

Branch Name:	Mechanical Engineering
Program Code:	ET402
Course Title:	Estimating, Costing & Contracting
Course Code:	2ET4020505
Pre-requisite Course:	-

Course Objectives:

1. Prepare accurate cost estimates for given component/product.
2. Analyze and interpret component/product drawings to calculate quantities.
3. Understand the different methods of estimating and their applications.
4. Develop proficiency in preparing detailed tender documents.
5. Evaluate and manage contractual obligations in construction of component.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	2	4	60	40	20	30	150

Course Contents:

Sr. No.	Topic	Total Hours	Weightage (%)
1	Introduction 1.1 Need, Scope & importance of ECC in industries. 1.2 Need of attitude, knowledge & skill required for ECC. 1.3 Difference between costing and estimating.	4	10
2	Elements of Cost and Overhead Allocation 2.1 Terminology associated with various cost elements and their classification. 2.2 Terminology associated with overheads, their classification and allocation. 2.3 Determination of selling price and catalogue price.	4	10
3	Cost Estimation of Welding 3.1 Elements of cost in welding. 3.2 Factors effecting welding cost. 3.3 Estimating cost elements in gas and arc welding. 3.4 Estimation of production cost of given welding job for above methods.	6	15
4	Cost Estimation of Forging and Casting 4.1 Cost terminology associated with forging shop. 4.2 The procedure of calculating material cost of a product for forging shop (including input weight, cut weight, forged weight etc.). 4.3 Procedure of estimating cost of forging dies. 4.4 Procedure of estimating forging cost. 4.5 Given the forged component, estimate forging cost.	10	23

	4.6 Cost terminology associated with foundry shop. 4.7 The procedure of calculating material cost of a product for foundry shop. 4.8 Procedure of estimating cost of pattern making. 4.9 Procedure of estimating foundry cost. 4.10 Given the casting component, estimate foundry cost.		
5	Cost Estimation of Machined Part 5.1 The terminology associated with machine shop estimation. 5.2 Procedure to estimate material cost. 5.3 Procedure of estimating cost of machined part for following operations: Lathe operations (Facing, outside/inside turning, boring, drilling on lathe, grooving and outside threading), Drilling operations (Drilling, reaming, tapping), Shaping operations, milling operations (Face milling, side and face cutting, end milling, key way milling and gear forming). Cylindrical grinding operations (Plain cylindrical, grinding), For given machined part, estimate material cost and machining cost.	7	16
6	Break Even Analysis 6.1 Classification of costs as fixed and variable costs. 6.2 Relationship between the costs and quantity of production 6.3 Break Even Chart: i. Definition of Break Even Point (BEP) and its needs in industry. ii. Procedure of construction of Break-Even Chart. iii. Assumptions made in constructing Break even chart. iv. Calculation of BEP analytically and graphically. v. Margin of safety, its importance and its derivation. vi. Effect of changing various parameters on BEP. vii. Numeric examples.	4	10
7	Contracting 7.1 Define contracts, its characteristics and advantages. 7.2 Types of contract. 7.3 Tendering, manual tendering and E-tendering. 7.4 Provision of different conditions in a contract. 7.5 Documents required in an engineering contract. 7.6 Prepare a contract for a given input situation	3	6
8	Estimation of process cost 8.1 Understand importance of estimating various process costs. 8.2 Procedure and steps to estimate cost for following processes: i. Producing power using diesel generating set. ii. Power produced at thermal power plants. iii. Pouch packaging. iv. Ice plant.	4	10

List of Practical:

Sr. No	Name of Practical	Approx. Hours.
1	Welding Estimation: a. Determine raw material volume for all welded parts. b. Select welding rod to be used. Estimate quantity of welding rod required. c. Determine material and consumables costs. d. For each part, estimate welding cost. Show the assumptions and steps followed to estimate welding cost. e. Derive total cost of the part.	04
2	Casting Estimation:	06

	a. Determine raw material volume for all casted parts (calculate input weight, cut weight, net weight, losses etc.). b. Prepare pattern drawings (production drawings with all dimensions, surface finishes, allowances, etc.) for all parts. c. Estimate pattern cost. d. Determine material and consumables costs. e. For each part, estimate casting cost. Show the assumptions and steps followed to estimate casting cost. f. Derive total cost of the part	
3	Forging estimation: a. Determine raw material volume for all forged parts. b. Prepare die drawings (production drawings with all dimensions, surface finishes, allowances, etc.) for all parts. c. Estimate dies cost. d. Determine material and consumables costs. e. For each part, estimate forging cost. Show the assumptions and steps followed to estimate forging cost. f. Derive total cost of parts.	06
4	Machining estimation: a. Determine raw material volume for all machined parts. b. For each part, tabulate operation, cutting tool/s to be used and cutting parameters (speed, feed and depth of cut) to be used. c. Estimate raw material cost. d. For each part, estimate machining cost. Show the assumptions and steps followed to estimate machining cost. e. Derive total cost of parts.	08
5	Process estimation: a. Teacher will assign the input data. Estimate hourly rate of running diesel generating set. Show the assumptions and steps followed to estimate the rate. b. Teacher will assign the input data. Estimate hourly rate of running ice plant. Also estimate the rate to produce a Ton of ice with same data. Show the assumptions and steps followed to estimate the rate. c. Teacher will assign the input data. Estimate hourly rate of running heat exchanger. Show the assumptions and steps followed to estimate the rate. d. Teacher will assign the input data. Estimate unit rate of thermal power plant. Show the assumptions and steps followed to estimate the rate.	04

Reference Books:

Sr. No.	Title of Book	Author	Publication
1.	Mechanical estimating and costing	Banga and Sharma	Khanna Publishers
2.	Mechanical estimating and costing	Shrimali and Jain	Khanna Publishers
3.	Mechanical costing and estimation	Singh and Khan	Khanna Publishers
4.	Learning package in ECC	NITTTR, Bhopal	NITTTR, Bhopal

List of Open-Source Software/learning website:

1. <https://youtu.be/0iQUO04iwlI?si=dkZqeitgDwSUSdwe>
2. https://youtu.be/_mFSqRHDeRo?si=6LaAH5PeHQKBfhrY
3. <https://youtu.be/7F1n5OgnK4I?si=9qFZaHujz74mB-mD>
4. https://youtu.be/vRrBPuTHbM4?si=lrLJMO1LDeEcI4_J
5. <https://youtu.be/hnfkUh3iYb4?si=Kc8Bgh39X9OusSS9>
6. https://youtu.be/aTnDZF_C-XM?si=oJL8k7VMUysL0xFx

Course Learning Outcomes (CLO) on completion of this course, the students will able to

CLO	Description	Bloom's Taxonomy Level
CLO1	Calculate material cost of given component/product.	3 Applying
CLO2	Identify and estimate elements of cost in various processes.	2 Understanding 4 Analyzing
CLO3	Perform break even analysis to calculate break even quantity and find profit or loss in production of given product	3 Applying 5 Evaluating
CLO4	Prepare simple engineering contracts	2 Understanding 5 Evaluating
CLO5	Calculate the losses of material in forging process.	3 Applying
CLO6	Prepare the pattern and the casting of given component/product	2 Understanding 6 Creating

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Mapping of CLO with PO and PSO

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	H														M	
CLO2		M							L				M		M	
CLO3	M	M						L					M			
CLO4	L		M		L			L							L	
CLO5	M	L											M		M	
CLO6	M		M		L				L				M			

H: High, M: Medium, L: Low