

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. SEMESTER : VI

MANUFACTURING ENGINEERING

Subject Name: METAL FORMING PROCESSES

Subject Code:163402

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam(E)	Mid Sem Exam(Theory) (M)	Practical (Internal)
3	0	2	5	70	30	50

Sr No	Course Contents
1	STRESS TENSOR AND YIELD CRITERIA State of stress – Components of stress – Symmetry of stress tensor – Principal stresses – Stress deviator – Von Mises – Tresca yield criteria – Comparison of yield criteria – Octahedral shear stress and shear strain – Forming load calculations.
2	FUNDAMENTALS OF METAL FORMING Classification of forming processes – Mechanics of metal working – Flow stress determination – Effect of temperature – Strain rate and metallurgical structure on metal working – Friction and lubrication – Deformation zone geometry – Workability – Residual stresses.
3	FORGING AND ROLLING Forging – Types of presses and hammers – Classification – Open die forging and closed die forging – Die design – Forging in plane strain – Calculation of forging loads – Forging defects – Causes and remedies – Residual stresses in forging – Rolling: Classification of rolling processes – Types of rolling mills – Hot and cold rolling – Rolling of bars and shapes – Forces and geometrical relationship in rolling – Analysis of rolling load – Torque and power – Rolling mill control – Rolling defects – Causes and remedies.
4	EXTRUSION AND DRAWING Direct and indirect extrusion – Variables affecting extrusion – Deformation pattern – Equipments – Port-hole extrusion die – Hydrostatic extrusion – Defects and remedies – Simple analysis of extrusion – Tube extrusion and production of seamless pipe and tube – Drawing of rods, wires and tubes.
5	SHEET METAL FORMING AND OTHER PROCESSES Forming methods: Shearing, blanking, bending, stretch forming and deep drawing – Types of dies used in press working – Defects in formed part – Sheet metal formability – Formability limit diagram – High velocity forming: Comparison with conventional forming – Explosive forming – Electro hydraulic – Electromagnetic forming – Dynapak and petro-forge forming.

TEXT BOOKS

1. Dieter.G.E., “Mechanical Metallurgy”, SI Edition, McGraw-Hill Co., 1995.
2. Nagpal. G.R., “Metal Forming Processes”, Khanna Publications, 2000.

REFERENCES

1. Kurt Lange “Handbook of Metal Forming”. Society of Manufacturing Engineers, Michigan,
2. Avitzur, “Metal Forming - Processes and Analysis”, Tata McGraw-Hill Co., 1977.
3. ASM Metals Handbook, Vol.14, “Forming and Forging”, Metals Park, Ohio, 1990.
4. Taylor Altan, Soo I.K. Oh, Gegel, H.L., “Metal Forming: Fundamentals and Applications”, ASM. Metals Park. Ohio, 1983.