

PE307: TOOL ENGINEERING
CREDITS = 5 (L=3, T=0, P=2)

Teaching and Assessment Scheme:

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

Course Content:

Unit No.	Topics	Teaching Hrs.
1.	<p><u>Theory of metal cutting:</u></p> <p>Cutting tools, tool geometry, concept of speed, feed, depth of cut & cutting action & effect of these on cutting forces, types of chips, Merchant circle of forces. Estimation of cutting forces. Empirical relations. Tool force dynamometers. Measurement of cutting forces and power required in turning, drilling & milling, tool wear, tool life, influence of volume of and pressure of cutting fluid on chip.</p>	06
2.	<p><u>Cutting tool standards and materials:</u></p> <p>Tool signature ORS & ASA methods, tool standards: Single point cutting tool, drills, broach, reamer, milling cutters. Cutting tool materials selection and evaluation, heat treatment of tools. Cutting tool holders, locating and clamping devices, Nonconventional tool geometry, advance tool materials, coating on tool, throwaway inserts, tool inserts, punch and die materials.</p>	06
3.	<p><u>Heat generation, tool life & Economic of cutting tools:</u></p> <p>Heat generation in cutting, cutting fluid, tool wear, Tool life equation of Taylor. Factors affecting tool life, Machinability and its rating, criteria for Machinability. Economics of machining. Criteria for minimum cost & maximum production influence of parameters on heat generation.</p>	06
4.	<p><u>3-2-1 Location system:</u></p> <p>Meaning of Location, Principles of Locations, Different Methods Used for Locations.</p>	04

5.	<u>Fundamentals of Jigs and fixtures:</u>	06
	Significance and purpose of jigs and fixtures and their functions in manufacturing processes. Classifications of jigs and fixtures. Designs features of main elements of Jigs and fixtures such as locating, clamping and guiding elements and their integrations. Indexing, locking and auxiliary elements. Bodies and bases or frames of Jigs and fixtures. Economics of Jigs and fixtures, Pneumatics & Hydraulics for jig & fixtures.	
6.	<u>Design of jigs & fixtures:</u>	08
	General guidelines & procedures for design of Jigs and fixtures. Design & selection of standard elements, Analysis of number of clamping forces required & their magnitude, concept of modular fixtures & tool presetting fixtures.	
7.	<u>Press Tools:</u>	06
	Press working processes-types, sketches and applications, Press tools: types, working, components and their functions, calculations of press tonnage and shut height of press tool, Shear action in die cutting operation, Centre of pressure, Die clearance, Cutting force: Methods to calculate and methods of reducing, Shear angle- concept, need and method to give shear angle on punch, and die, forming tools, deep drawing tools.	
8.	<u>Die and moulds:</u>	06
	Drawing dies-types and method to determine blank size for drawing operation. Types, sketch, working and applications of drawing dies (embossing, curling, bulging, coining, swaging and hole flanging), Forging dies- terminology, types, sketch, working and applications, Sketch, working and applications of following dies/mould: i. Extrusion. ii. Plastic injection. iii. Blow moulding.	

TOTAL	48
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Reference Books:

1. Wilson, “*Fundamentals of tool design*”, A.S.T.M.E.
2. M.H.A. Kempster, “Introduction to Jigs and fixtures design”.ISBN8185617856.
3. .Dolye, “Manufacturing processes and material for engineers”.
4. G. Kuppuswamy, “*Principles of metal cutting*”, university press, ISBN 81 73710287.
5. Basu, Mukherjee and Mishra, “*Fundamentals of tool Engineering and Design*”, Oxford and ffiH publishing. ISBN812040016X.
6. P C Sharma, “*Production Engg*”. , Khanna publishers. ISBN8121904218.
7. “*Tool Engineering Handbook*”, A.S.T.M.E.
8. R. K. Jain, “*Production Technology*”, Khanna Publishers.ISBN8174090991
9. Rao P. N., “*Manufacturing Technology (Vol. 2)*”, Tata McGraw-Hill

10. Hajra Choudhury S. K., Bose H. K., Hajra Choudhury A. K., “*Elements of Workshop Technology (Vol. II, 12th Edition)*”, Media promoters and Publishers Pvt. Ltd.
11. HMT, “*Production Technology*”, Tata Mc GrawHill
12. W.A.J. Chapman, “*Workshop Technology (Vol. I, II & III)*”, CBS publication