Fifth Semester B.E. Degree Examination, Aug./Sept.2020
Manufacturing Process - III

Time: 3 hrs.   Max. Marks:100

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

PART - A

1 a. How are metal forming processes classified? Explain with sketches. **(10 Marks)**
   b. Derive an expression to establish the relationship between :
      i) Conventional stress and True stress   ii) Conventional strain and True strain. **(05 Marks)**
   c. Differentiate Wrought product and Cast product. **(05 Marks)**

2 a. Explain the effect of the following on metal working process :
      i) Friction and Lubrication   ii) Temperature. **(10 Marks)**
   b. Explain with a neat sketch, the hydrostatic pressure in metal working. **(05 Marks)**
   c. Briefly explain how the residual stresses are formed in metal working processes. **(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. Briefly explain the defects that are seen in forged product. **(04 Marks)**
   c. A rectangular bar of length 200mm, width 100mm and thickness 40mm is compressed between two flat dies in plane strain condition such that the plane sections remain same and the dimension 200mm does not change. If the yield strength of the work material is $75N/mm^2$ and coefficient of friction M = 0.08, determine the minimum average and the maximum die pressure at the beginning of compression. **(06 Marks)**

4 a. Derive and expression for maximum possible reduction in rolling processes. **(04 Marks)**
   b. With a neat sketch, explain different types of rolling mill arrangement. **(10 Marks)**
   c. A strip is given 20% reduction in thickness by rolling operation. If its final thickness is 5mm and roll radius is 500mm, determine the position of the neutral plane. Take $\mu = 0.2$ and assume the plane strain condition for rolling. **(06 Marks)**

PART - B

5 a. Explain with a neat sketch, tube drawing process. **(06 Marks)**
   b. Derive an expression for drawing load by slab analysis. **(08 Marks)**
   c. Explain Optimal cone angle and dead zone formation in drawing. **(06 Marks)**

6 a. With neat sketches, explain briefly direct and indirect extrusion. **(06 Marks)**
   b. Explain the following : i) Defects in extrusion   ii) Lubrication in extrusion. **(10 Marks)**
   c. Explain any four variables influencing extrusion process. **(04 Marks)**

7 a. Draw neat sketches of Compound die and Progressive die. Briefly explain their principle of working. **(10 Marks)**
   b. Explain briefly the rubber forming process with respect to sheet metal forming. **(05 Marks)**
   c. Explain the term limiting draw ratio as applied to deep drawing. **(05 Marks)**

8 a. Explain the basic steps of powder metallurgy with the help of flow chart. **(08 Marks)**
   b. What are the various finishing operation carried out in powder metallurgical products after sintering? Explain each briefly. **(06 Marks)**
   c. Explain with neat sketch, the principle of working , advantages and applications of explosive forming. **(06 Marks)**

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