

GUJARAT TECHNOLOGICAL UNIVERSITY

Diploma in Metallurgy Engineering

Semester: 3

Subject Code

Subject Name METAL FORMING AND POWDER METALLURGY

Sr. No.	Course content
1.	INTRODUCTION TO METAL FABRICATION PROCESS : 1.1 Importance of metal fabrication processes. 1.2 Classification of metal fabrication processes. 1.3 Differentiate between Hot and cold working. 1.4 List the properties required during metal working operations like ductility, forgability, formability, recovery and recrystallization, slip and twinning etc. 1.5 Safety precautions during metal forming processes.
2.	ROLLING : 2.1 Understand the rolling as a metal working process. 2.2 Define billets, blooms, slab, flats etc. 2.3 Theory of Rolling (metallurgical Fundamental) like absolute draft angle of bite, critical plane etc. 2.4 Classification of Rolling Mills. 2.5 List the main parts of rolling mills with function. 2.6 List the various product obtained by Rolling. 2.7 Understand the Rolling variables. 2.8 Tube M/f by Rolling. 2.9 Defect & Remedies during rolling process.
3.	FORGING : 3.1 Understand the forging as a metal working process. 3.2 Classify the forging process. 3.3 List the product obtained by forging process. 3.4 Machinery, equipment used for forging process. 3.5 Composition, Properties of dies & die blocks. 3.6 Understand Metallurgical fundamental of forging. 3.7 Compare forging with casting. 3.8 Defect & remedies during forging product.
4.	EXTRUSION : 4.1 Explain extrusion as a metal working process. 4.2 Classification of extrusion processes. 4.3 Describe equipment used in different types of extrusion. 4.4 Explain the procedure for producing article by extrusion like tubes, Rods etc.

	4.5 Metallurgical aspect of extrusion. 4.6 Discuss the variables of extrusion. 4.7 Defect & remedies during extrusion process.
5.	DRAWING : 5.1 Explain Drawing as a important metal forming operation. 5.2 Explain Principle of rod & wire drawing. 5.3 Explain Principle of Tube drawing. 5.4 Explain Rod & wire drawing equipment. 5.5 Discuss the importance of patenting of wire. 5.6 Defect & remedies during wire drawing process. 5.7 Compare the production of tube by Rolling, extrusion & drawing
6.	COLD WORKING AND SHEET METAL WORKING : 6.1 List the cold working operations especially sheet Metal working. 6.2 List the products obtained by cold working. 6.3 Briefly explain the various cold working operation on sheet metal (spinning, coining, embossing, cupping etc.) 6.4 Metallurgical aspect of cold working.
7.	INTRODUCTION TO POWDER METALLURGY : TRS-7,8,9 7.1 Importance of powder metallurgy. 7.2 Define powder metallurgy. 7.3 Understand powder metallurgy as a comparative process of fabrication.
8.	PRODUCTION OF METAL POWDER AND ITS CHARACTERISTIC : 8.1 Know various methods of production of Metal powder. 8.2 Explain the principle and steps involved in pulverization. 8.3 Understand the atomization as a process of powder making. 8.4 List the characteristics of powder. 8.5 Understand the electrolytic as a process of powder making.
9.	STEPS FOR MANUFACTURING COMPONENT BY POWDER METALLURGY : 9.1 List the steps for manufacturing component by P/M. 9.2 Explain following for mixing, Briquetting, pressing and sintering like Machinery, equipment, Importance, variables etc. 9.3 Explain importance of binder & lubricants in mixing. 9.4 List the defect in powder metallurgy products.
10.	APPLICATIONS AND LIMITATION OF POWDER METALLURGY : 10.1 Advantage & limitation of powder metallurgy. 10.2 List the product of powder metallurgy. 10.3 Application of powder metallurgy product in various areas.

LABORATORY EXPERIMENTS:

1. To study the different types of Rolling Mills & Rolling Mill design & parts of a Rolling Mill.
2. To study production of different articles which are usually made by rolling
3. To study various forging methods & forging equipment.
4. To manufacture at least two articles by forging.
5. To study types of Extrusion and production of articles by extrusion.
6. To study production of Rods, wire and Tubes by extrusion.
7. To study cold working of sheet metals.
8. To study important properties metal powders.
9. To study production of at least two articles by powder metallurgy methods.
10. Industrial visit

Reference Books:

1. Powder metallurgy by A.K.Sinha
2. Principles of Powder metallurgy by W.D.Jhones
3. Engg. Metallurgy Vol. I & II by R.A.Higging
4. Mechanical Metallurgy by Dieter