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Manufacturing processes I (bMetal Forming), 0906311
Mid Exam, Monday, 14 / 4 / 2014, 3 – 4 pm.

Q -1 (36 points) choose the right answer from the choices given for each problem.

1- If two specimens from the same material, the first with initial length L1 and initial Area A1 and the second with initial length 2 L1 and initial Area 2 A1 are tested in tension until fracture then.

a- The second will have two times the elongation percent of the first
b- The second will have two times the elongation of the first
c- Both will have the same reduction in area
d- The second will have two times the reduction in area percent of the first

2- Which of the following is true?

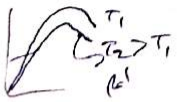
a- The Poisson's ratio has a value generally between 0.2 and 0.3 in both elastic and plastic ranges.
b- The Poisson's ratio has a value generally between 0.2 and 0.3 in the elastic range and does not exist in the plastic ranges.
c- The Poisson's ratio has a value generally between 0.5 in the plastic range and does not exist in the elastic ranges.
d- The Poisson's ratio has a value generally between 0.2 and 0.3 in elastic range and 0.5 in the plastic ranges.

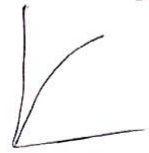
3- During metal forming:

a- Cold forming is used for primary processing at high strain rates
b- Cold forming is used for primary processing at low strain rates
c- Hot forming used for primary processing is used at low strain rates
d- Hot forming used for primary processing is used at high strain rates

4- Hydrostatic pressure is used for

a- Forming of brittle materials
b- Forming of hard materials
c- Forming of hydrostatic materials
d- Forming of soft and ductile materials

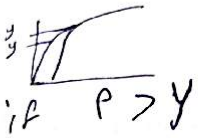




5- Toughness of metallic materials:

a- Increases with both ductility and strength
b- Increases with ductility but decreases with strength
c- Decreases with ductility but increases with strength
d- Decreases with both ductility and strength

6- If a material with original yield strength "Y" is surrounded by a fluid which exerts a hydrostatic pressure "P" then:



a- Its new yield strength will be "Y – P"
b- Its new yield strength will be "Y"
c- Its new yield strength will be "Y + P"
d- Its new yield strength will be "P-Y"

7- Uniform elongation exits in:

a- In the elastic range only
b- In plastic range only
c- In both elastic and plastic ranges
d- Between UTS and fracture

8- Strain rate sensitivity

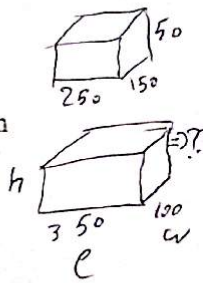
a- Increases with both temperature and strain rate
b- Decreases with both temperature and strain rate
c- Increases with temperature only
d- Increases with strain rate only

9- If a material has a mechanical behavior of:

$\sigma = 400 + 800\varepsilon$ MPa, then its engineering UTS is equal to:

a- 800 MPa
b- 485.2 MPa
c- 1200 MPa
d- 441.45 MPa

A metallic work piece is made of a material whose density and specific heat are 4 g cm^3 and 0.365 kJ/kg.°K and has a mechanical behavior of $\sigma = 500$ MPa with dimensions 250x150x50 mm. it is wanted to form it in cold working so that its final length and width will be 350 mm and 100 mm, respectively. If the material follows the maximum shear stress criterion then:



10- How many stages are needed

a- 1
b- 2
c- 3
d- 4

11- What would be the rise in temperature assuming redundant and frictional work are equal to 30% of ideal deformation?

a- 20.25 °K
b- 200.24 °K
c- 220.04 °K
d- 17.35 °K

12- What would be the length at the end of the first stage?

a- 350 mm
b- 679.57 mm
c- 500 mm
d- 375 mm

Q-2 (14 points)

Define the following:

- Effective strain
- Strain hardening
- Uniform elongation
- Redundant work

Good Luck

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Answer sheet Q - 1

Problem	a	b	c	d
1			✓	
2	✓			✓
3	✓			
4	✓			
5	✓			
6			✓	
7			✓	
8		✓		
9		✓		
10	✓			
11	✓			
12	✓			

Q.2)

[1] Effective strain :- ($\bar{\sigma}$) a representative single value for the strains in the other direction ($\sigma_1, \sigma_2, \sigma_3$)

[2] Strain hardening :- the strength that the material's gain due to plastic deformation

[3] uniform elongation :- the increases in the length of the material & the reduction of area are uniform on the whole length off the w/p

[4] Redundant work :- the work needed to deform the material's in wich done by redundant frictional force.

the end

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