



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Mechanical Engineering

Subject Code: DI04019031

Subject Name : Engineering Costing and Plant Maintenance

w. e. f. Academic Year:	2025-26
Semester:	4 th
Category of the Course:	Professional Elective - II

Prerequisite:	Mathematics
Rationale:	This course is designed to develop students' ability to evaluate materials, consumables, and process costs in monetary terms. By doing so, it contributes to improving organizational productivity and promoting the conservation of valuable resources. The course also helps students build essential decision-making skills and learn how to plan, use, monitor, and control resources efficiently and economically. In addition, it provides fundamental knowledge and skills related to industrial maintenance problems, including their causes and possible remedies.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes
01	Understand the concept of estimation, costing and depreciation.
02	Apply break even analysis to get optimum production level.
03	Calculate cost for various conventional manufacturing processes.
04	Explain various maintenance practices, machine diagnostics methods, and fault analysis techniques.
05	Demonstrate understanding of industrial safety standards, hazard identification, and preventive safety practices.

Teaching and Examination Scheme:

Teaching scheme (in Hours)			Total Credits L+T+(PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR		C	Theory		Tutorial / Practical	
			ESE(E)		PA (M)	PA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150



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Course Content:

Unit No.	Content	No. of Hrs	% of Weightage
1.	Introduction of Costing 1.1 Terminology associated with various cost elements and their classification. 1.2 Terminology associated with overheads, their classification and allocation. 1.3 Determination of selling price and catalogue price. 1.4 Depreciation and obsolescence: Definition, types, Different methods of calculating depreciation. 1.5 Numerical problems	06	14
2.	Break even analysis 2.1 Classification of costs as fixed and variable costs. Relationship between the costs and quantity of production. 2.2 Definition of Break Even Point (BEP) and its needs in industry. 2.3 Procedure of construction of Break Even Chart, Assumptions made in constructing Break even chart, Calculation of BEP analytically and graphically. 2.4 Numerical problems	06	14
3.	Costing in Welding, Fabrication and Machining shop 3.1 Cost terminology and procedure associated with welding and machining shop. 3.2 Calculate cost of consumables and production for gas cutting and welding (Gas & Arc) of a given job. 3.3 Calculate fabrication cost of real time object. 3.4 Calculation of Solar Roof Top costing for various capacities. It includes, cost of welding, framing, solar panel, labour, taxes, subsidies, etc. 3.5 Calculate machining cost in lathe, drilling and milling machines. 3.6 Numerical problems.	10	21
4.	Costing in forging and casting shop. 4.1 Cost terminology and procedure associated with forging and casting shop. 4.2 Calculate volume of various shapes. 4.3 Calculate mass and material cost of given component. 4.4 Calculate various forging losses and forging cost for given data. 4.5 Calculate pattern making cost (for given data). 4.6 For a given component, calculate casting cost including all losses. 4.7 Numerical problems.	08	18
5.	Maintenance Concepts and Practices 5.1 Introduction to Maintenance – Need, objectives, types of maintenance	05	11



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	5.2 Preventive, Predictive and Breakdown Maintenance 5.3 Condition-based maintenance – Vibration, temperature, lubrication checks 5.4 Maintenance planning, scheduling and documentation 5.5 Tools and equipment used in maintenance 5.6 Maintenance records, history cards and checklists.		
6.	Machine Diagnostics and Fault Analysis 6.1 Basics of machine diagnostics – Purpose and importance 6.2 Common mechanical faults – misalignment, imbalance, wear, leakage and noise 6.3 Vibration analysis – causes and interpretation 6.4 Thermal analysis – overheating, friction, lubrication issues 6.5 Fault tracing methods and troubleshooting procedure 6.6 Root cause analysis (RCA) and corrective actions	05	11
7.	Industrial Safety 7.1 Industrial hazards – mechanical, electrical, chemical and fire hazards 7.2 Personal Protective Equipment (PPE) and safe working practices a. Fire triangle, fire extinguishers, PASS method 7.3 Safety signs, signals and colour codes 7.4 Machine guarding, lockout–tagout (LOTO) 7.5 Workplace safety guidelines and emergency procedures 7.6 Accident causes, reporting and prevention techniques a. Factory Act 1948 – key provisions	05	11
Total		45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
21	21	28	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) 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.



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4.	Maintenance Engineering and Management	R. C. Mishra & K. Pathak	PHI Learning Pvt. Ltd
5.	Maintenance Engineering	Er. S. K. Srivastava	S. Chand & Company,

(b) Open source software and website:

1. <https://www.youtube.com/watch?v=KH-9VQbZxQE>
2. <https://youtu.be/7F1n5OgnK4I>
3. <https://youtu.be/btrxpqk4F-Q>
4. <https://youtu.be/hnfhU3iYb4>
5. <https://www.youtube.com/watch?v=vRrBPuTHbM4>
6. https://youtu.be/aTnDZF_C-XM
7. <https://www.youtube.com/watch?v=4ZXfjfs09g8>
8. https://www.youtube.com/watch?v=7rKjN-wK83s&list=PLSGws_74K019n5sjannZRKcSpG25beMLl

Suggested Course Practical List:

Sr. No.	Practical Exercises	Hrs
1	Calculate welding cost of various components. a. Determine raw material volume of welded parts. b. Select welding rod and estimate quantity of welding rod required. c. Determine material and consumable costs. d. Calculate welding cost. Show assumption and steps followed to estimate welding cost. e. Derive total cost of the component.	04
2	Calculate cost of machining component. a. Determine raw material volume of machined parts. b. For each part, Tabulate operation, cutting tools to be used and cutting parameters (Speed, Feed, Depth of cut) to be used. c. Calculate raw material cost. d. Calculate machining cost. Show assumption and steps followed to estimate machining cost. e. Derive total cost of the component.	04
3	Calculate volume of given component.	02
4	Calculate cost of given forging component. a. Determine raw material volume of forged parts. b. Prepare Die drawing (Production drawings with all dimensions, surface finishes, allowances etc.) for all parts.	02



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	<p>c. Calculate Die cost.</p> <p>d. Determine material and consumable costs.</p> <p>e. Calculate forging cost. Show assumption and steps followed to estimate forging cost.</p> <p>f. Derive total cost of the component.</p>	
5	<p>Calculate cost of given casting component.</p> <p>a. Determine raw material volume of casted parts.</p> <p>b. Prepare pattern drawing (Production drawings with all dimensions, surface finishes, allowances etc.) for all parts.</p> <p>c. Calculate pattern cost.</p> <p>d. Determine material and consumable costs.</p> <p>e. Calculate casting cost. Show assumption and steps followed to estimate casting cost.</p> <p>f. Derive total cost of the component.</p>	04
6	<p>Preparation of Preventive Maintenance Schedule</p> <p>Tasks:</p> <p>Select any workshop machine (lathe, milling, drilling, and compressor)</p> <p>Identify machine parts requiring routine maintenance.</p> <p>Prepare Preventive Maintenance (PM) schedule including:</p> <ul style="list-style-type: none"> ○ Daily / Weekly / Monthly PM tasks ○ Lubrication chart ○ Checklist format ○ Spare parts required <p>Prepare machine maintenance history card.</p>	04
7	<p>Machine Fault Identification & Root Cause Analysis (RCA)</p> <p>Observe any rotating equipment (motor, pump, fan, lathe spindle).</p> <ul style="list-style-type: none"> • Identify at least 3 possible faults, such as: <ul style="list-style-type: none"> ○ Misalignment ○ Bearing wear ○ Imbalance ○ Lubrication failure • Perform step-by-step fault tracing. • Prepare Root Cause Analysis (RCA) using: <ul style="list-style-type: none"> ○ Fishbone diagram ○ Fault tree • Suggest corrective actions. 	04



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8	Demonstrate safety equipment and their methods use.	02
9	Mini project and presentation.	04

List of Equipment:

- i. Tool kit.
- ii. Fire extinguishers.
- iii. Lubricants.
- iv. Cotton waste.
- v. Kerosene.
- vi. Measuring instruments.

Suggested Activity for Students

1. Collect the finished parts from industries/market/scrap merchants consisting:
 - i. Welded parts, ii. Casted parts, iii. Forged parts, iv. Machined Parts
 - ii. Measure and prepare production drawings of all the parts using A4 size paper (Manually).
2. Do market survey and find prevailing hourly rates of CNC, Hacksaw cutter, lathe, milling, drilling, grinding and shaping machines and price of these machines.
3. Do market survey and find prevailing rates of commonly used engineering materials like MS, brass, copper, stainless steel, Aluminum, etc.
4. Estimate fabrication cost of real time objects like safety grill (e.g. windows, doors, etc.), gate, various shades, etc.
5. Estimate solar roof top costing for various capacities. It includes cost of welding, framing, solar panel, labour, taxes, subsidies, etc.
6. It includes cost of welding, framing, solar panel, labour, taxes, subsidies, etc.
7. Calculate cutting fluid cost. e.g. cost of lubricating oil, coolant, packaging oil, etc.
8. Calculate cutting tool cost. e.g. cost of drill, tips, carbide cutter, reamer, honing stick, etc.
9. Monitor functionality of machine element and try to judge fault in it.
10. Visit nearby Industry/plant/workshop/hospital and collect samples of periodic & preventive maintenance format.

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