

III B.Tech II Semester Supplementary Examinations, April/May 2005
METAL FORMING
(Production Engineering)

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. Explain the terms:
 - (a) "True Stress" and "True Strain". How they differ from the concepts of Engg. Stress and Engg. Strain
 - (b) Discuss the relationships between
 - i. True stress and Engineering stress
 - ii. True strain and Engineering strain
2. (a) How a slip system can be indicated ? What is its significance ? Explain its role in BCC, FCC and HCP Crystals. Discuss with neat sketch.
(b) Differentiate between Slip and Twinning. How a slip phenomena is helpful in describing plastic deformation.
3. (a) Differentiate between Hot spinning and Cold spinning operations. What are its advantages and disadvantages?
(b) A steel washer is of 40 mm outer diameter and 20 mm inner hole diameter and is of 12 mm thick. If maximum shear stress is 400N/mm^2 and percentage penetration is 24 find:
 - i. Work done
 - ii. Shear to be ground on tool if maximum punch force is to be reduced to 0.05 MN.
4. (a) What is meant by "Throat Depth" of a press? A 200 KN Triple action Hydraulic press is used to punch Hexagonal blanks of 25 mm side having a shear of 2 mm and 50% penetration. Calculate the necessary blanking force?
(b) Differentiate between Structural components and Guiding components of a press? Discuss the tonnage capacity of Mechanical and Hydraulic presses?
5. (a) Derive an equation to calculate Extrusion Load.
(b) Discuss the common methods of extrusion processes with sketches.
6. (a) Classify different load estimation techniques in metal forming process. List out assumptions in slab analysis, slip line field theory and upper bound solutions.
(b) Derive an equation for axial stress at die exit needed to cause deformation during strip drawing of a wide sheet.
7. (a) Discuss the following elements in the design of a forging die. Why they are needed?

- i. Mismatch
 - ii. Draft angles
 - iii. Parting line
 - (b) List out various die block materials used in forging die design Mention its uses. Classify forging methods and processes.
8. (a) Differentiate between continuous rolling and controlled rolling. Give examples of each. Mention the methods of reducing roll separating force.
- (b) How the Rolling of I-Sections can be carried out using Mild Steel? Explain with a neat sketch?

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