M.Tech. 1st Semester (Mechanical Engg.) (Machine Design) Examination, December–2017

METAL FORMING ANALYSIS

Paper–M–807–A

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt any five questions.*

1. For the given state of stress, determine the principal stresses and their directions. Also check for the invariance. 20

$$\begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

2. Explain in detail the schematic implementation of FEM for the solution of plastic flow problems. 20

3. Describe three dimensions Mohr's circle of stresses and strains. Also describe the stress tensors and stress invariants. 20

4. (a) What is the flow curve ? Explain the use of flow curve in metal forming analysis. 10

   (b) What is yielding ? Explain the effect of work hardening and anisotropy in yielding. 10

5. What is forming defect ? What are the various critical effects of forming defects in products ? Give the remedies of these defects ? 20

6. Explain the following :
   (a) Stretch forming
   (b) Deep drawing. 20

7. (a) Discuss friction and various lubrications methods in hot and cold working processes. 10

   (b) Explain effect of temperature and strain rate in metal working. 10

8. Explain the following :
   (a) Stiffness matrices.
   (b) Material integration scheme
   (c) Extrusion processes. 20