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06ME73

Seventh Semester B.E. Degree Examination, June/July 2013
Manufacturing Process – III

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. How are the metal working processes classified? **(05 Marks)**

b. Give the advantages and disadvantages of metal working process. **(05 Marks)**

c. Explain Tresca and Von-Mises yield criteria. **(06 Marks)**

d. Explain the concept of flow stress. **(04 Marks)**

2 a. Explain the effects of strain rate and temperature on metal working process. **(10 Marks)**

b. Explain with neat sketches, of deformation zone geometry in metal working process. **(06 Marks)**

c. Write a note on workability of materials. **(04 Marks)**

3 a. Derive an expression for average forging load using slab analysis. **(08 Marks)**

b. 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 $\sigma = 15\ (0.01 + \varepsilon)^{0.41} N/mm^2$, and the coefficient of friction is 0.05. Also find the average die pressure. **(08 Marks)**

c. Explain any four forging defects. **(04 Marks)**

4 a. Explain with neat sketches:
i) Four-high; ii) Cluster; iii) Tandom and iv) Planetary rolling mills. **(10 Marks)**

b. Explain the concept of friction hill and roll pressure distribution during rolling. **(05 Marks)**

c. Calculate the rolling load if a 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 entrance and 200MPa at the exit from the roll gap due to the increasing velocity. **(05 Marks)**

PART – B

5 a. With a neat sketch, explain tube drawing process. **(06 Marks)**

b. What do you mean by redundant work in drawing process? Explain. **(06 Marks)**

c. Derive an expression for drawing load. **(08 Marks)**

6 a. Explain with neat sketches Direct and Indirect extrusion processes. **(08 Marks)**

b. Explain any five extrusion defects. **(05 Marks)**

c. An aluminum alloy is hot extruded at 400°C at 50 mm/s from 150mm diameter to 50mm diameter. The flow stress at this temperature is given by $\bar{\sigma} = 200(\varepsilon)^{0.15} MPa$. If the billet is 380mm long and the extrusion is done through conical die with a semi die angle of 60°. Determine the force required for the operation. **(07 Marks)**

7 a. Explain with a neat sketch deep drawing process. **(05 Marks)**
b. Explain stretch forming. **(04 Marks)**
c. Define drawability and explain the factors affecting the drawability. **(06 Marks)**
d. Briefly explain progressive and compound dies. **(05 Marks)**

8 a. With a neat sketch, explain the principle and applications of
i) Explosive forming; ii) Electromagnetic forming. **(10 Marks)**
b. With a line diagram, explain the basic steps in powder metallurgy process. **(10 Marks)**

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