Assignment-3

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment. Due on 2019-02-27, 23:59 IST.

1) Which of the following are true regarding dislocation in NaCl type structure?  
   P. Slip systems are like that of FCC  
   Q. For a <110>{110} type edge dislocation, there are two missing planes of opposite charges  
   R. For a <110>{100} type edge dislocation, alternating layers of (100) consists of alternating charges

   - P and Q are true  
   - P and R are true  
   - Q and R are true  
   - All P, Q and R are true

No, the answer is incorrect.
Score: 0
Accepted Answers:
- Q and R are true

2) A super dislocation a<110> in L1₂ structure dissociates into which of the following:

   - \( \frac{a}{6} < 211 > + APB + \frac{a}{6} < 121 > + CSF + \frac{a}{6} < 211 > + APB + \frac{a}{6} < 121 > 
   - \( \frac{a}{6} < 211 > + APB + \frac{a}{6} < 121 > + APB + \frac{a}{6} < 121 > 
   - \( \frac{a}{6} < 211 > + CSF + \frac{a}{6} < 121 > + CSF + \frac{a}{6} < 121 > 
   - \( \frac{a}{6} < 211 > + APB + \frac{a}{6} < 211 > + CSF + \frac{a}{6} < 121 > 

No, the answer is incorrect.
Score: 0
Accepted Answers:
- \( \frac{a}{6} < 211 > + CSF + \frac{a}{6} < 121 > + APB + \frac{a}{6} < 211 > + CSF + \frac{a}{6} < 121 > 

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4) If two dislocations in FCC are moving in two parallel glide planes which are 10a distance apart, then the minimum shear stress required to glide these dislocations past each other, is given by:

\[
\frac{G}{80\sqrt{2}\pi(1-\theta)}
\]

(a is the lattice parameter and other terms have usual meaning)

No, the answer is incorrect.
Score: 0

Accepted Answers:
\{111\}

5) Two positive dislocations are located in two parallel glide planes which are 10 nm apart. At what value of separation in x direction, they experience net zero force.

- x=-10 nm; x=0 nm and x=10 nm
- x=-20 nm; and x=20 nm
- x=-20 nm; x=10 nm and x=0 nm
- x=0 nm; x=10 nm and x=20 nm

No, the answer is incorrect.
Score: 0

Accepted Answers:
x=-10 nm; x=0 nm and x=10 nm

6) Match the following system with their respective structure

No, the answer is incorrect.
Score: 0

Accepted Answers:
x=-10 nm; x=0 nm and x=10 nm
<table>
<thead>
<tr>
<th>p. NaCl</th>
<th>i. Two interpenetrating simple cubic structures of two different atoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>q. CsCl</td>
<td>ii. Eight BCC cells with alternating body centers sites occupied by opposite atoms</td>
</tr>
<tr>
<td>r. Fe\textsubscript{12}Al\textsubscript{4}</td>
<td>iii. Two Interpenetrating FCC structure of different atoms</td>
</tr>
</tbody>
</table>

- p → ii; q → iii; r → i
- p → iii; q → i; r → ii
- p → i; q → ii; r → iii
- p → ii; q → ii; r → i

No, the answer is incorrect.
Score: 0

Accepted Answers:
- p → ii; q → iii; r → i

7) In A\textsubscript{3} compound which has L1\textsubscript{2} structure, if slip takes place by a/2 <110>, then which of the following happens

- For slip on {111}, nearest-neighbor (NN) changes; For slip on {100} nearest-neighbor (NN) changes
- For slip on {111} next-nearest-neighbor (NNN) changes; For slip on {100} next-nearest-neighbor (NNN) changes
- For slip on {111}, nearest-neighbor (NN) changes; For slip on {100} next-nearest-neighbor (NNN) changes
- For slip on {111} next-nearest-neighbor (NNN) changes; For slip on {100} next-nearest-neighbor (NNN) changes

No, the answer is incorrect.
Score: 0

Accepted Answers:
- For slip on {111}, nearest-neighbor (NN) changes; For slip on {100} next-nearest-neighbor (NNN) changes

8) A superalloy shows yield stress anomaly where strength increases with increasing temperature. Beyond a temperature, strength starts to decrease again with temperature. Which of the following do NOT contribute to this decrease in strength with increasing temperature

- Order-disorder transformation
- Reduction in anti-phase boundary energy
- Decrease in Peierl Stress
- Dislocations of opposite sign annihilate each other

No, the answer is incorrect.
Score: 0

Accepted Answers:
- Reduction in anti-phase boundary energy

9) Two positive dislocations are located in two parallel glide planes which are 10 nm apart. At what value of separation in x direction, they experience maximum force and minimum force

1 point
10) In a material, 100 dislocations were observed in TEM in an area of 10,000 b². What is the shear stress required to move dislocation through this material (Hint: Use Taylor hardening relation)?

\[ \frac{G}{80\sqrt{2}\pi(1-\theta)} \]

Accepted Answers:

- \[ \frac{G}{80\sqrt{2}\pi(1-\theta)} \]
- \[ \frac{G\sqrt{2}}{80\pi(1-\theta)} \]
- \[ \frac{G\sqrt{2}}{4\sqrt{2}\pi(1-\theta)} \]
- \[ \frac{G\sqrt{2}}{4\pi(1-\theta)} \]