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Unit 5 - Week 3

Register for Certification exam

Course outline

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Week 0

Week 1

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Week 3

- Transitions in Creep Mechanisms and Creep Constitutive Equation
- Deformation Mechanism Maps - Part 1
- Deformation Mechanism Maps - Part 2
- Modeling the Useful Creep Life of Materials/Components - Part 1
- Modeling the Useful Creep Life of Materials/Components - Part 2

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

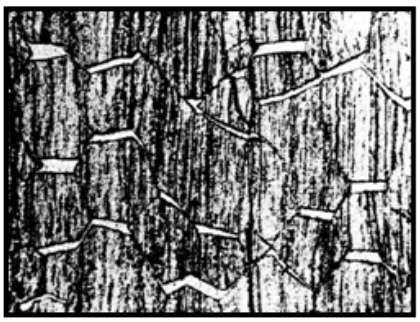
1) The transition from one mechanism of creep to another is expected to happen sharply at a given grain size and temperature. ***1 point***

- True
- False

No, the answer is incorrect.
Score: 0

Accepted Answers:
False

2) What are the white zones observed in the below figure and what is the cause of the same? ***1 point***



- These are cracks which were created due to creep strain incompatibility.
- These are denuded zones which are devoid of precipitates due to elongation of grains during dislocation creep.
- These are denuded zones which are devoid of precipitates due to elongation of grains during diffusion creep.

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grains during diffusion creep.

3) During creep controlled by viscous glide, the creep plastic strain decreases with a _____ in alloying element concentration.

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: String) increase

1 point

4) An Arrhenius type of plot is used for determining the activation energy of deformation. This plot is generally

1 point

- A log-log plot between applied stress on x-axis and temperature on y-axis.
- A semi-log plot between reciprocal of temperature on x-axis and log of creep strain rate on y-axis.
- A semi-log plot between reciprocal of stress on x-axis and log of creep strain rate on y-axis.
- A log-log plot between applied stress on x-axis and creep strain rate on y-axis.

No, the answer is incorrect.
Score: 0

Accepted Answers:
A semi-log plot between reciprocal of temperature on x-axis and log of creep strain rate on y-axis.

5) Determination of activation energy from creep curves under constant stress conditions leads to _____ value of activation energy.

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: String) apparent

1 point

6) Which of the following statements associated with viscous glide creep are false?

1 point

- The deformation microstructures of materials crept under viscous glide regime are usually devoid of subgrains.
- If the applied stress exceeds a breakaway stress, then viscous glide creep mechanism is replaced by grain boundary sliding creep behaviour
- During viscous glide creep behaviour, recovery processes are considered very important
- Viscous glide creep is also known as Class A creep.

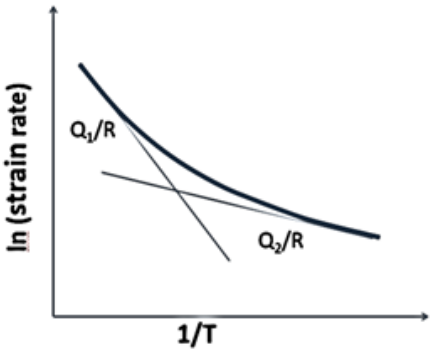
No, the answer is incorrect.
Score: 0

Feedback:

Accepted Answers:

If the applied stress exceeds a breakaway stress, then viscous glide creep mechanism is replaced by grain boundary sliding creep behaviour
During viscous glide creep behaviour, recovery processes are considered very important

7) The information conveyed by the below figure is **1 point**

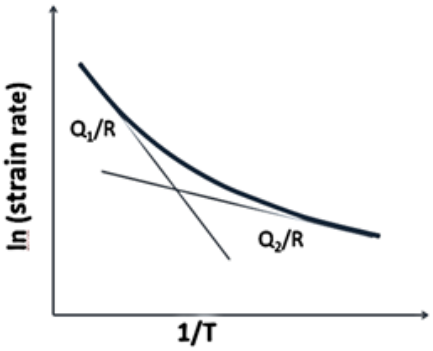


- Mechanisms requiring high activation energy are dominant at low temperatures and vice versa
- Mechanisms requiring low activation energy are dominant at high temperatures and vice versa
- Mechanisms requiring low activation energy are dominant at low temperatures and vice versa
- None of the above.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Mechanisms requiring low activation energy are dominant at low temperatures and vice versa

8) The information conveyed by the below figure is **1 point**



- Mechanisms requiring high activation energy are dominant at low temperatures and vice versa
- Mechanisms requiring low activation energy are dominant at high temperatures and vice versa
- Mechanisms requiring low activation energy are dominant at low temperatures and vice versa
- None of the above.

No, the answer is incorrect.
Score: 0

Accepted Answers:

Mechanisms requiring low activation energy are dominant at low temperatures and vice versa

9) For mechanisms operating in series, the slower mechanism become rate controlling. Continuum damage mechanics (CDM) based approach is useful for creep life modelling than creep life modelling based on steady state creep rates from a single mechanism because **1 point**

- CDM approach accounts for the damage process which is not taken into account during modelling based on a single creep mechanism
- CDM approach considers a constant stress while single creep mechanism based approach considers a constant temperature
- CDM approach uses an exponential dependence on stress whereas single creep mechanism based approach uses a power law dependence on stress.
- CDM approach does not account for instantaneous changes in stress whereas single creep mechanism based approach accounts for instantaneous changes in stress.

No, the answer is incorrect.
Score: 0

Accepted Answers:
CDM approach accounts for the damage process which is not taken into accou during modelling based on a single creep mechanism

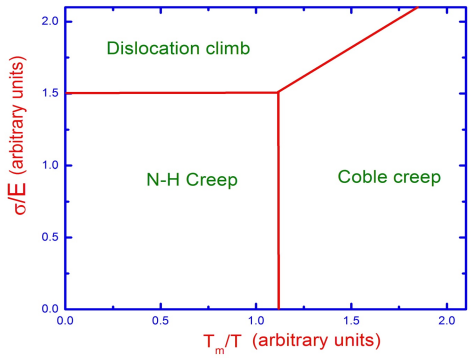
10) In a Mohamed-Langdon type of deformation mechanism map, the line separating H-D and N-H creep regimes has a slope **1 point**

- Zero
- Infinity
- -1
- 1

No, the answer is incorrect.
Score: 0

Accepted Answers:
Zero

11) In the hypothetical deformation mechanism map shown below, the dotted line describes the critical temperature at which transition from N-H to Coble creep would occur. The formula for this temperature is also shown. Describe the effect of a) increase in grain size and b) increase in Q_L on the location of the dashed line which is boundary between N-H and Coble creep. For increase in grain size, the dotted line will move to the _____ and for increase in Q_L,the dotted line will move to the _____.



$$T_c = \frac{(Q_L - Q_{GB})}{R\left(\ln\left[\frac{A_{NH} D_{0L} d}{A_c D_{0B} b}\right]\right)}$$

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: String) right,left
(Type: String) right, left
(Type: String) right , left
(Type: String) right ,left
(Type: String) right left
(Type: String) rightleft

1 point

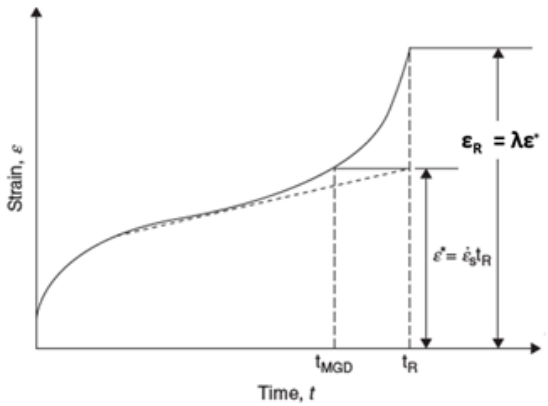
12) Typically strengthening of materials with hard dispersoids or ceramic fibers usually leads to ***1 point***

- Observation of higher stress exponent for the composite compared to that of the monolithic material (without the dispersions / fibers).
- Observation of lower stress exponent for the composite compared to that of the monolithic material (without the dispersions / fibers).
- Similar values of stress exponent for the composite and the monolithic material (without the dispersions / fibers).
- None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
Observation of higher stress exponent for the composite compared to that of the monolithic material (without the dispersions / fibers).

13) Which of the statements is true for the below figure if the value of λ = 1. ***1 point***



- The material fails in primary creep regime
- The material fails in the secondary creep regime
- The material fails in the tertiary creep regime

The material does not fail at all.

No, the answer is incorrect.
Score: 0

Accepted Answers:
The material fails in the secondary creep regime

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