

20/12/2023

Time: 3 hour

Max Marks:80

Note: 1. Q1 is compulsory

2. Solve any three from remaining

20

Q1

Solve any Five out of six

- Differentiate hot and cold extrusion process
- Explain the effect of temperature in metal forming process.
- Explain Extrusion of pipes by cold working. With neat sketches.
- Explain defects in forging.
- Classification of forging process.
- Explain the concept of flow stresses.

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Q2

- Differentiate between open die and closed die forging Process.

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- Wire is drawn through a draw die with entrance angle 14 degree, starting diameter is 2.75mm and final diameter is 2.25mm. The coefficient of friction at work die interface is 0.08. The metal has strength coefficient $K = 215 \text{ MPa}$ and strain hardening exponent $n = 0.2$, Determine the draw stress and draw force in this operation

Q3

- A billet of 20mm diameter and 50mm length is to be extruded in a direct extrusion method it has extrusion ratio of $r_x = 4$, The W/P has flow curve defined $K = 415 \text{ MPa}$, $n = 0.18$, Determine the pressure applied to the end of the billet ($C = 75, 50, 25$) As the ram moves forward. Take $a = 0.8$ and $b = 1.5$ for Johnson equation
- List out advantageous and disadvantageous of extrusion process

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Q4

- A cylindrical work piece is subjected to cold upset forging operation. The starting piece is 100 mm in height and 60 mm in diameter. It is reduced in the operation to a height of 50 mm. The work material has a flow curve defined by $K_f = 1 + (0.4\mu D/h)$, where K_f = forging shape factor, $K = 350 \text{ MPa}$ and $n = 0.17$. Assume a coefficient of friction of 0.1. Determine the force as the process begins, at the intermediate height of 62 mm and at the final height of 36 mm.
- Explain the effect of temperature and strain rate on metal forming

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Q5

- In a single pass rolling operation, a 25 mm thick plate with plate width of 100 mm, is reduced to 22 mm. The roller radius is 350 mm and rotational speed is 11 rpm. The average flow stress for the plate material is 300 MPa. Calculate the power required for the rolling operation in kW.

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- Explain operation and principle of Forging Process.

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Q6

2x10=20

Answer any two

- a) Effect of cold working on Mechanical Properties of the material.
 - b) Differentiate direct and indirect extrusion process.
 - c) Explain with sketches of drawing process and list out components in drawing process
 - d) Explain Forged products mechanical properties with sketches
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