing estimation
f) https://www.youtube.com/watch?v=-aJnyfccfrQ – offset process costing
g) https://www.youtube.com/watch?v=KG0wP4fjMns – what is printing cost
h) https://www.youtube.com/watch?v=rvXA8FKiNwU – packaging material costing
i) https://www.youtube.com/results?search_query=watch%3Fv%3DLH9oF8_h-mg – calculate costing online
j) https://www.youtube.com/results?search_query=watch%3Fv%3Du3DJ7Y4Qfh8 – total cost of ownership
k) https://www.youtube.com/watch?v=YBS-GLHXXag – estimation through spreadsheet

15. PO-COMPETENCY-CO MAPPING

Semester V	Costing and Estimating for Printing (Course Code: 4355804)									
	POs and PSOs									
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	**PSO 1** Design and develop the product and process for the need of the industries and society.	**PSO 2** Analyze and improve productivity, quality and cost effectiveness for the various pre-press, press and post press process involved in printing to meet the industries requirement.	**PSO 3** (If needed)
Competency	**Prepare competitive estimation for the given job.**									
Course Outcomes CO a) Differentiate between estimating and costing.	3	-	-	-	-	2	2	-	2	
CO b) Identify factors controlling estimation and cost.	3	-	-	-	-	2	2	-	2	
CO c) Estimate pre-printing operations for the given job.	3	-	2	2	-	2	2	-	2	
CO d) Estimate raw material requirement for the given job.	2	-	-	-	-	2	2	-	2	
CO e) Calculate	2	-	-	-	-	2	2	-	2	

finishing and transportation costs for the given job.										

Legend: '**3'** for high, '**2**' for medium, **'1'** for low or **'-'** for the relevant correlation of each competency, CO, with PO/ PSO

16. COURSE CURRICULUM DEVELOPMENT COMMITTEE

GTU Resource Persons

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

NITTTR Resource Persons