

29/05/17
3pm-6pm

(01)

T2425 / T0533 THERMODYNAMICS AND BIOCHEMICAL ENGINEERING

TE / Sem V / BT / CBSGS / TBE

Q. P. Code: 16529

(3 HOURS)

19

(MAX. MARKS : 80)

Note:

1. Question No. 1 is compulsory.
2. Attempt any three questions out of remaining five questions.
3. Figures to right indicate full marks.

Q.1 Attempt any 4

- a. Explain PVT behaviour of pure fluids with reference to pressure-volume diagram? 05
- b. General statement of second law of thermodynamics? 05
- c. Explain carnot cycle? 05
- d. Write short note on heat engine and heat pump? 05
- e. Derive Gibbs-Helmholtz equation? 05

- Q.2
- a. State and prove clausius inequality? 10
 - b. The enthalpy of a binary liquid system of species 1 and 2 at a fixed T and is represented by equation $H = 400X_1 + 600X_2 + X_1X_2(40X_1 + 20X_2)$ where H is in J/mol. Determine expression for H_1 and H_2 as a function of X_1 , numerical value for the pure species enthalpy $H_{\square 1}$ and $H_{\square 2}$, and numerical value for the pure enthalpies at infinite dilution? 10

- Q.3
- a. Derive the equation for workdone in adiabatic process? 10
 - b. Show that $C_p - C_v = R$. 05
 - c. Explain different factors affecting equilibrium conversion? 05

- Q.4 a. Derive Maxwell relation in detail? 20

- Q.5
- a. State and derive mathematically first law of thermodynamics for flow process? 10
 - b. Explain any two types of thermodynamic diagram? 10

- Q.6
- a. Explain the criteria for phase equilibria? 05
 - b. Explain the following 15
 - i) Open, closed and isolated system.
 - ii) State and path function.
 - iii) Homogeneous and Heterogeneous system.
 - iv) Zeroth law.
 - v) Intensive and extensive properties