

Assignment-3

1. Match the following:

- | | | |
|-----------------|-------|-------------------------|
| A. Cold working | (i) | $0.3 T_m < T < 0.5 T_m$ |
| B. Warm working | (ii) | $0.5 T_m < T$ |
| C. Hot working | (iii) | $T < 0.3 T_m$ |

(a) A-i, B-ii, C-iii

(b) A-iii, B-ii, C-i

(c) A-iii, B-i, C-ii

(d) A-ii, B-iii, C-i

2. Recrystallization during hot working is characterized by

(a) Rearrangement of defects/dislocations inside grains

(b) Nucleation of strain free grains

(c) No major microstructural changes

(d) Large growth of grains

3. For warm working of Cu (whose melting point is 1080 C), maximum temperature of the work piece can be

(a) 403.5 C

(b) 132.9 C

(c) 540 C

(d) 324 C

4. If flow stress of a material is given by $\bar{\sigma} = a\bar{\epsilon}^2 + c$, ideal work per unit volume will be

(a) $\frac{a\bar{\epsilon}^3}{3} + c\bar{\epsilon}$

(b) $k\bar{\epsilon}^{n+1}/(n+1)$

(c) $\frac{a\bar{\epsilon}^3}{3} + \frac{b\bar{\epsilon}^2}{2} + c\bar{\epsilon}$

(d) $k\bar{\epsilon}^{n+1}$

5. Consider a metal whose strain hardening behavior follow $\bar{\sigma} = 250\bar{\epsilon}^{0.25}$ MPa. Its an annealed bar, pulled in tension from $D_0=12.7$ mm to $D_f = 11.5$ mm. What is the work per unit volume?

(a) 3.93 MJ/m³

(b) 9.34 MJ/m³

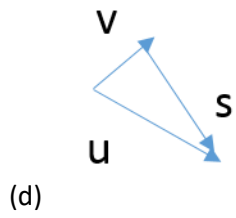
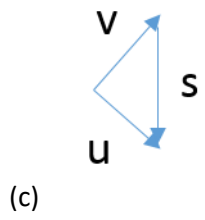
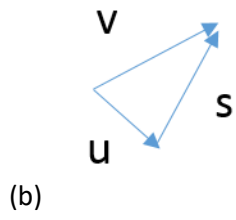
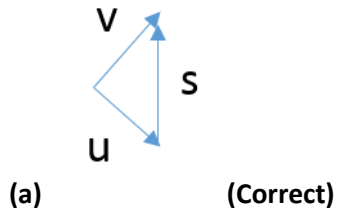
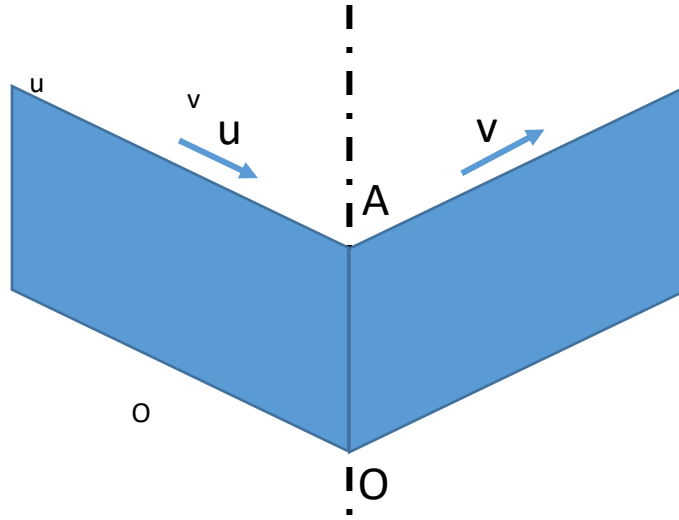
(c) 26.5 MJ/m³

(d) 250 MJ/m³

Assignment-3

6. In a wire drawing operation if the pull force F_d is applied for conducting the operation, A_0 is the initial diameter and A_f is the final cross section and α is the die angle, then actual work done per unit volume is given by.
- (a) $F_d \cos\alpha/A_f$
 - (b) $F_d \sin\alpha/ A_f$
 - (c) F_d/A_f**
 - (d) F_d/A_f
7. If η is efficiency of a wire-drawing operation being applied to a material with flow stress given by $\bar{\sigma} = k\bar{\epsilon}$, what is the maximum drawing reduction that can be achieved.
- (a) $\epsilon^* = \eta$
 - (b) $\epsilon^* = 1.2\eta$
 - (c) $\epsilon^* = 1.5\eta$
 - (d) $\epsilon^* = 2\eta$**
8. For initial set up of wire drawing operation, wire reduction of the end zone is done by
- (a) Machining
 - (b) Casting
 - (c) Powder Metallurgy
 - (d) Swaging**
9. If a metal moving at a velocity 'u' is deformed along the plane OA and then moves at the velocity 'v', and 's' is the shearing velocity, then which of the following represents the hodograph for this condition:

Assignment-3



Assignment-3

10. If $|AA|$, $|BB|$, $|CC|$ are projected lengths of shear planes and the shear velocities are V_a , V_b and V_c respectively, then rate of internal work is given by:

(a) $3K \cdot |AA| \cdot V_a$

(b) $K\{|AA| \cdot V_a + |BB| \cdot V_b + |CC| \cdot V_c\}$

(c) $3K \cdot |BB| \cdot V_b$

(d) $3K \cdot |CC| \cdot V_c$