

Please, Answer The Following Questions:-

Q1-a) Explain precisely all the methods to measure experimentally strain of sheet metal forming.

-b) The work done in deforming a perfectly plastic material, $\sigma_f = 500 \text{ MPa} = \text{constant}$ under the action of principal stresses $\sigma_1 = 5\sigma_2$, $\sigma_3 = 9\sigma_2$ is 0.5 J mm^{-3} . Determine the principal strains, ϵ_1 , ϵ_2 , ϵ_3 , and the representative strain. [25]

Q2-a) A flat sheet is clamped around a radius $r_o = 100 \text{ mm}$ has a center hole of radius $r_i = 30 \text{ mm}$ which is free of loading. The sheet is formed by frictionless punch of cone angle 30° . Determine the contact pressure, p_1 at r_i in terms of yield tension T .

-b) What are classifications of EXTRUSION processes? [25]

Q3-a) A steel, **2 mm** thickness and **80 mm** wide and of yield stress **300 MPa**, is formed into a circular tube by drawing is through a die. The friction work is equal in magnitude to the work of plastic deformation. Using the values of σ_g and λ_p found by interpolation in Table 4.1 determine the drawing force.

-b) Draw carefully sketch of **WIRE DRAWING DIES**. [25]

Q4-a) What are WIRE drawing equipment?

-b) A sheet of initial thickness t_0 is **2 mm** is bulged by fluid pressure so that at some instant the pressure p is **170 MPa**, the radius of curvature $\rho = 150 \text{ mm}$ and membrane strain at the pole ϵ is **0.173**. Determine the flow stress σ_f . [15]

Q5-a) What are different types of **ROLLING** processes?

-b) What are problems and defects in rolled products? [20]

GOOD LUCK

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