ANSHUL GOYAL

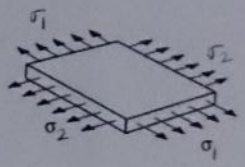
MEL 234 METAL FORMING AND MACHINING
Minor Test – 1 (II Sem, 2013-14)

Time : One hour

Max. Marks: 30

1. A tensile test was done on a 12mm diameter specimen with gauge length 50mm at a constant cross head velocity of 5 mm/min. Maximum load of 93.5 kN was recorded at 40% elongation. Determine a) equation for flow stress if the material obeys power law of strain hardening, b) ideal plastic work during uniform elongation and c) strain rate at the maximum load. d) If an identical specimen is tested up to 20% elongation, what is the load applied? (8)

2. When a rectangular plate of dimensions 150mm x 100mm x 2mm is subjected to biaxial stretching as shown in the figure, it has been found that the length and the width of the plate increased to 190mm and 115mm respectively. If the material's constitutive equation for plastic deformation is given by $\sigma_{eff} = 450\ \varepsilon_{eff}^{0.25}$ MPa, calculate the stresses applied on the plate and the final thickness of the plate. (7)



3. A 500mm long solid block of Al with rectangular cross section of dimensions 50mm x 40mm is compressed between two flat dies without any change in length at room temperature. If the height of this block has to be reduced by 40%, calculate the forging load and the coefficient of spread. Determine whether this forging is possible with a press of capacity 1000 tons taking a factor of safety of 2. Uniaxial flow stress of the material is 110 MPa. Assume coefficient of friction to be 0.25. (7)

4. Write whether the following statements are True or False and justify your answer. (8)

a) High temperatures and high strain rates are favorable for superplasticity in some Al alloys.
b) Von Mises and Tresca yield criteria predict different yield stresses when deformed under a state of pure shear.
c) The forging load increases with increase in flash width in impression die forging.
d) The pressure variation across the width in upsetting of a lead block at room temperature is exponential.