

TOOL & DIE DESIGN
Semester III (Production Engineering) SUB CODE: MEPR301
Teaching Scheme (Credits and Hours)

Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
4	0	2	6	5	3	70	30	20	30	150

LEARNING OBJECTIVES:

The objective of this course is

- To learn various concepts related to tool & die design

LESSON PLANNING

SR.NO	CHAPTER NO	DATE/WEEK	%WEIGTAGE
1	1,2	1 st 2 nd 3 rd	20
2	3	4 th 5 th 6 th	20
3	4	7 th 8 th 9 th	20
4	5	10 th 11 th 12 th	20
5	6,7	13 th 14 th 15 th	20

Total hours (Theory): 60, Total hours (Practical):30, Total hours: 90

DETAILED SYLLABUS

Cha p. No.	Topic
1	Cutting Tool Design: Fundamentals of Cutting tools design, cutting tools and their principal elements, Tool geometry, system of nomenclatures and their interrelations, setting for the grinding of various basic cutting tool (turning, drilling, milling)
2	Analyses and Design of Jigs and Fixture: Principles of jig and fixture design, Dual cylinder location, diamond pin analysis, V-block analysis, design principles of centralisers, various mechanisms and design of equalizers, analysis for optimum number of clamping forces required and calculation of their magnitudes, concept of modular fixtures, design of fixtures for NC/CNC machines, computer applications in fixture design and analysis.
3	Design of press tools: Components of die design, design of die blocks, punches and strippers, methods of holding punches, sketches of stock stops, Design procedure for progressive dies, compound dies and combination dies for press tool operation forging die design for drop and machine forging parts. Computer applications in press tool design.
4	Design of forging dies: Grain flow considerations, parting line selection, draft, design problems involving ribs, bosses and fillets. Flash and flash control, determination of number of impressions required and their sequence, design steps and analysis of forging dies, detail calculations, shrinkage, cavity shapes, heat transfer considerations, cooling and ejection systems, automation in forging operations, computer aided design and analysis.
5	Design of injection molds: Principles of melt processing, product considerations, determination of economical number of cavities, temperature control of injection molds, calculation of mold opening force and ejection force. Detail design of cooling system, ejection system and gating system. Moldability features, mold flow analysis.

6	Die casting die design: Metals for die casting, specific details of die construction, casting ejectors, side cores, loose die pieces, slides, types of cores, directional solidification, types of feeders, die venting, water cooling, design aspects of die casting dies, defects.
7	Tooling for Automats: Cam design for automats, gauge design – gauge allowances and tolerance – materials for gauges. Economics of Tooling: Selection of economical method – amortization of tooling costs.

LIST OF PRACTICALS

Sr. No.	Practical Content
1	TOOL DESIGN OF SINGLE POINT TOOL
2	TOOL DESIGN OF DRILL
3	TOOL DESIGN OF MILLING CUTTERS
4	PERFORMANCE OF RESHARPENING OF SINGLE POINT TOOL, MILLING CUTTERS
5	PERFORMANCE OF RESHARPENING OF DRILL
6	PERFORMANCE OF RESHARPENING OF MILLING CUTTERS
7	DESIGN OF PRESS TOOLS
8	DESIGN OF FORGING DIES
9	DESIGN OF INJECTION MOULD DIES
10	DESIGN OF DIE CASTING DIE
11	CAM DESIGN FOR AUTOMATS

INSTRUCTIONAL METHOD AND PEDAGOGY (Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all units while conducting teaching & examination.
- Attendance is compulsory in lectures and Tutorial.
- Viva Voce will be conducted at the end of the semester of 30 Marks.
- One internal exam of 30 marks is conducted as a part of Mid semester evaluation.

STUDENTS LEARNING OUTCOMES:

At the end of the course

- The students will gain an experience in tool design meant for various applications to be applied in the field of production.

References

1. Cole: "Tool Design"
2. Donaldson: "Tool Design", Tata McGraw Hill.
3. ASTM: "Fundamentals of Tool design"