

ME470: PRODUCT ENGINEERING
CREDITS = 5 (L=3, T=0 P=2)

Course Objective:

To explain the process of manufacturing components as per the design

Teaching and Assessment Scheme:

Teaching Scheme			Credits	Assessment Scheme				
L	T	P	C	Theory		Practical		Total Marks
				ESE	CE	ESE	CE	150
3	0	2	5	70	30	30	20	

Course Contents:

Unit No.	Topics	Teaching Hours
1	<p><u>Introduction:</u> General Manufacturing Processes, Organization Chart, Product engineering and Process engineering.</p> <p><u>Classifying Operations:</u> Basic Process Operations, Principal Process Operations, Major Operations, Auxiliary Process Operations, Supporting Operations.</p> <p><u>Preliminary Part Print Analysis:</u> Problems Encountered in Reading and Interpreting Part Prints, Establishing the General Characteristics of the Workpiece, Auxiliary Methods for Visualizing the Part from the Print, Determining the Principal Process, Alternate Processes, Functional Surfaces of the Workpiece, Determining Areas Used for Processing, Specifications, Nature of the Work to be Performed, Finishing and Identifying Operations, Relating the Part to Assembly.</p>	09
2	<p><u>Dimensional & Tolerance Analysis:</u> types of dimensions, measuring the geometry of form, surface quality and its measurement, baselines, direction of specific dimensions</p> <p><u>Tolerance Charts:</u> Causes of Workpiece Variation, Terms Used in Determining Workpiece Dimensions, How Limits are Expressed, How Tolerances are Expressed, The Problem of Selective Assembly, Tolerance Stacks, Cost of Arbitrary Tolerance Selection . Computer aided tolerance analysis.</p>	10
3	<p><u>Workpiece Control:</u> Equilibrium Theories, Concept of Location, Geometric Control, Dimensional Control, Mechanical Control, Alternate Location Theory.</p>	06

Unit No.	Topics	Teaching Hours
4	<u>Planning and Selection of manufacturing processes:</u> functions, economy and appearance, fundamental rules of Manufacturing process, Basic design of the product, influence of process engineering on product design, rechecking specifications, how materials selected affect process cost, using materials more economically, the material cost balance sheet, eliminating operations, selection the proper tooling, availability of equipment, make or buy decisions. Process picture.	04
5	Determining the manufacturing sequence; Selection of Equipment; Standard Equipment. <u>Classification of Tooling:</u> Sources of tooling, tooling, tools, tool holders, workpiece holders, moulds, patterns, core boxes, dies, templates, gauges.	07
6	Value Engineering: definition and objectives of value engineering, evaluation of function, worth, cost and value. Value engineering job plan. FAST diagram	06
TOTAL		42

List of References:

1. Donald F Eary and George E Johnson, “*Process Engineering for Manufacturing*”, Prentice Hall Inc
2. V Kovan, “*Fundamentals of Process Engineering*”, Mir Publication
3. George Dieter, “*Engineering Design*”, McGraw Hill Inc
4. Harold G Tuffty, “*A Compendium on Value Engineering*”, The Indo-American Society
5. Arthur E Mudge, “*Value Engineering – A Systematic Approach*”, McGraw Hill
6. CMTI, “*Machine Tool Design Hand Book*”, Tata McGraw Hill Inc

Course Outcomes (COs):

At the end of this course students will be able to

1. Analyze the part print for selection of processes in the context of manufacturing
2. Analyze tolerances before manufacturing the actual components as per the process sequence
3. Apply the 3-2-1 location concepts
4. Selection of process sequence to create quality components
5. Design of tooling used in machining processes
6. Apply value engineering concepts.