



USN

10MA755

Seventh Semester B.E. Degree Examination, June/July 2019  
**Metal Forming Technology**

Time: 3 hrs.

Max. Marks:100

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

**PART - A**

- 1 a. Derive an expression for true stress and true strain. (05 Marks)  
b. Explain: i) Tresca's yield criterion; ii) Von-Mises yield criterion (10 Marks)  
c. An aluminium alloy having  $\sigma_0$  (uniaxial flow stress) as 500 MPa is subjected to three principal stress,  $\sigma_x$  (tensile) 200 MPa,  $\sigma_y$  100 MPa ( tensile)  $\sigma_z = 50$  MPa (compressive) and shear stress = 50 MPa. Will the material exhibit yielding. If not, what is the safety factor? (05 Marks)
- 2 a. With neat sketches, explain the classification of metal working processes on the basis of force applied. (10 Marks)  
b. Explain the effect of the following on working process: (i) Friction and lubrication (ii) Strain Rate. (10 Marks)
- 3 a. Discuss the following in forging process:  
i) Friction hill ii) Forging defects iii) Material flow lines (08 Marks)  
b. An aluminium billet 25 mm  $\phi$  50 mm high is compressed between flat parallel dies to a height of 25 mm. The average yield stress is 6 N/mm<sup>2</sup>. Find the frictionless work done. Also determine the maximum pressure exerted if the coefficient of sliding friction is 0.24. (07 Marks)  
c. Explain die design parameters in forging. (05 Marks)
- 4 a. Explain different types of rolling mills with neat sketches. (12 Marks)  
b. A 300mm wide Al alloy strip is not rolled from an initial thickness of 25mm to a final thickness of 15mm. The diameter of the rolls is 1m and speed of rotation is 120 rpm. The plane strain flow stress is 70 MPa at the entrance of rolls and 110 MPa at the unit. Find rolling load and the power required. Assume  $\mu = 0.25$  and  $\lambda = 0.5$ . (06 Marks)  
c. List the defects in rolled products. (02 Marks)

**PART - B**

- 5 a. Explain with sketch the wire drawing and rod drawing operation. (08 Marks)  
b. Determine the drawing stress to produce 20% reduction in a 10 mm stainless steel wire. The mean flow stress  $\bar{\sigma}$  is given as 637 MPa. The dia angle is 12° and the  $\mu$  is 0.09. Also determine the power required to draw when the wire is moving through the die at 3 m/sec. (06 Marks)  
c. Explain with sketch any two methods of tube drawing. (06 Marks)
- 6 a. Write a note on extrusion equipment die design and lubrication. (10 Marks)  
b. Explain the different extrusion variables. (10 Marks)
- 7 a. Write a note on die and punch material in sheet metal forming. (05 Marks)  
b. Explain the magnitude of spring back in sheet metal work. (05 Marks)  
c. Explain the various defects in deep drawing process. (05 Marks)  
d. With a neat sketch, explain the process of stretch forming. (05 Marks)
- 8 a. What is HERF and explain explosive forming with sketch. (10 Marks)  
b. Explain the following :  
i) Electro discharge forming ii) Electromagnetic forming. (10 Marks)

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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.