CODE NO: RR 21305

2006 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

II B.TECH I SEMESTER REGULAR EXAMINATIONS

CHEMICAL AND BIO-THERMODYNAMICS

(BIO-TECHNOLOGY)

NOVE 2006

TIME:3 HOUR
MARK:80

ANSWER ANY FIVE QUESTIONS ALL QUESTIONS CARRY EQUAL MARKS

1. (a) Explain the PVT relationships with a neat diagrams. Indicate the triple point.

(b) Write the Virial equation of state, and define the compressibility factor.

2. Write short notes:

(a) Write about condensable-fluid cycle.
(b) Write about simple power-plant cycle.
(c) Write about analysis of the steam-power plant cycle.

3. The PVT behavior of a certain gas is described by : P(V-b) = RT, where b is a constant. If CV is also a constant, show that –

(a) U is a function of T only
(b) ? is a constant
(c) for a mechanically reversible process, P(V - b)
is a constant

4. (a) Discuss chemical potential as a criterion for phase equilibrium.

(b) Define partial molar properties: internal energy, enthalpy, entropy, Gibbs energy.

5. The Stability criteria apply to a particular phase. However, there is nothing to preclude their application to problems in phase equilibria,where the phase of interest (e.g; a liquid mixture) is in equilibrium with another phase (e.g; a vapour mixture). Considerbinary isothermal vapour/liquid equilibria at pressures low enough that the vapour phase may be considered an ideal-gas mixture.what are the implications of liquid-phase stability to the features of isothermal P-X-Y diagrams.

6. Consider a vessel which initially contains only n0 mol of water vapour .If decomposition occurs according to the reaction.
H2O ! H2 + 1/2O2
Find expression which relate the number of moles and the mole fraction of each chemical species to the reaction co-ordinate e

7. (a) Explain the Gaden classification from stoichiometric point of view the product formation in fermentation processes.

(b) The following stoichiometric equation describes penicillin systhesis

1.5Glucose+H2SO4+2NH3 + phenyl acetate! Pencillium G + CO2+8H2O the theoretical yield of pencillium is 1.2g/(gram of glucose). Find out the molecular weight of pencillium G.

8. Discuss in detail about Elemental balance.