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06ME73

Seventh Semester B.E. Degree Examination, Dec.09-Jan.10
Manufacturing Process - III

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each Part.***

PART - A

1 a. Explain the salient features of metal forming processes along with the advantages and limitations. **(10 Marks)**

b. Explain the concept of true stress and true strain. **(05 Marks)**

c. Write a note on determination of flow stress. **(05 Marks)**

2 a. Explain the effect of the following on metal working processes : i) Temperature ii) Friction and lubrication. **(10 Marks)**

b. Comment on i) Deformation zone geometry ii) Residual stresses in wrought products. **(10 Marks)**

3 a. A circular disc of diameter 120mm and height 64mm is forged between two flat dies to 36mm height. Find the die load at the end of compression using the slab method of analysis. The yield strength of the material is given by $\sigma = 15.00(0.01+ \varepsilon)^{0.41}$ kgf/mm^2, and the coefficient of friction is 0.05. Also find mean die pressure. **(08 Marks)**

b. Explain die design parameters in forging. **(06 Marks)**

c. What is the significance of slab analysis? Explain the steps involved in it. **(06 Marks)**

4 a. A 300mm wide aluminium alloy strip is hot rolled in thickness from 20 to 15mm. The rolls are 1m diameter and operate at 100 rpm. The rolling load is 2.36MN. Find the power required for this hot reduction. **(04 Marks)**

b. Calculate the rolling load if steel sheet is hot rolled 30% from a 40mm thick slab using a 900mm diameter roll. The slab is 760mm wide. Assume $\mu = 0.30$. The plane strain flow stress is 140 MPa at the entrance and 200MPa at the exit from the roll gap due to increasing velocity. Also find the rolling torque. **(10 Marks)**

c. Explain the following : i) Planetary rolling mill ii) Defects in rolling. **(06 Marks)**

PART - B

5 a. Derive an expression for drawing **(07 Marks)**

b. Write a note on 'Estimation of redundant work'. **(03 Marks)**

c. Briefly explain, optimal cone angle and dead zone formation in drawing. **(04 Marks)**

d. Find the drawing stress to produce 20% reduction in a 10mm diameter steel wire. The flow stress is given by $\sigma_0 = 1300\ \varepsilon^{0.30}$ MPa. The die angle is 12^0 and $\mu = 0.09$. **(06 Marks)**

6 a. Give the classification of extrusion processes and explain hydrostatic extrusion process with a neat sketch. **(08 Marks)**

b. Explain the following : i) Defects in extrusion ii) Lubrication in extrusion. **(12 Marks)**

7 a. Give the classification of dies in sheet metal forming and explain 'combination dies' with neat sketch. **(07 Marks)**

b. Explain with neat sketches the following : i) Rubber forming ii) Stretch forming. **(08 Marks)**

c. Write a note on forming limit criteria. **(05 Marks)**

8 a. Discuss the principle of 'High Energy Rate Forming' methods and with a sketch, explain explosive forming. **(10 Marks)**

b. With a flow chart, explain in detail the powder metallurgy process. **(10 Marks)**

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