

**II B.Tech II Semester Supplementary Examinations,
November/December 2005
CHEMICAL ENGINEERING THERMODYNAMICS-I
(Chemical Engineering)**

Time: 3 hours**Max Marks: 80**

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) A closed system contains coal. If coal is burnt the temperature of system rises. What happens the energy content of the system? Discuss the above case in thermodynamic sense.
(b) What is phase rule? Calculate degrees of freedom at triple point of water. [8+8]
2. Explain the application of steady flow energy equation to a turbine and a condenser. [16]
3. A rigid vessel contains a mixture of saturated steam and water at 550 K. The volume of the vessel is 50 liters. If the liquid mass is 10 kg, determine the total mass, enthalpy, entropy and internal energy of the mixture. [16]
4. (a) Discuss briefly the virial expansion.
(b) Explain briefly the law of corresponding states. [8+8]
5. (a) Does first law of thermodynamics specify the direction of a process? [5]
(b) Name three irreversible process. [6]
(c) State the Carnot theorems. [5]
6. (a) What is thermal reservoir?
(b) Show that the thermodynamic temperature scale is equivalent to the ideal gas temperature scale. [8+8]
7. (a) Explain the Sensible Heat Effects with Homogeneous substance of constant composition. [10]
(b) Evaluate the Sensible-Heat Integral. Derive the expression for it. [6]
8. If the heat of combustion of urea, $(NH_2)_2CO_{(s)}$ at $25^\circ C$ is 631,660 J / mol when the products are $CO_{2(g)}$, $H_2O_{(l)}$ and $N_2(g)$. What is ΔH_{f298}^0 for urea at $25^\circ C$? [16]
