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10ME55

Fifth Semester B.E. Degree Examination, December 2012
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. With neat sketches, explain the classification of metal working processes on the basis of force applied. **(10 Marks)**

b. Derive an expression for true stress and true strain. **(05 Marks)**

c. An aluminum alloy having σ_0 (uniaxial flow stress) as 500 MPa is subjected to three principal stresses, σ_x (Tensile) 200 MPa, $\sigma_y = 100$ MPa (Tensile), σ_z = 50 MPa (compressive) and shear stress = 50 MPa, will the material exhibit yielding. If not, what is the safety factor? **(05 Marks)**

2 a. Discuss the effect of various parameters on metal working process. **(10 Marks)**

b. Explain deformation zone geometry. **(05 Marks)**

c. Determine engineering strain, true strain and reduction,
i) For a bar which is doubled in length.
ii) For a bar which is halved in length. **(05 Marks)**

3 a. Derive an expression for forging pressure and load in open die forging by slab analysis in sliding friction at the interface and draw friction hill. **(10 Marks)**

b. A circular disc of lead of radius 150 mm and thickness 50 mm is forged to half its original thickness by open die forging. Determine the maximum forging force if the coefficient of friction between job and the die is 0.25. The average yield stress is 4 N/mm^2. **(05 Marks)**

c. Explain briefly the forging defects. **(05 Marks)**

4 a. With a neat sketch, explain different types of rolling mill arrangements. **(10 Marks)**

b. Calculate rolling load if steel sheet is not rolled 30% from a 40 mm thick slab using (900 mm) diameter roll. The slab is 760 mm wide. Assuming μ = 0.3, the plain strain flow stress is 140 MPa at entrance and 200 MPa at the exit during rolling and 200 MPa at the exit during rolling and power required for hot reduction. Take N = 100 rpm and λ = 0.5 for hot rolling. **(10 Marks)**

PART – B

5 a. Write a note on estimation of redundant work in drawing. **(07 Marks)**

b. Explain with a neat sketch, tube drawing process. **(07 Marks)**

c. Explain optimal cone angle and dead zone formation in drawing. **(06 Marks)**

6 a. With a neat sketch, explain backward extrusion process. Why power involved in backward extrusion is much lesser than direct extrusion. **(06 Marks)**

b. With a neat sketch explain impact extrusion process. **(06 Marks)**

c. List out defects in extrusion and explain any one. **(08 Marks)**

7 a. Explain the following operations with neat sketches: i) Rubber forming ii) Stretch forming. **(10 Marks)**

b. With neat sketches, explain the following dies:
i) Progressive dies ii) Combination dies. **(10 Marks)**

8 a. With a flow chart explain the operations involved in making powder metallurgy parts. **(08 Marks)**

b. Explain with a neat figure unconfined explosive forming process. **(06 Marks)**

c. Explain with a neat figure electromagnetic forming process. **(06 Marks)**

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