

TOOL DESIGN

Subject Code	: 10ME762	IA Marks	: 25
Hours/Week	: 04	Exam Hours	: 03
Total Hours	: 52	Exam Marks	: 100

PART – A

UNIT - 1

Introduction to tool design: Tooling, requirements of a tool designer, general tool design procedure.

Design of Single point Cutting Tools: Design of single point lathe tool: Design of shank dimension using strength and rigidity considerations for rectangular, square and round cross section and selection of tool geometry. Solid type tool, brazed tip tool, long index able insert, throwaway index able insert types and chip breakers.

06 Hours

UNIT - 2

Design of Multi Point Cutting Tool: Drill bit design of elements like back taper, web thickness, land width, margin, flute length and cross section and selection of tool geometry. Design of milling cutter: Design of elements like number of teeth and height circular pitch, body thickness, chamfer width, fillet radius and selection of tool geometry.

04 Hours

UNIT - 3

Design of Jigs : Functions and differences between jigs and fixtures, advantages in mass production, design principles, economics of jigs and fixtures. Principles of location -3-2-1 and 4-1-1 types of locations, different types of locating elements. Clamping – Principles of clamping, types of clamping including power clamping devices. Drill jigs- Types, Drill bushes, simple exercises of designing jigs for given components.

05 Hours

UNIT - 4

Design of Fixtures: Fixture Design Turning fixtures, milling fixtures, grinding and broaching fixtures, indexing fixtures. Design of fixtures for simple components.

05 Hours

PART – B

UNIT - 5

Design of Sheet Metal: Working of a power press and classification of presses. Components of a simple die, press tool operation, die accessories, shearing action in punch & die, clearance, shear on punch and die, Centre of pressure and problems, scrap strip layout. Simple, progressive, compound, combination and inverted dies. Design problems on blanking and piercing dies for simple components.

05 Hours

UNIT - 6

Bending & Drawing: Bending dies – Introduction, bend allowance, spring back, edge bending die design. Drawing dies – Single action, double action and triple action dies, factors affecting drawing, drawing die design.

05 Hours

UNIT - 7

Die Casting Dies : Terminology: Core, cavity, sprue, slug, fixed and movable cores, finger cams, draft, ejector pins ejector plates, gate, goose-nozzle, over-flow, platten, plunger, runner, vent, water-line etc. Types of Dies: Single cavity, multicavity dies, combination dies, unit dies, advantages and disadvantages of types of dies. Die casting dies, unit dies. advantages and disadvantages of types of dies. Die casting alloys, defects in die casting, finishing trimming and inspection of die casting components, safety, modern trends in die casting dies.

05 Hours

UNIT - 8

Injection Molding: Injection moulding machine and its elements, general configuration of a mould. 2 plate and 3 plate mould. Introduction, to gate, runner, parting surface, ejection system. Core and cooling system.

Introduction to compression, transfer, blow moulding, extrusion, forming and calendaring.

05 Hours

TEXT BOOKS:

1. **Tool Design**, C. Donaldson, G.H.Le Cain V.C. Goold, Tata McGraw Hill pub.1976.
2. **Metal cutting theory & cutting tool design**, V. Arshinow and G. Alfseev Mir pub. Mascow Edu 1976:

REFERENCE BOOKS:

1. **Introduction to jigs and fixture design**, M H A Kempster, Elbs, Edn. 1974.
2. **Tool engineering and design**, Nagpal Khanna pub.Edn. 1998.
3. **Fundamentals of tool design**, ASTM Prentice Hall India.2000
4. **Metal cutting and tool design**, DR,B,J, Ranga, Vikas Pub. Edn. 1993.
5. **Manufacturing technology (foundry forming and welding)** P.N. Rao, Tata McGraw Hill Pub, Edn.1996
6. **Die Casting Die Design**, Burton 2000
7. **Injection Moulding Design**, RGW Pye, john.1998
8. **Injection Moulding Handbook**, Dominick V. Rosato & Donald V. Rosato, 1996, CBS Publishers

Scheme of Examination:

1. Eight questions to be set selecting FOUR questions from each Part
2. Each question carries 20 marks.
3. Five questions to be solved selecting at least two question from each Part