

B. E. MECHANICAL ENGINEERING Choice Based Credit System (CBCS) and Outcome Based Education (OBE) SEMESTER - III			
METAL CUTTING AND FORMING			
Course Code	18ME35A/45A	CIE Marks	40
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	60
Credits	03	Exam Hours	03
Course Learning Objectives: <ul style="list-style-type: none"> To enrich the knowledge pertaining to relative motion and mechanics required for various machine tools. To introduce students to different machine tools to produce components having different shapes and sizes. To develop the knowledge on mechanics of machining process and effect of various parameters on machining. To acquaint with the basic knowledge on fundamentals of metal forming processes To study various metal forming processes. 			
Module-1			
Introduction to Metal cutting: Orthogonal and oblique cutting. Classification of cutting tools: single, and multipoint; tool signature for single point cutting tool. Mechanics of orthogonal cutting; chip formation, shear angle and its significance, Merchant circle diagram. Numerical problems. Cutting tool materials and applications.			
Introduction to basic metal cutting machine tools: Lathe- Parts of lathe machine, accessories of lathe machine, and various operations carried out on lathe. Kinematics of lathe. Turret and Capstan lathe.			
Module-2			
Milling: Various Milling operations, classification of milling machines, Vertical & Horizontal milling, up milling & down milling. Indexing: need of indexing, simple, compound & differential indexing. Drilling: Difference between drilling, boring & reaming, types of drilling machines. Boring operations & boring machines. Shaping, Planing and Slotting machines- machining operations and operating parameters. Grinding: Grinding operation, classification of grinding processes: cylindrical, surface & centerless grinding.			
Module-3			
Introduction to tool wear, tool wear mechanisms, tool life equations, effect of process parameters on tool life, machinability. Cutting fluid-types and applications, surface finish, effect of machining parameters on surface finish. Economics of machining process, choice of cutting speed and feed, tool life for minimum cost and production time. Numerical problems.			
Module-4			
MECHANICAL WORKING OF METALS			
Introduction to metal forming processes & classification of metal forming processes. Hot working & cold working of metals. Forging: Smith forging, drop forging & press forging. Forging Equipment, Defects in forging. Rolling: Rolling process, Angle of bite, Types of rolling mills, Variables of rolling process, Rolling defects. Drawing & Extrusion: Drawing of wires, rods & pipes, Variables of drawing process. Difference between drawing & extrusion. Various types of extrusion processes.			
Module-5			
Sheet Metal Operations: Blanking, piercing, punching, drawing, draw ratio, drawing force, variables in drawing, Trimming, and Shearing. Bending — types of bending dies, Bending force calculation, Embossing and coining. Types of dies: Progressive, compound and combination dies.			

Course Outcomes: At the end of the course, the student will be able to:

CO1: Explain the construction & specification of various machine tools.

CO2: Discuss different cutting tool materials, tool nomenclature & surface finish.

CO3: Apply mechanics of machining process to evaluate machining time.

CO4: Analyze tool wear mechanisms and equations to enhance tool life and minimize machining cost.


CO5: Understand the concepts of different metal forming processes.

CO6: Apply the concepts of design of sheet metal dies to design different dies for simple sheet metal components.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub- questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbook/s				
1	Manufacturing Technology Vol I & II	P.N.Rao	Tata McGraw Hill Pub. Co. Ltd., New Delhi	1998
2	A textbook of Production Technology Vol I and II	Sharma, P.C.,	S. Chand & Company Ltd., New Delhi	1996
3	Manufacturing Science	Amithab Gosh &A.K.Malik	East-West press	2001
Reference Books				
3	Workshop Technology Vol. I and II	Chapman W. A. J.	Arnold Publisher New Delhi	1998
4	Elements of Manufacturing Technology Vol II,	Hajra Choudhary, S. K. and Hajra Choudhary, A. K.	Media Publishers, Bombay	1988
5	Metal Forming Handbook	Schuler	Springer Verlag Publication	
6	Metal Forming: Mechanics and Metallurgy	Hosford,WF and Caddell,R.M	Prentice Hall	1993
7	Manufacturing Engineering and Technology	Kalpakjian	Addision Wesley CongmenPvt. Ltd.	2000
8	Production Technology	HMT		


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