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## P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Fifth Semester, B.E. - Mechanical Engineering

Semester End Examination; Dec. - 2014

Manufacturing Process - III

**Time: 3 hrs**

**Max. Marks: 100**

*Note: i) Answer any FIVE full questions, selecting at least TWO full questions from each part.  
ii) Assume suitable missing data if any*

### PART - A

1. a. List the importance characteristics of wrought products. 5
- b. Compare Tresca and von Mises yield criteria. 5
- c. What is flow stress? Name the methods to determine the flow stress. Explain any one method. 10
2. a. Explain the effect of the following on metal working. Processes, 10
  - i) Temperature
  - ii) Friction.
- b. Comment on; 10
  - i) Deformation zone Geometry
  - ii) Residual stresses in wrought products.
3. a. A circular disc of diameter 120 mm and height 64 mm is forged between two flat dies to 36 mm height. Find the die load at the end of compression using the slab method of analysis. The yield strength of the material is given by  $\sigma = 15.00(0.01 + \epsilon)^{0.41}$  kgf/mm<sup>2</sup> and the coefficient of friction is 0.05. Also find the mean die pressure. 10
- b. Discuss the following in forging process: 10
  - i) Friction hill
  - ii) Material flow
  - iii) Forging defects.
4. a. Derive an expression for maximum possible reduction in rolling. 8
- b. Explain rolling process. Define the terms slab, bloom and billet applied to rolling. 6
- c. Explain Roll separating force. What are the factor influencing its reduction. 6

### PART - B

5. a. With simple sketch explain the following extrusion process, 10
  - i) Hydrostatic extrusion
  - ii) Tube extrusion.
- b. Explain the features of a simple extrusion die with an illustration. 5
- c. It is required to extrude a cylindrical aluminium billet of 50 mm diameter to 10 mm diameter. The length of the billet is 75mm and the average tensile yield stress for aluminium material is 170 N/mm<sup>2</sup>. Calculate the force required for extrusion. Assume  $\mu = 0.15$  and semi – die angle = 45°. 5

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| 6. a. | What is redundant work in drawing? How is it estimated?   | 7 |
|       | b. Explain the process variables that affect the drawing force in wire drawing process.   | 5 |
|       | c. With a neat sketch explain explosive forming process.  | 8 |
| 7. a. | Briefly explain the following with respect drawing process;   |   |
|       | i) Limiting process Ratio   | 6 |
|       | ii) Forming limit criterion.  |   |
|       | b. Explain spring back in bending with a simple sketch. Write the equation for spring back ratio.<br>What are the methods to overcome the effects of spring back? | 8 |
|       | c. Explain progressive die with a sketch.   | 6 |
| 8. a. | List the important characteristics of metal powders.  | 6 |
|       | b. Explain atomization and chemical reduction methods of powder production.   | 6 |
|       | c. What is Sintering? Explain its mechanisms. Write a note on post sintering operations.  | 8 |

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