

## Unit 12 - Week 10

## Course outline

How does an NPTEL online course work?

## Practice Assignment

## Week 1

## Week 2

## Week 3

## Week 4

## Week 5

## Week 6

## Week 7

## Week 8

## Week 9

## Week 10

● Lecture 46: Ising Model and Other Lattice Models Part 3

○ Lecture 47: Ising Model and Other Lattice Models Part 4

○ Lecture 48: Ising Model and Other Lattice Models Part 5

● Lecture 49: Binary Mixtures: Towards Understanding Non-Ideality and Osmotic Pressure Part 1

○ Lecture 50: Binary Mixtures: Towards Understanding Non-Ideality and Osmotic Pressure Part 2

## ○ Quiz : Assignment 10

○ Assignment-10 Solutions

○ Weekly Feedback

○ Download Videos

## Week 11

## Week 12

## Live Session

## Text Transcripts

## Assignment 10

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

**Due on 2020-11-25, 23:59 IST.**

1) The magnetization per spin in the presence of magnetic field (B) for the one-dimensional Ising model is (all the symbols involved below have their usual meanings) 1 point

(a)  $\frac{\mu \sinh(\beta B)}{\sqrt{\sinh(\beta B) + e^{-4J\beta}}}$

(b)  $\frac{\mu \sinh(\beta B)}{\sinh^2(\beta B) + e^{-4J\beta}}$

(c)  $\frac{\mu \sinh(\beta B)}{\sqrt{\sinh^2(\beta B) + e^{-4J\beta}}}$

(d) 0

- (a)  
 (b)  
 (c)  
 (d)

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(c)

2) Which of the following statement is correct in case of two-dimensional Ising model regarding phase transition: 1 point

- In the presence of magnetic field, phase transition is first order but second order in the absence of field.  
 In the presence of magnetic field, phase transition is second order but first order in the absence of field  
 phase transition is both first order in the absence of field and in the presence of magnetic field  
 phase transition is both second order in the absence of field and in the presence of magnetic field

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
In the presence of magnetic field, phase transition is first order but second order in the absence of field.

3) According to Hohenberg - Mermin theorem fluctuation in two-dimensional systems grows 1 point

- Exponentially  
 Logarithmically  
 Power law type  
 Linearly

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
Logarithmically

4) In case of two-dimensional Ising model, which of the following property become non-analytic in the presence of external magnetic field 1 point

- Free energy  
 Entropy  
 Internal energy  
 Volume

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
Free energy

5) Bragg-Williams approximation states that 1 point

- Binary collision can be approximated by single particle correlation function  
 Binary collision can be approximated by the square root of single particle correlation function  
 Binary collision can be approximated by the square of single particle correlation function.  
 Binary collision can be approximated by the cube root of single particle correlation function.

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
Binary collision can be approximated by the square of single particle correlation function.

6) According to mean field theory, critical temperature of phase transition exists when coupling constant (J) satisfies 1 point

- J = 0  
 J < 0  
 J > 1  
 J > 0

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
J > 0

7) Which of the following is (are) not true for ideal binary mixtures? 1 point

- (a)  $\Delta S_{\text{mix}} = 0$   
(b)  $\Delta V_{\text{mix}} = 0$   
(c) It obeys Raoult's law  
(d)  $\Delta H_{\text{mix}} = 0$

- (a)  
 (b)  
 (c)  
 (d)

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(a)

8) Which of the following is an example of structure breaking binary mixture? 1 point

- water and dimethyl sulfoxide (DMSO)  
 water and ethanol  
 acetone and water  
 cyclohexane and ethanol

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
cyclohexane and ethanol

9) The entropy change of mixing for an ideal solution formed by mixing 1.9 mole of the solvent with 0.1 mole of the solute at 300 K is 1 point

- 6.3 J/K  
 4.3 J/K  
 3.3 J/K  
 5.3 J/K

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
3.3 J/K

10) A 250 ml solution containing 21.4 g of a polymer in toluene had an osmotic pressure of 0.055 atm at 27 °C. What is the apparent formula weight of the polymer? 1 point

- 15,000 g/mol  
 22,000 g/mol  
 38,000 g/mol  
 32,000 g/mol

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
38,000 g/mol