CBCS SCHEME

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15ME653

Sixth Semester B.E. Degree Examination, June/July 2018
Metal Forming

Time: 3 hrs.

Max. Marks: 80

Note: *Answer any FIVE full questions, choosing one full question from each module.*

Module-1

1 a. How are metal forming processes classified? Explain with simple sketches. **(08 Marks)**
   b. Discuss the advantages, limitations and applications of hot forming processes. **(08 Marks)**

OR

2 a. Derive an expression for true strain in terms of engineering strain. **(08 Marks)**
   b. A tensile specimen having initial dimension of 12mm diameter and 50mm gauge length reaches a maximum load of 90kN and fractures at 70kN. The maximum diameter at fracture is 10mm. Find i) The engg. stress at maximum load and true fracture stress.
   ii) True strain and engg. strain at fracture. **(08 Marks)**

Module-2

3 a. Discuss the effects of strain rate and deformation zone geometry on metal forming, with neat sketches. **(08 Marks)**
   b. Explain Plastic deformation by slip and twining, with neat sketches. **(08 Marks)**

OR

4 a. Derive a relationship for the die pressure under compressive loading with sticking friction. Hence show the pressure distribution with sticking friction using a neat sketch in forging. **(08 Marks)**
   b. What is the forging load required to convert a cylindrical bloom of 1m diameter into a square section of the same area of cross section? The average tensile yield strength of the metal is 104MPa and coefficient of friction is 0.5. Assume plane strain condition for forging. **(08 Marks)**

Module-3

5 a. With neat sketches, explain the different types of rolling mill arrangements. **(08 Marks)**
   b. Discuss the maximum possible reduction in the rolling process, with a neat sketch. **(08 Marks)**

OR

6 a. With neat sketches, explain any two types of tube drawing process. **(08 Marks)**
   b. A steel wire is drawn from an initial diameter of 6mm to a final diameter of 5.2mm. The die angle is 18^0, coefficient of friction at the die – wire interface is 0.15. Yield strength of the material is $255N/m^2$. Calculate the drawing stress in the absence of back tension. **(08 Marks)**

Module-4

7 a. Explain Direct and Indirect extrusion, with neat sketches. **(08 Marks)**
   b. Discuss the defects in extrusion products. Explain the causes and possible remedies. **(08 Marks)**

OR

8 a. Explain the following sheet metal forming processes, with neat sketches :
      i) Roll bending   ii) Deep drawing.   (08 Marks)
   b. A circular blank of 30mm diameter is to be cut from a 2mm thick steel sheet. Determine the die and punch sizes. Estimate the punch force and stripping force needed. Shear strength of steel is 310 MPa.   (08 Marks)

Module-5

9 a. How are High Energy Rate Forming [HERF] processes classified? Explain any two methods, with suitable sketches.   (08 Marks)
   b. Discuss the advantages, limitations and applications of High Energy Rate Forming [HERF] methods.   (08 Marks)

OR

10 a. Explain the operations involved in making powder metallurgy parts with the help of a flow chart.   (08 Marks)
   b. Explain Hot Isostatic Pressing [HIP], with a neat sketch.   (08 Marks)

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