Assignment-2

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

Due on 2018-09-05, 23:59 IST.

1) The scale of a thermal modeling problem is given by ___________.

- Number of nodes / number of time steps
- Number of nodes * number of time steps
- Number of time steps / number of nodes
- Number of nodes + Number of time steps

No, the answer is incorrect.
-score: 0

Accepted Answers:
Number of nodes * number of time steps

2) Longitudinal view gives information about ___________ in welding.

- Plane of melting along the heat source motion
- Plane of solidification along heat source motion
- Solidification microstructure change as function of depth
- All of the above

No, the answer is incorrect.
-score: 0

Accepted Answers:
All of the above

3) Fourier's law of heat conduction is based on balance of ___________.

- Entropy
- Free Energy

No, the answer is incorrect.
-score: 0

Accepted Answers:
The scale of a thermal modeling problem is given by ___________.

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Accepted Answers:
Number of nodes * number of time steps

2) Longitudinal view gives information about ___________ in welding.

- Plane of melting along the heat source motion
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No, the answer is incorrect.
-score: 0

Accepted Answers:
All of the above

3) Fourier's law of heat conduction is based on balance of ___________.

- Entropy
- Free Energy

No, the answer is incorrect.
-score: 0

Accepted Answers:
4) According to 1st Fourier heat conduction law, heat flows ______ the temperature gradient.

- along
- down
- perpendicular to
- unrelated to

**No, the answer is incorrect.**
**Score: 0**
**Accepted Answers:**
*down*

5) Transverse section gives information about __________ in welding.

- plane of solidification
- cooling direction
- weld pool geometry
- ripple formation

**No, the answer is incorrect.**
**Score: 0**
**Accepted Answers:**
*weld pool geometry*

6) Fourier's second law of heat conduction written as \( \frac{\partial T}{\partial t} = \alpha \frac{\partial^2 T}{\partial x^2} \) is valid for ______ .

- Single phase liquid with fluid flow
- Single phase solid without heat generation
- Single phase solid with heat generation
- Both solid and liquid including phase change

**No, the answer is incorrect.**
**Score: 0**
**Accepted Answers:**
*Single phase solid without heat generation*

7) SI unit of heat flux density is __________ .

- W * m
- W / m
- W / (m²)
- W

**No, the answer is incorrect.**
**Score: 0**
**Accepted Answers:**
*W / (m²)*

8) Which of the following parameters is NOT a part of the Rosenthal's 3-D equation for analytical solution of temperature during welding as given in this course?

- Thermal conductivity of solid
- Travel speed of the heat source
- Exponential function
9) Pick the right effect on the shape of the weld pool as you increase welding speed keeping the heat input constant.

- Weld pool becomes larger
- Weld pool becomes wider
- Aspect ratio of the weld pool changes
- Weld pool becomes deeper

No, the answer is incorrect.
Score: 0
Accepted Answers:
Aspect ratio of the weld pool changes

10) Which of the following aspects of the weldment are addressed by effective heat capacity method with respect to the latent heat?

1. Solid part of the domain
2. Liquid part of the domain
3. Freezing range of the alloy
4. Mushy zone of the weldment

- 1 and 2 only
- Only 2
- Only 1
- 3 and 4

No, the answer is incorrect.
Score: 0
Accepted Answers:
3 and 4

11) Which of the following options describes the idea behind the enthalpy method best?

- Taking into account the different heat capacities in solid and liquid
- Taking into account the release of latent heat
- Calculation of enthalpy based on sensible and latent heats
- Implementation of Young's balance

No, the answer is incorrect.
Score: 0
Accepted Answers:
Calculation of enthalpy based on sensible and latent heats

12) A plate is welded using GTAW. The welding is carried out at 200A, 10V and 5 mm/s. Based on Rosenthal's three dimensional heat equation. Calculate the cooling rates along x-axis at a point where temperature is 600°C and when the work piece is preheated for 300°C. The thermal conductivity of the work piece is assumed to be 40 W/m°C. Assume melting efficiency to be 80%.

Note: Enter the answer as a value rounded to two decimal places.

No, the answer is incorrect.
13. According to Stefan’s condition the difference in heat flux across the solid and liquid regions is equal to:

- Heat flux * Volume of the melting zone
- Latent heat required for phase change * Volume of the solid
- Latent heat required for phase change * Velocity of the torch
- Difference in the specific heat capacities of solid and liquid

No, the answer is incorrect.

Score: 0

Accepted Answers:
Latent heat required for phase change * Velocity of the torch

14. Consider a typical fusion welding process such as GTAW on a heat treatable alloy such as AA2014. Which of the following options describes the correct chronological sequence of physical phenomena that take place in the alloy just below the arc?

- Dissolution, precipitation, solidification, melting
- Solidification, melting, precipitation, dissolution
- Dissolution, melting, solidification, precipitation
- Melting, solidification, precipitation, dissolution

No, the answer is incorrect.

Score: 0

Accepted Answers:
Dissolution, melting, solidification, precipitation

15. Which of the following characteristics of an alloy such as AISI 316 stainless steel metal plate is least likely to change due to the effect of welding cycles?

- Texture
- Grain Growth in case of fine grain structure of plate
- Dissolution of precipitates
- Composition of the alloy

No, the answer is incorrect.

Score: 0

Accepted Answers:
Composition of the alloy

16. Which of the following statements are correct for GTAW of a typical alloy such as AA2014? (i) Fusion zone is defined by contour of its solvus temperature. (ii) Partially melted zone is defined between the contours at liquidus and solidus temperatures. (iii) Heat affected zone is defined between the contours at solidus and solvus temperatures.

- (i) and (ii)
- (i) only
- (ii) and (iii)
- All the three

No, the answer is incorrect.
17. Which of the following phrases provides the correct option to complete the following statement? The cracking tendency during fusion welding of an alloy …

- is more for a hypo-eutectic alloy than a peritectic alloy.
- is more for a hyper-eutectic alloy than a peritectic alloy.
- is less for a eutectic alloy.
- is less for an alloy with large freezing range.

No, the answer is incorrect.

Score: 0

Accepted Answers:

(ii) and (iii)

18. Partially melted zone for an alloy is to be drawn using contours of temperatures characteristic of the alloy. Which of the following is a correct choice for one of these contours?

- Peak temperature
- Solidus temperature
- Solvus temperature
- Preheat temperature

No, the answer is incorrect.

Score: 0

Accepted Answers:

Solidus temperature

19. Which of the following welding processes provides the highest thermal gradient?

- GTAW
- EBW
- SMAW
- SAW

No, the answer is incorrect.

Score: 0

Accepted Answers:

EBW

20. Among the following materials, which one is likely to exhibit the sharpest thermal gradient under a typical welding process such as GTAW?

- Cu based alloy
- Plain carbon steel
- Al based alloy
- Ag based alloy

No, the answer is incorrect.

Score: 0

Accepted Answers:

Plain carbon steel