B. Tech.

(SEM. IV) EXAMINATION, 2006-07

MANUFACTURING TECHNOLOGY - II

Time : 3 Hours] [Total Marks : 100

Notes :  (1) Answer all questions.
        (2) All questions carry equal marks.

1. Attempt any two of the following : 10×2=20

   (i) Describe the mechanisms of plastic deformation of a metal crystal. How does plastic deformation of polycrystalline material differ from it? Explain the difference between mechanical twins and annealing twins.

   (ii) What is (a) BAUSCHINGER Effect   (b) LUDER BAND?

   (iii) Why are forging considered stronger than castings?
2. Attempt any four parts of the following : 5x4=20

(i) What is the role of friction in the rolling process? Derive an expression for the limiting value of contact angle for unaided rolling.

(ii) What do you understand by Ragging of rolls? Why is ragging not resorted to in cold-rolling?

(iii) Name some common rolling defects. What causes (a) Centre, Split, and (b) Alligating.

(iv) Bring out the difference between open die and closed die forging. Also explain the following terms used in forging : (a) upsetting (b) Fullering and (c) Flash

(v) Derive the following expression for pressure distribution (for sliding friction) for forging of a rectangular block (size b x h x w)

\[
\frac{P}{\theta_0} = e^{\frac{2\mu}{h} \left( \frac{b}{2} - x \right)}
\]

where \( P \) is pressure at a distance ‘\( x \)’ from centre, \( \theta_0 \) is the yield strength and \( \mu \) is coefficient of friction.

(vi) What is the recommended forging temperature for mild steel? What is the effect, if forging is left off when the temperature of work piece is still high? Also indicate, if there is any harm, if forging is continued, when the work piece has become cold?
3. Answer any **two** of the following: \[10 \times 2 = 20\]

(i) What are the advantages and disadvantages of the extrusion process?

(ii) Calculate the force required to reduce a wire of 4 mm diameter to 3 mm diameter by wire-drawing process through a conical dia. Assume coefficient of friction to be 0.05 and no back tension. Yield strength of material is 400 n/mm\(^2\). semi dia angle is 15\(^\circ\). Suggest a suitable value for drawing speed.

(iii) (a) Describe the process of hydrostatic extrusion and

(b) Discuss how the value of dia-angle affects the process of extrusion. Under what circumstances, dead zone formation and shaving occur?

4. Answer any **two** of the following: \[10 \times 2 = 20\]

(i) What do you understand by HERF and HVF processes? How are they different than conventional processes? Describe one H.V.F process. What are its advantages and disadvantages?

(ii) Write short notes on:

(a) Spinning process

(b) Spring Back

(c) Nibbling machines and

(d) Deep drawings process.
(iii) Draw a neat sketch of a simple cutting die and punch arrangement as fitted in a press ready for punching holes in a sheet. Label all the parts. Explain briefly how the press capacity can be estimated. What is the effect of SHEAR provided on the punch?

5. Answer any two of the following:

(i) What are the requisites / characteristics desired in a good metal powder for use in powder – metallurgy?

(ii) List the different processes you know for manufacturing metal powders. Describe briefly any two methods explaining the steps involved.

(iii) Write short notes on:

(a) OSPREY Process

(b) HIP process

(c) Briquetting and

(d) Presintering.