



**CVM**  
**UNIVERSITY**

Aegis: Charutar Vidya Mandal (Estd.1945)

## FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

**Programme:** Bachelor of Technology (Mechanical Engineering)

**Semester:** VIII

**Course Code:** 202090806

**Course Title:** Product Engineering

**Course Group:** Professional Elective Course - VI

**Course Objectives:** The course is designed to expose the students, how to analyze the capacity and capabilities of machine tool. It deals with analysis of part print for selection of appropriate machine. Students learn about the operation sequence and cost of manufacturing a product. Students are exposed to design concept of fixtures. Value engineering deals with the technique of cost reduction by changing design with creative and innovative design.

### Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Theory		J/V/P*		Total
				Internal	External	Internal	External	
3	0	2	4	50 / 18	50 / 17	25 / 9	25 / 9	150/53

\* J: Jury; V: Viva; P: Practical

### Detailed Syllabus:

Sr. No.	Contents	Hours
1	<b>Product Development:</b> Introduction, Product selection, Product life cycle, manufacturing processes, concurrent engineering, engineering organization structure, process engineering.	2
2	<b>Product Analysis:</b> <b>Part Print Analysis:</b> Dimensional datums, functional surfaces, classifying operations, Product and process critical surfaces, identification of manufacturing datums, determining principal process. <b>Process Design:</b> Selection of Process of manufacture for a product, machine requirements, capabilities and limitations of machines, Operation routing, machining time calculations, process picture.	8



3	<b>Workpiece control:</b> Concept of location, Geometric control, Dimensional control, mechanical control. <b>Tooling and Tooling Analysis:</b> Standard and special tooling, 3-2-1 location system, location afforded by standard tooling, relating work piece location requirements with location afforded by tooling, special tooling design.	15
4	<b>Tolerance Analysis:</b> Dimensioning and tolerancing, rules for dimensioning, choice of datums, developing tolerance charting, balancing the tolerance chart.	7
5	<b>Producibility Considerations:</b> Producibility characteristics and requirements for casting, welding, machining, metal shearing and product assembly.	3
6	<b>Costing:</b> Cost make up, Overhead allocation, Depreciation methods, Cost estimation, Cost reduction techniques, Time value of Money, Lifecycle cost. <b>Value Analysis and Value Engineering:</b> Introduction, Function analysis in two words, FAST diagramming technique.	10
<b>Total</b>		<b>45</b>

### List of Practicals / Tutorials:

1	Capability and capacity study of the workshop
2	Part print analysis
3	Operation Routing for a component
4	Costing for a component
5	Location system afforded by standard tooling
6	Design for Manufacturing
7	Process capability analysis
8	Preparation of Tolerance chart
9	Analysis of Assembly
10	Fast diagram and critical logic worksheet

### Reference Books:

1	Process Engineering: For Manufacturing by G.E. Johnson, Donald F. Eary, Prentice Hall, 1962.
2	Dimensional control in precision manufacturing by Gadzala, John L., McGraw-Hill, 1959.
3	Engineering Design, by George Dieter & Linda Schmidt, McGraw Hill; 5th edition, 2012
4	Fundamentals of Process Engineering by V. M. Kovan et al, Mir Publication, 1979.
5	Design for Manufacturability handbook by James G Bralla
6	Value Engineering: A how to Manual bby S. S. Iyer, New age International Publishers
7	Value Engineering : A Systematic Approach by Arthur E. Mudge - Mc GrawHill

### Supplementary learning Material:

1	NPTEL resources
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### Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Seminar/Poster Presentation
- Industrial/ Field visits
- Course Projects



### Internal Evaluation:

The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. where individual component weightage should not exceed 20%.

### Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						R: Remembering; U: Understanding; A: Applying; N: Analyzing; E: Evaluating; C: Creating
R	U	A	N	E	C	
10%	20%	50%	10%	5%	5%	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

### Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understand process engineering function in industry	25
CO-2	Learn location system afforded by various tooling and to select the appropriate tooling for given operation	30
CO-3	Learn to prepare tolerance chart to produce workpiece within required tolerance	15
CO-4	Learn to understand the capabilities and limitations of different manufacturing processes.	10
CO-5	Learn to calculate cost of producing a product and reduce production cost by innovative and creative idea.	20

### Curriculum Revision:

Version:	2
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	--
Next Review on (Month-Year):	June-2025