

Printed Pages : 3



ME-402

(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 140406**

Roll No.

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**B. Tech.**

(SEM. IV) THEORY EXAMINATION, 2014-15

**MANUFACTURING SCIENCE - I**

Time : 3 Hours]

[Total Marks : 100

**Note :** Attempt all questions. All questions carry equal marks.**1** Attempts any two parts of the following :  $2 \times 10 = 20$ 

- a. Derive a relationship to determine the forging force for forging of a disc with sticking friction condition.
- b. (i) What are the two important yielding criteria for ductile material, compare them and derive the basic governing equation of the yielding criterion.  
(ii) What is meant by cold working and hot working explain the difference between the two?
- c. A strip of lead with initial dimensions  $24 \times 24 \times 150$  mm is forged between two flat dies to a final size of  $6 \times 96 \times 150$  mm and if the coefficient of friction is 0.25. Determine the forging force. The average yield stress of lead in tension is  $7 \text{ N/mm}^2$ .

- 2 Attempts any two parts of the following :  $2 \times 10 = 20$
- Derive the expression for drawing stress for wire drawing through a conical die.
  - An Al rod of 6.5 mm diameter is drawn into wire of 5.6 mm diameter. Die angle is  $20.2^\circ$ . Find the drawing stress considering the friction to be .04 and nominal stress 35 MPa. Also calculate the max reduction that can be given to the material.
  - Write a note on rolling defects, their causes and remedies. Calculate the bite angle in deg when rolling 15 mm thick plate using rolls of 400 mm dia., final thickness of plate 12 mm.
- 3 Attempts any two parts of the following :  $2 \times 10 = 20$
- Draw a sketch of Die- punch assembly and explain it in brief. A hole of 100 mm diameter is to be punched in a metal sheet of 6 mm thickness. The ultimate shear stress of the metal is 400 MPa. Normal radial clearance is 10 % of sheet thickness and cutting, completes at 40 % penetration. Find Punch and Die diameters and punching force.
  - Describe the process of Air Bending and V-Bending. What is meant by "spring back" and "spring how is it compensated?
  - How does a compound die differ from a progressive die? Giving a neat sketch, describe constructional feature and working of a compound die.

- 4 Attempts any four parts of the following :  $4 \times 5 = 20$
- What are the different types of pattern and allowances in making the pattern? Explain in brief.
  - Calculate the ratio of solidification of two steel cylindrical riser of size 36 cm in dia by 72cm height and 72 cm in dia by 36 cm in height subjected to identical conditions of cooling.
  - Draw a properly labeled sketch of cupola and write a brief account of its operation.
  - Briefly describe solidification of casting and columns and dendritic grain formation.
  - State the advantage and disadvantage of Die casting
- 5 Attempts any four parts of the following :  $4 \times 5 = 20$
- Enlist unconventional metal forming process and briefly describe with neat sketch, working and applications of explosive forming.
  - Describe each step in powder metallurgy. Mention advantage and limitation of powder metallurgy.
  - Explain "Injection moulding" and "Blow moulding" methods of processing plastics.
  - What characteristics properties do polymers display? Explain the meaning of "monomer molecules". What is a copolymer?
  - Why are jigs and fixtures used? Differentiate between a jig and a fixture.