

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BACHELOR OF ENGINEERING – SEMESTER 7 – EXAMINATION – SUMMER 2026**

**Subject Code: 3171921**

**Date: 26/05/2026**

**Subject Name: Metal forming analysis**

**Time: 02:30 PM TO 05:00 PM**

**Total Marks: 70**

**Instructions:**

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**
- 4. Simple and non-programmable scientific calculators are allowed.**

- Q.1**
- (a) Differentiate open die forging and closed die forging **03**
  - (b) What is clearance in sheet metal work? Also state its importance **04**
  - (c) Explain Forming Limit Diagram with neat sketch also state its importance in forming process. **07**
- Q.2**
- (a) What is principle of forging process? Also state its applications. **03**
  - (b) Identify upset forging process with neat sketch. **04**
  - (c) Explain in detail Two-Dimensional Mohr's circle diagram for stress analysis. **07**
- OR**
- Q.2**
- (c) What do you know about Tresca yield criteria elaborate with necessary sketches **07**
- Q.3**
- (a) Determine the maximum permissible reduction for cold rolling a 300 mm thick slab when is  $\mu=0.08$  and roll diameter 600 mm. what is maximum reduction on same mill for hot rolling when  $\mu=0.5$ . **03**
  - (b) Discuss the different defects in extrusion processes. **04**
  - (c) Explain direct extrusion process along with advantages and disadvantages . **07**
- OR**
- Q.3**
- (a) Discuss material used in wire drawing die. **03**
  - (b) Explain the effect of (1) coefficient of friction (2) diameter of roll (3) backward and forward tension on rolling load. **04**
  - (c) Identify difference between Hydrostatic extrusion and impact extrusion also explain Hydrostatic extrusion with sketch. **07**
- Q.4**
- (a) What do you mean by Drawability? List factor Affecting to Drawability. **03**
  - (b) Elaborate the defects of extrusion process. **04**
  - (c) Using slab Method Derive the formula for Rolling Load with usual notations. **07**
- OR**
- Q.4**
- (a) Explain angle of bite and its importance in rolling process. **03**
  - (b) Differentiate direct and indirect extrusion process. **04**
  - (c) Analyze slip line and upper bound method for extrusion process. **07**
- Q.5**
- (a) Identify nesting in sheet metal process. **03**
  - (b) Find out difference between compound die and progressive die. **04**

(c) What is deep drawing process? Discuss various stress develop in it with neat sketch. **07**

OR

**Q.5** (a) Elaborate spring back effect in bending process. **03**

(b) Define (1) punching (2) Nibbling (3) Lancing (4) Notching for press work. **04**

(c) A circular blank of 30 mm diameter is to be cut from 2 mm thick 0.1C steel sheet. **07**  
Determine the die and punch size also estimate the punch force and stripping force needed. You may assume the following for steel: tensile strength 410 MPa, shear strength 310 MPa.

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