

**Total No of Questions: [06]**

**SEAT NO. :**

**[Total No. of Pages :1 ]**

**TE (2015 course): In semester Examination [August 2017]**

**Material Forming (2015)(311083)**

**(Semester - V)**

**Time: 60 minutes**

**Max. Marks : 30**

**Instructions to the candidates:**

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume Suitable data if necessary

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- Q1)** a) Explain and differentiate between **hot forming** and **cold forming** [4]  
b) A bar of 60 mm length is elongated to a length of 160 mm by forming process in three stages. The increases in length in three stages given below: [6]  
    **Stage1:** 60mm length is increased to 90mm.  
    **Stage2:** 90mm length is increased to 120mm.  
    **Stage3:** 120mm length is increased to 160mm.  
a) Calculate engineering strain and true strain for each stage. Also calculate overall engineering strain and overall true strain.  
b) Show that true strains are more convenient than that of engineering strain.
- OR**
- Q2)** a) Derive the equation for elastic work done (**W<sub>elastic</sub>**) and plastic work done (**W<sub>plastic</sub>**) [6]  
b) Explain any two direct compression forming processes. [4]
- Q3)** a) Explain the following forging operations with neat sketch [6]  
    i) Fullering, ii) edging and iii) blocking  
b) Explain double acting steam hammer with neat sketch [4]
- OR**
- Q4)** Derive an equation for maximum pressure (**p<sub>max</sub>**) and show that [10]  
$$p_{\max} = \sigma_0 e^{\frac{2\mu L}{h}}$$
  
Considering plane strain and sliding friction in open die. Where,  
    2L : length of work piece to be forged,  
    μ: Coefficient of friction at die and work piece interface,  
    h: thickness of work piece
- Q5)** a) Explain **wire drawing die** with neat sketch and state the materials of die [4]  
b) Calculate drawing stress and drawing load required to draw a rod of 5 mm diameter to 3.5 mm diameter. The die angle is 10° and the coefficients of friction at die and wire interface is 0.1. The flow stress of wire material is 340 N/mm<sup>2</sup>. Also calculate motor power required if the drawing speed is 2 m/s. [6]
- OR**
- Q6)** Tube of 11 mm external diameter and 1 mm thickness is reduced to 10 mm external diameter and 0.75 mm thickness. The die angle is 24° and plug angle is 20°. The coefficients of friction at die and tube interface and tube and plug (moving mandrel) interface is 0.1. The flow stress of tube material is 340 N/mm<sup>2</sup>. Calculate and compare drawing stress and drawing load if the tube drawing operation is carried out using [10]  
    i) Fixed plug ii) Floating plug, iii) Moving cylindrical mandrel.
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