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NPTEL

Courses » Phase field modelling: the materials science, mathematics and computational aspects

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FAQ

Unit 9 - Week 8

Course outline
How to access the portal ?
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Module 12 -

Assignment 8

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.   **Due on 2018-09-26, 23:59 IST.**

1) If a crystal does not possess inversion symmetry, then all the second rank property tensors *1 point* of the crystal will be:

○ isotropic

○ symmetric

○ anti-symmetric

○ zero

No, the answer is incorrect.
Score: 0

Accepted Answers:
zero

2) The second rank diffusivity tensor in a cubic system is given by: *1 point*

○

$$D = \begin{bmatrix} D_{11} & D_{12} & D_{13} \\ D_{21} & D_{22} & D_{23} \\ & & \end{bmatrix}$$

$$D = \begin{bmatrix} D_{11} & D_{12} & D_{13} \\ 0 & D_{22} & D_{23} \\ 0 & 0 & D_{33} \end{bmatrix}$$

○

Module 12 - Lecture 50 : Crystal: symmetry elements II

$$D = \begin{bmatrix} D_{11} & 0 & 0 \\ 0 & D_{11} & 0 \\ 0 & 0 & D_{11} \end{bmatrix}$$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$$D = \begin{bmatrix} D_{11} & 0 & 0 \\ 0 & D_{11} & 0 \\ 0 & 0 & D_{11} \end{bmatrix}$$

3) The basic symmetry operations used to define a symmetry group are rotation, inversion and _____   **1 point**

Module 12 - Lecture 51 : Understanding Neumann's principle

- ○ translation
- ○ migration
- ○ scaling
- ○ reflection

No, the answer is incorrect.
Score: 0

Accepted Answers:
reflection

4) Representation quadrics are used to describe: **1 point**

Module 12 - Lecture 52 : Representation quadric

- ○ all property tensors
- ○ symmetric property tensors
- ○ symmetric property tensors of rank 2
- ○ symmetric property tensors of rank 3

No, the answer is incorrect.
Score: 0

Module 13 - Lecture 53 : Variational calculus

Accepted Answers:
symmetric property tensors of rank 2

5) The principle of least action requires a quantity called Action to be minimized during the   **1 point**
motion of a body. Action ($\mathcal{F}$) is defined as the difference between the Kinetic Energy (T) and Potential Energy (V) and is given as:
$\mathcal{F} = T - V$.
That is,
$\mathcal{F} = \frac{1}{2} m\dot{x}^2 - V(x)$.
The integral equation will be :
$\mathcal{L} = \int_{t_1}^{t_2} \mathcal{F}(t, x, \dot{x} \equiv \frac{dx}{dt})dt$
where t is the time, x is the position, and $\dot{x}$ is the velocity. Action is a functional because it is a function of the three variables shown in the integral equation. Write down the Euler-Lagrange equation for this

Module 13 - Lecture 54 : Optimization of functionals I

functional. The ODE that results from subsequent algebraic manipulation is :

- ○

$m\ddot{x} = -\frac{d}{dx} V(x)$

- ○

$m\dot{x} = -\frac{d}{dx} V(x)$

$$\frac{1}{2} m\dot{x}^2 = -\frac{d}{dx} V(x)$$

$$m\ddot{x} = -\frac{d^2}{dx^2} V(x)$$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$$m\ddot{x} = -\frac{d}{dx} V(x)$$

6) Euler-Lagrange equation of the functional $\int_{t_1}^{t_2} (\dot{x}^2 + x)dt$:   **1 point**

$$\ddot{x} = \frac{1}{2}$$

$$\ddot{x} = 0$$

$$\ddot{x} = -\frac{1}{2}$$

$$\ddot{x} = \frac{1}{4}$$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$$\ddot{x} = \frac{1}{2}$$

7) Writing the Euler-Lagrange equation for some functional yields the following ODE.   **1 point**
$$\frac{dx}{dt} = -x^2 exp(-t)$$
Solve this ODE using the *lsode* inbuilt function in GNU Octave. Take *t* to vary from 0 to 5. Assume an initial approximation $(x_0 = 5)$. The value of *x* at time t=1 is?

2.4892

2.5993

1.2017

0.9671

No, the answer is incorrect.
Score: 0

Accepted Answers:
1.2017

8) In a non-centrosymmetric crystal, all _____ rank tensors are identically zero.

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: String) even

          1 point

9) The representation quadric of a cubic system has the following shape: **1 point**

cubic

hyperboloidal

Module 13 - Lecture 55 : Optimization of functional II

Module 13 - Lecture 56 : Variational derivative

Download Videos

Weekly Feedback

Quiz : Assignment 8

Solution

assignment 8

Week 9

Week 10

Week 11

Week 12

○ spherical

○ ellipsoidal

No, the answer is incorrect.
Score: 0

Accepted Answers:
spherical

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