USN | | | | | | | | | | |

10ME55

Fifth 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. How the metal working processes are classified? Explain. **(06 Marks)**

b. Define re-crystallization. Distinguish hot working from cold working. **(06 Marks)**

c. Derive an expression for the following with respect to yield criteria for ductile material:
i) Von-Mises or distortion energy criteria
ii) Tresca or maximum shear stress criteria. **(08 Marks)**

2 Explain the following parameters which affects the metal working processes:
a. Temperature b. Strain rate effects
c. Hydrostatic pressure d. Deformation zone geometry **(20 Marks)**

3 a. Explain with sketch the procedural steps involved in forging operation. **(06 Marks)**

b. A solid cylindrical slug made of stainless steel is 150 mm diameter and 100 mm height. It is reduced in height by 50% at room temperature by open die forging with flat dies. Assume μ as 0.2 and flow stress as 1000 MPa, calculate forging force at the end of the stroke. **(06 Marks)**

c. Derive an expression for slab analysis to determine the mean pressure for closed die forging. **(08 Marks)**

4 a. Explain with sketch any three types of rolling mills. **(09 Marks)**

b. Derive an expression to determine the roll force and power required in rolling operation. **(06 Marks)**

c. Determine the maximum possible reduction for cold rolling a 300 mm slab when μ is 0.08 and the roll diameter is 600 mm. What is the maximum reduction on the same mill for hot rolling when μ is 0.5? **(05 Marks)**

PART – B

5 a. Explain with sketch the wire drawing and rod drawing operations. **(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 die angle is 12° and the μ is 0.09. Also determine the power required to draw when the wire is moving through the die at 3m/sec. **(06 Marks)**

c. Explain with sketch any two methods of tube drawing. **(06 Marks)**

6 a. Explain with sketch the direct extrusion and indirect extrusion processes. **(06 Marks)**

b. Explain with sketch the following extrusion processes:
i) Cold extrusion ii) Hydrostatic extrusion and iii) Impact extrusion **(09 Marks)**

c. Explain in detail the deformation, lubrication and defects in extrusion. **(05 Marks)**

7 a. Explain with sketch the progressive die and combination die in sheet metal forming. **(06 Marks)**

b. Explain with sketch the following operations in sheet metal forming:
i) Deep drawing ii) Stretch forming iii) Rubber press forming **(09 Marks)**

c. Mention defects in sheet metal formed parts. **(05 Marks)**

8 a. Explain with sketch the following high energy rate forming methods:
i) Explosive forming; ii) Electro hydraulic forming; iii) Electromagnetic forming. **(12 Marks)**

b. Explain different steps in powder metallurgy process. **(08 Marks)**

* * * * *