



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

(An Autonomous Institution affiliated to VTU, Belagavi)

**Sixth Semester, B.E. – Industrial and Production Engineering**

**Semester End Examination; June - 2017**

### Theory of Metal Forming

*Time: 3 hrs*

*Max. Marks: 100*

*Note: Answer FIVE full questions, selecting ONE full question from each unit.*

#### UNIT - I

- |      |  |    |
|------|--|----|
| 1 a. | With neat sketches, explain the classification of primary forming processes on the basis of force applied. | 8  |
|      | b. Explain the effect of cold and hot working process in metal working process.                            | 6  |
|      | c. Mention the various factors that determine the worm working temperature.                                | 6  |
| 2 a. | Explain clearly mechanics of metal working (Slab-Method).  | 10 |
|      | b. Discuss the role of strain rate of friction in metal working processes.                                 | 6  |
|      | c. Write a note on friction and lubrication in metal working.  | 4  |

#### UNIT - II

- |      |  |    |
|------|--|----|
| 3 a. | With an illustration, explain different types of forging operations.   | 10 |
|      | b. With a neat sketch, explain clearly the various defects in forging. | 10 |
| 4 a. | With neat sketches, briefly explain the following rolling mill :       | 12 |
|      | i) Cluster mill    ii) Tandem mill    iii) Planetary mill.             |    |
|      | b. Explain forces and geometrical relationships in rolling.            | 8  |

#### UNIT - III

- |      |   |   |
|------|---|---|
| 5 a. | Differentiate between direct and indirect extrusion process.                          | 8 |
|      | b. Explain with neat sketches, how seamless tubes are produced by extrusion process?  | 8 |
|      | c. Explain the various defects in extrusion.  | 4 |
| 6 a. | Describe with neat sketches, wire and rod drawing arrangement.                        | 8 |
|      | b. Explain with a neat sketch, a conical drawing die used for wire drawing processes. | 6 |
|      | c. Write a note on defects in draw wires and rods.                                    | 6 |

#### UNIT - IV

- |      |   |    |
|------|---|----|
| 7 a. | Define spring back. Explain elimination of spring back.             | 8  |
|      | b. Explain the following with neat sketches :                       |    |
|      | i) Shearing    ii) Bending    iii) Spinning.                        | 12 |
| 8 a. | Explain with a neat sketch, progressive and compound die.           | 8  |
|      | b. Explain with a neat sketch, principle of deep drawing operation. | 8  |
|      | c. Define draw ability and limiting draw ratio.                     | 4  |

**UNIT - V**

- 9 a. Explain with neat sketches, the following high energy rate forming methods :
- i) Explosive forming 12
  - ii) Electro hydraulic forming
  - iii) Electromagnetic forming.
- b. Define HERF. List the advantages of HERF. 8
- 10a. Explain clearly the basic steps in powder metallurgy process. 8
- b. Explain clearly the characteristics of powder. 6
  - c. List the advantages and limitations of powder metallurgy. 6

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