



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; August - 2023

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 Maximum of 18 marks from each unit.

Q. No.	Questions	Marks	BLs	COs	POs
I : PART - A		10			
1 a.	Define Engineering stress and Engineering strain.	2	L1	CO1	PO1
b.	What is Recrystallization temperature?	2	L1	CO2	PO1
c.	How is extrusion process classified?	2	L1	CO3	PO1
d.	List different types of sheet metal.	2	L1	CO4	PO1
e.	What is HERF? What are the different HERF methods?	2	L1	CO5	PO1
II : PART - B		90			
UNIT - I		18			
2 a.	Discuss for Von Mises and Tresca's yield criterion.	9	L3	CO1	PO1
b.	Differentiate between hot working, cold working and warm working.	9	L4	CO1	PO1
c.	Show that;	9	L4	CO1	PO1
	$\sigma_{xa} = \frac{2}{\sqrt{3}} \sigma_0 \ln \frac{h_b}{h_a}$				
UNIT - II		18			
3 a.	Derive an expression for the maximum forging strain.	9	L2	CO2	PO1
b.	Discuss any two forging equipment's used.	9	L2	CO2	PO1
c.	Discuss all the geometric relationship in rolling.	9	L2	CO2	PO1
UNIT - III		18			
4 a.	Discuss with neat sketch direct extrusion process.	9	L2	CO3	PO1
b.	With neat sketch, describe production of seamless Pipe and tubing	9	L2	CO3	PO1
c.	Draw a neat sketch of a drawing die and show all the zones and other details.	9	L2	CO3	PO1

UNIT - IV**18**

- 5 a. Discuss the following with neat sketch:
- i) Stretch forming 12 L2 CO4 PO1
 - ii) Spinning
- b. With a neat sketch explain the terms:
- i) Blanking 12 L2 CO4 PO1
 - ii) Shearing
- c. Discuss the metal flow in drawing operation in a cup shaped object with a neat sketch the bending process and elimination of spring in bending. 6 L2 CO4 PO1

UNIT - V**18**

- 6a. Discuss the principle of high energy rate forming. 9 L2 CO5 PO1
- b. With neat sketch, explain explosive forming. 9 L2 CO5 PO1
- c. Discuss the benefits, disadvantages and applications of powder metallurgy. 9 L2 CO5 PO1

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