25-4-19

Roll No. | | | | | | | | | | |

B.E / B.TECH (FULL TIME) END SEMESTER EXAMINATIONS –APR / MAY 2019

MATERIALS SCIENCE AND ENGINEERING

Third Semester

ML8303 THERMODYNAMICS OF MATERIALS

(Regulation2012)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. What is the change in internal energy during constant volume process?
2. What is a triple point in the phase diagram of H_2O?
3. Why the work done during reversible isothermal process is greater than reversible adiabatic process?
4. What is configurational entropy?
5. State Zeroth law of thermodynamics.
6. What are the assumptions made in Einstein's crystal?
7. Define the term Mole fraction.
8. What do you mean by activity coefficient?
9. What do you understand by Pourbaix diagrams?
10. Define the term solid electrolytes.

Part – B (5 x 16 = 80 marks)
(Question No.11 is Compulsory)

11. Explain why the specific heat capacity at constant pressure is always greater than specific heat capacity at constant volume. Discuss the contribution of inter-atomic forces to specific capacity

12. a) (i) State and prove Thomsen and Clausius statements. (8)

(ii) Prove that PV^{γ} = constant for reversible adiabatic process. (8)

(OR)

b) Determine the set of values of n_i that maximizes the number of arrangements within the most probable distribution at Const. U,V and n.

13. a) i) State 3rd Law of thermodynamics and prove that at absolute Zero, the coefficient of thermal expansion of any substance vanishes. (8)

ii) explain the incompleteness in Nernst's theorem with an example and the proposed correction. (8)

(OR)

b) Explain any one method of theoretical calculation of heat capacity.

14. a) Compare Raoult's law and Henry's law on behavior of solutions.

(OR)

b) Explain the usefulness of Gibb-Duhem relation in the determination of activity in a binary solution

15. a) Derive the relationship between

(i) Cell EMF(E) and free energy of the cell reaction (ΔG). (8)

(ii) Cell EMF(E) and chemical potentials at electrodes. (8)

(OR)

b) (i) Obtain a mathematical expression for Langmuir's adsorption isotherm. (8)

(ii) Discuss on the thermodynamics of point defects in stoichiometric compounds. (8)