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06ME73

Seventh Semester B.E. Degree Examination, Dec.2013/Jan.2014
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. Explain Tresca yield criterion and Von Mises yield criterion with relevant to mathematical expression in terms of principal stresses. **(08 Marks)**

b. Derive the relationship between true stress, true strain, engineering stress and engineering strain. **(06 Marks)**

c. Explain the advantages of wrought product over cast and machined products. **(06 Marks)**

2 a. Explain briefly the variables which influence the metal working processes. **(10 Marks)**

b. What is hydrostatic stress? Explain how it influences the metal deformation. **(05 Marks)**

c. Explain residual stresses in wrought products. **(05 Marks)**

3 a. Derive the expression $p_{max} = \sigma_0' e^{\frac{2\mu a}{h}}$ for calculating maximum forging pressure for plane strain condition with usual notations. What assumptions are made in deriving the above formula? **(10 Marks)**

b. List the forging defects. How they can be minimized? **(05 Marks)**

c. Enumerate the advantages of press forging over drop forging. **(05 Marks)**

4 a. Explain the role played by friction during rolling of strip from entry side to exit side of the die. **(08 Marks)**

b. What is roll camber? Explain clearly with sketches. **(06 Marks)**

c. A 300 mm wide aluminium alloy strip is hot-rolled in thickness from 20 mm to 15 mm. The rolls are 1 m in diameter and operate at 100 rpm. The uniaxial flow stress for the aluminium alloy can be express as $\sigma = 140\ \varepsilon^{0.2}$ MPa. Determine the rolling load and the power required for this hot reduction. **(06 Marks)**

PART – B

5 a. Derive an expression for wire drawing stress, assuming plane strain condition using slab method. **(10 Marks)**

b. Explain the factors which govern the metal flow during drawing operation. **(05 Marks)**

c. Explain tube sinking process with merits and demerits. **(05 Marks)**

6 a. Explain with sketches, how seamless pipes and tubes can be produced by extrusion. **(08 Marks)**

b. Explain with sketch impact extrusion. What are its applications? **(06 Marks)**

c. Write the significance of extrusion dies. **(06 Marks)**

7 a. What are the differences between a compound die and progressive die. Explain with sketches. **(10 Marks)**

b. A cup 80 mm diameter and 70 mm deep is to be drawn from steel sheet of deep drawing quality 0.8 mm thick. The yield stress of the steel is 320 MPa. Determine blank diameter, punch diameter for first draw and drawing force required. Given mean draw ratio k = 1.82. **(06 Marks)**

c. Explain open back inclined press. **(04 Marks)**

8 a. Explain electromagnetic forming with a neat sketch. What are its applications? **(08 Marks)**

b. What is atomization? Explain the process of metal power production. **(06 Marks)**

c. Explain the effect of sintering temperature and time during sintering operation of stainless steel component. **(06 Marks)**

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