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NPTEL

Unit 8 - Week 7

Assignment 7

The due date for submitting this assignment has passed. **Due on 2018-09-19, 23:59 IST.**
As per our records you have not submitted this assignment.

1) If a_1, a_2 and a_3 denote the unit vectors of a 3D lattice, then the reciprocal lattice vector b_1 is given by: ***1 point***

- $b_1 = 2\pi \frac{a_1 \times a_2}{a_3.(a_1 \times a_2)}$
- $b_1 = 2\pi \frac{a_2 \times a_1}{a_3.(a_2 \times a_1)}$
- $b_1 = 2\pi \frac{a_1 \times a_3}{a_2.(a_1 \times a_3)}$
- $b_1 = 2\pi \frac{a_2 \times a_3}{a_1.(a_2 \times a_3)}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$b_1 = 2\pi \frac{a_2 \times a_3}{a_1.(a_2 \times a_3)}$

2) Consider a function $g(x)$. The evaluation of the second derivative $\frac{\partial^2 g}{\partial x^2}$ in the Fourier space would be: ($\tilde{g}$ is the Fourier transform of g, k is the reciprocal lattice vector) ***1 point***

$-k^2\tilde{g}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$-k^2\tilde{g}$

3) When the diffusion equation is solved using Fourier transforms, the boundary condi that is implicitly assumed is: **1 point**

- Dirichlet
- Neumann
- Robin
- Periodic

No, the answer is incorrect.
Score: 0

Accepted Answers:
Periodic

4) Stress acting on a material is a **1 point**

- property tensor
- field tensor
- both (a) and (b)
- not a tensor

No, the answer is incorrect.
Score: 0

Accepted Answers:
field tensor

5) Diffusivity is a tensor with rank: **1 point**

- zero
- one
- two
- four

No, the answer is incorrect.
Score: 0

Accepted Answers:
two

6) The number of components in a tensor of rank 4 (in 3D space) is : **1 point**

- 16
- 27
- 81
- 9

No, the answer is incorrect.
Score: 0

Accepted Answers:
81

7) According to Einstein summation convention, the dummy index/indices in the equation $y_{ij} = a_{ijkl}x_{kl}$ is/are: **1 point**

- k

- i
- i and j
- k and l

No, the answer is incorrect.
Score: 0

Accepted Answers:
k and l

8) The number of times the transformation matrix is multiplied with a tensor to represent it in a new coordinate frame of reference is equal to the _____ of the tensor. ***1 point***

- trace
- determinant
- rank
- number of rows

No, the answer is incorrect.
Score: 0

Accepted Answers:
rank

9) The trace of an $n \times n$ anti-symmetric matrix is equal to ***1 point***

- 1
- -1
- 0
- n^2

No, the answer is incorrect.
Score: 0

Accepted Answers:
0

10) According to Neumann principle, any property of a tetragonal crystal cannot have ***1 point***

- spherical symmetry
- cubic symmetry
- hexagonal symmetry
- tetragonal symmetry

No, the answer is incorrect.
Score: 0

Accepted Answers:
hexagonal symmetry

11) Which of the following options does not satisfy the definition of a group ? ***1 point***

- $\{1, 3, 5, 7\}$; operation $=$ multiplication modulo 8.
- $\{0, i, -i, 1\}$; operation $=$ multiplication
- $\{0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}\}$; operation $=$ addition modulo 2π
- $\{1, i, -i, -1\}$; operation $=$ multiplication

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\{0, i, -i, 1\}$; operation = multiplication

12) In addition to the four conditions that define a group, that is, closure, associativity, identity and inverse, if an operation (*) on its elements also obeys (a*b) = (b*a), then the group is called a/an _____ group.
(Note : Please spell your answer correctly)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: String) abelian
(Type: String) commutative

1 point

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