

GUJARAT TECHNOLOGICAL UNIVERSITY
B.E. SEMESTER : VI
MANUFACTURING ENGINEERING

Subject Name: TOOL DESIGN

Subject Code:163404

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam(E)	Mid Sem Exam(Theory) (M)	Practical (Internal)
4	0	0	4	70	30	50

Sr No	Course Contents
1	<p>Cutting Tools Design of Single Point Cutting Tool. Form tools – Introduction, Types , design of form tools. Drills – Introduction, Types, Geometry, Design of drill. Milling cutters – Introduction, Types, Geometry. Design of milling cutters. Reamers Taps & Broaches – constructional features only.</p>
2	<p>Press Tool Design Introduction, Press operations – Blanking, piercing, Fine Blanking, Notching, Perforating, Trimming, Shaving, Slitting, Lancing, Nibbling, Bending, Drawing, Squeezing. Press working equipment – Classification, Rating of a press, Press working Terminology, Working of a cutting die, Types of dies – Simple dies, Inverted dies, Compound dies, Combination dies, Progressive dies, Transfer dies, Multiple dies.</p> <p>Principle of metal cutting, strip layout, clearance, angular clearance, clearance after considering elastic recovery, cutting forces, method of reducing cutting forces, Die block, die block thickness, Die opening, Fastening of die block, back up plate, Punch, Methods of holding punches, Strippers. Stoppers, Stock stop, Stock guide, Knock outs, Pilots. Blanking & Piercing die design-single & progressive dies.</p>
3	<p>Bending Forming and Drawing Dies Bending methods – Bending Terminology, V – Bending, Air bending, bottoming Dies, Wiping dies, spring back & its prevention, channel dies. Design Principles- Bend radius, Bend allowance, Spanking, width of die opening, Bending pressure.</p> <p>Forming Dies – Introduction, Types – solid form dies, pad type form dies, curling Dies, Embossing dies, coining dies, Bulging dies, Assembly dies.</p> <p>Drawing Dies – Introduction, Difference between blending, forming & drawing, Metal flow during drawing, Design, Design consideration – Radius of draw die, Punch Radius, Draw clearance, Drawing speed, Calculating blank size, Number of draws, Drawing pressure, Blank holding pressure.</p>
4	<p>Forging Die Design Introduction, Classification of forging dies, Single impression dies, Multiple Impression dies, Forging design factors – Draft, fillet & Corner radius, parting line, shrinkage & die wear, mismatch, finish allowances, webs & ribs Preliminary forging operation- fullering, edging, bending, drawing, flattering, blacking finishing , cutoff. Die design for machine forging – determination of stock size in closed & open die forging. Tools for flash trimming & hole piercing, materials & manufacture of forging dies.</p>

5	<p>Design of Jigs & Fixtures Introduction, locating & clamping – principle of location, principle of pin location, locating devices, radial or angular location, V –location, bush location design principle for location purpose, principle for clamping purposes, clamping devices, design principles common to jigs & fixtures.</p> <p>Drilling Jigs: Design principles, drill bushes, design principles for drill bushings, Types of drilling jigs – Template jig, plate type jig, open type jig, swinging leaf jig, Box type jig, channel type jig. Jig feet.</p> <p>Milling Fixtures: Essential features of milling fixtures, Milling machine vice, Design principles for milling fixtures, Indexing jig & fixtures, Automatic clamping devices.</p>
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TEXT BOOKS

1. Production Engineering By P.C. Sharma, S.Chand Publication
2. Tool Design by Donaldson, TMH

REFERENCES

1. Production Engineering Sciences By P.C.Pandey & C.K.Singh, Standard Publishers.
2. Tool Engineering and Design By G.R. Nagpal.
3. Manufacturing Science by Ghosh & Mallik, East West Press, New Delhi.
4. Manufacturing Processes for Engineering Materials by Kalpakjian S, Pearson Publication.
5. Fundamental of Metal Machining and Machine Tools by Geoffrey Boothroyd.
6. Jigs & Fixtures by Grant, Tata McGrawhill.