

GOVT. POLYTECHNIC, NAYAGARH
4TH SEMESTER MECHANICAL ENGINEERING 2025-26
LESSON PLAN

Subject- Tool Engineering (Th-5b)

Total Periods: 45

Theory: 3P/Week

Name of Faculty: Santosh Kumar Patra, Lecturer Stage-I

Session: 22/12/2025 to 18/04/2026

Sl. No.	Week	Period	Topics To Be Covered
1	1st	1 st	Unit-I: Metal Cutting: Mechanics of Metal cutting; Requirements of tools.
		2 nd	Cutting forces; Types of chips (continuous, discontinuous, built-up edge).
		3 rd	Chip thickness ratio; Shear angle.
2	2nd	1 st	Simple numerical problems on Chip thickness ratio and Shear angle.
		2 nd	Types of metal cutting process: Orthogonal and Oblique cutting.
		3 rd	Form cutting; Cutting fluids: Types, characteristics and applications.
3	3rd	1 st	Tool wear: Types of wear (Crater wear, Flank wear).
		2 nd	Tool life; Tool life equations (Taylor's Tool Life Equation).
		3 rd	Unit-I Assessment / Numerical Practice (End of 10 Hours Module).
4	4th	1 st	Unit-II: Machinability & Tool Materials: Definition; Factors affecting machinability.
		2 nd	Machinability index; Tool materials: Types, characteristics, and applications.
		3 rd	Heat treatment of tool steels.
5	5th	1 st	Specification of carbide tips; Types of ceramic coatings.
		2 nd	Cutting Tool Geometry: Nomenclature of Single point cutting tool.
		3 rd	Geometry of Drills.
6	6th	1 st	Geometry of Reamers.
		2 nd	Geometry of Milling cutters.
		3 rd	Unit-II Assessment / Review (End of 10 Hours Module).
7	7th	1 st	Unit-III: Types of Dies: Construction of Simple Die and Compound Die.
		2 nd	Construction of Progressive Die and Combination Die.
		3 rd	Punch & Die mountings: Pilots, strippers, misfeed detectors.
8	8th	1 st	Pressure Pads and Knock outs.
		2 nd	Stock guide, Feed-Stop, guide bush, guide pins.
		3 rd	Unit-III Review (End of 8 Hours Module).
9	9th	1 st	Unit-IV: Die Design Fundamentals: Die Operations: Blanking, piercing, shearing, cropping.
		2 nd	Die Operations: Notching, lancing, coining, embossing, stamping.
		3 rd	Die Operations: Curling, drawing, bending, forming.
10	10th	1 st	Die set; Die shoe; Die area.
		2 nd	Calculations of clearances on dies and punch for blanking and piercing dies.
		3 rd	Strip layout: Concepts and importance.

Sl. No.	Week	Period	Topics To Be Covered
11	11th	1 st	Calculation of material utilization factor.
		2 nd	Numerical problems on Clearance and Material Utilization.
		3 rd	Unit-IV Assessment / Design Problems (End of 10 Hours Module).
Sl. No.	Week	Period	Topics To Be Covered
12	12th	1 st	Unit-V: Forming Dies: Bending methods; Bending Dies.
		2 nd	Bend allowance; Spring back; Spanking.
		3 rd	Bending pressure; Pressure pads; Development of blank length.
Sl. No.	Week	Period	Topics To Be Covered
13	13th	1 st	Drawing: Operations; Metal flow during drawing.
		2 nd	Calculation of Drawing blank size; Variables affecting metal flow during drawing.
		3 rd	Single action and double action dies; Combination dies.
Sl. No.	Week	Period	Topics To Be Covered
14	14th	1 st	Fundamentals of other Tools: Pressure Die casting dies; Metal extrusion dies.
		2 nd	Injection molding dies; Forging dies; Plastic extrusion dies.
		3 rd	Unit-V Review (End of 7 Hours Module).
Sl. No.	Week	Period	Topics To Be Covered
15	15th	1 st	Revision: Units 1 & 2 (Metal Cutting & Tool Geometry).
		2 nd	Revision: Units 3, 4 & 5 (Dies & Die Design).
		3 rd	Final Semester Examination Discussion / Doubt Clearing.

REFERENCES:

1. Tool Design - Donaldson Anglin, Tata McGraw Hill.
2. Production Technology - H.M.T. Jain, Tata McGraw Hill.
3. A Text Book of Production Engineering - P.C. Sharma, S. Chand & Co.
4. Production Technology - R.K. Jain, Khanna Publishers.



SANTOSH KUMAR PATRA
(LECTURER STAGE I)