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10ME55/10ME557

**Fifth Semester B.E. Degree Examination, July/August 2021**  
**Manufacturing Process – III**

Time: 3 hrs.

Max. Marks:100

*Note: Answer any FIVE full questions.*

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 aluminium alloy having  $\sigma_0$  (uniaxial flow stress) as 500MPa is subjected to three principal stresses.  $\sigma_x$  as 200 MPa (Tensile),  $\sigma_y = 100$ MPa (Tensile),  $\sigma_z = 50$ MPa (Compressive) and shear stress = 50MPa, will the material exhibit yielding? If not, what is the safety factor? (05 Marks)
2. a. Discuss 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 for  
 i) a bar which is doubled in length  
 ii) 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 150mm and thickness 50mm 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  $4\text{N/mm}^2$ . (05 Marks)  
 c. Explain briefly the forging defects. (05 Marks)
4. a. With neat sketch, explain different types of rolling mill arrangements. (10 Marks)  
 b. Calculate rolling load if steel sheet is hot rolled 30% from a 40mm thick slab using 900mm diameter roll. The slab is 760mm wide. Assume  $\mu = 0.3$ . The plain strain flow stress is 140MPa at entrance and 200MPa at the exit during rolling. (10 Marks)
5. a. Write a note on estimation of "Redundant work" in drawing. (07 Marks)  
 b. Explain with 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. Explain why power involved is much lesser than direct extrusion. (06 Marks)  
 b. With a neat sketch, explain tube drawing 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 unconfined explosive forming with a neat figure. (06 Marks)  
 c. Explain with a neat figure Electromagnetic forming. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.