VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING SESSION 2014 - 15 (ODD SEMESTER)

Total Pages-4

B.Tech/3rd/MM Metall. Thermodynamics and Kinetics

Full Marks: 70

Time : 3 hours

Answering of Q.No.1 is essential. All parts of a question should be answered at one place

The figures in the right-hand margin indicate marks

1. Answer all questions :

 2×10

(a) How does thermodynamics differ from kinetics?

(b) Define the terms enthalpy and internal energy.

(c) State different forms of first law of thermodynamics.

(d) Differentiate between homogeneous and heterogeneous systems.

(e) Define the term fugacity.

(Turn Over)

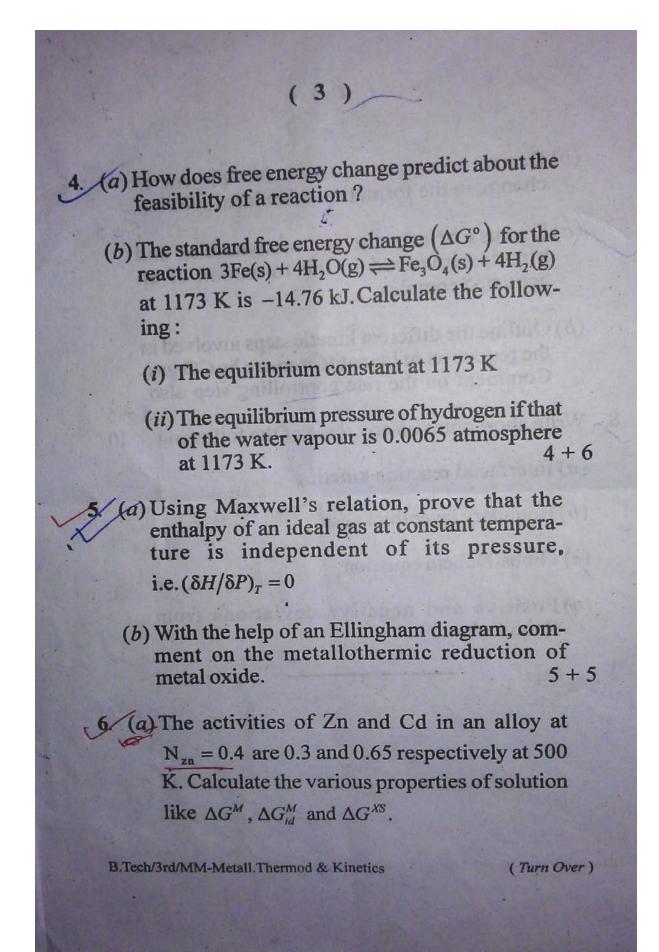
(2)(g) Outline the significance of statistical interpretation of entropy. (h) Outline the properties of ideal solutions. (i) Define the term regular solution. (j) Write down the names of different factors that affect the reaction rate kinetics. (a) Discuss briefly the applications of first law of thermodynamics for isobaric and adiabatic processes. (b) Comment on the entropy change associated with the following processes : (i) Reversible and irreversible processes (ii) Graphitization of petroleum coke. 5 + 5Derive necessary equations for the combined statements of first and second laws of thermodynamics.

(b) Derive necessary equation for the variation of entropy with temperature under isobaric condition. 5+5

(Continued)

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 $\delta q = dU + Pd$ $dH = \delta q + Vd$



4) (b) Derive necessary equation for free energy change in the formation of an ideal solution. 5 + 5(a) Discuss briefly the thermodynamics and kinetics involved in the formation of an activated complex. (b) Outline the different kinetic steps involved in the reduction of hematite iron ore by CO gas. Comment on the rate controlling step also. +5 8, Write short notes on any three of the following: 10 (a) Interfacial reaction kinetics (b) Boundary layer thickness (c) Gibbs-Duhem equation (d) Positive and negative deviations from Raoult's law.

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BE-100