



# P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Sixth Semester, B.E. - Industrial and Production Engineering

Semester End Examination; July / Aug. - 2022

## Theory of Metal Forming

Time: 3 hrs

Max. Marks: 100

### Course Outcomes

The Students will be able to:

CO1: Explain the theory behind the forming of the metal.

CO2: Demonstrate the concept of forging of metals, forces and defects involved in rolling of metals.

CO3: Recognize the basic knowledge of extrusion and drawing metals and the defects.

CO4: Demonstrate the basic concept of sheet metal forming processes and methods involved in forming process.

CO5: Identify the basic methods of high energy forming process. Powder Metallurgy and its applications.

**Note:** I) PART - A is compulsory. Two marks for each question.

II) PART - B: Answer any **Two** sub questions (from a, b, c) for a Maximum of **18 marks** from each unit.

Q. No.	Questions	Marks	BLs	COs	POs
<b>I : PART - A</b>		<b>10</b>			
I a.	Write the stress-strain curve (Ideal behavior) for ductile and brittle materials.	2	L1	CO1	PO1
b.	Define forging.	2	L1	CO2	PO1
c.	Draw a sketch of three roll mill or three high mills.	2	L1	CO3	PO1
d.	Mention the applications of sheet metal forming process.	2	L1	CO4	PO1
e.	Mention important benefits of powder metallurgy techniques.	2	L1	CO5	PO1
<b>II : PART - B</b>		<b>90</b>			
<b>UNIT - I</b>		<b>18</b>			
1 a.	Explain with neat sketch of direct compressive stress and indirect compressive stress.	9	L2	CO1	PO1
b.	Explain difference between cast product and wrought product.	9	L2	CO1	PO1
c.	Explain the following variables affecting the metal forming process:				
	i) Temperature	9	L2	CO1	PO1
	ii) Strain rate				
<b>UNIT - II</b>		<b>18</b>			
2 a.	Explain the process steam hammer forging equipment with neat sketch.	9	L2	CO2	PO1
b.	Explain with neat sketch Gravity drop hammer process	9	L2	CO2	PO1
c.	Explain the following rolling process:				
	i) Planetary Rolling Mill	9	L2	CO2	PO1
	ii) Cluster Mill				

**UNIT - III****18**

- 3 a. Explain how the working temperature and extrusion ratio (ER) affects the extrusion process 9 L2 CO3 PO1
- b. Explain with neat sketch the following process:
- i) Tube sinking 9 L2 CO3 PO1
- ii) Floating plug drawing
- c. Explain with neat sketch of tube extrusion process. 9 L2 CO3 PO1

**UNIT - IV****18**

- 4 a. Explain the different types of sheet metal process and also explain any two operations performed in press metal working process. 9 L2 CO4 PO1
- b. Explain with neat sketch triple action press process. 9 L2 CO4 PO1
- c. Explain in detail the different types of clearance on shearing process 9 L2 CO4 PO1

**UNIT - V****18**

- 5 a. Explain the detailed steps followed in powder metallurgy technique and list the disadvantage of powder metallurgy. 9 L2 CO5 PO1
- b. Explain with neat sketch electromagnetic forming process. 9 L2 CO5 PO1
- c. Give the brief description on production of metal powder in powder metallurgy. 9 L1 CO5 PO1

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