Question Bank (I scheme)

Name of Course: Chemical Engineering Thermodynamics (CET)
Subject code: 22406

Semester : IV   **Programme: Chemical**

Unit test I

Unit 1 :Thermodynamic system and equilibrium (8marks)

TWO marks question

1. Define intensive property. Give eg

2. Define quasi static process

3. Define thermodynamic equilibrium

FOUR marks question

4. Define state function and path function. Give eg

5. Explain stable, unstable and metastable equilibrium.

6. Explain the macroscopic and microscopic approaches adopted in thermodynamics.

Unit2:First law of thermodynamics (14marks)

TWO marks question

7. State the sign conventions used for heat and work.

8. Define internal energy.

9. Define heat capacity. Give its unit

10. State zeroth law of thermodynamics

11. State the equation for calculating ΔU, Q,W for adiabatic process

FOUR marks question

12. Explain Joule Thomson porous plug experiment

13. Prove that internal energy is a state function

14. Gas from a bottle of compressed helium is used to inflate an inelastic flexible balloon, originally folded completely flat to a volume of $0.5m^3$. If the barometer reads 760mm of Hg, Evaluate the work done by the balloon

15. A stationary mass is compressed without friction from an initial state of $0.3m^3$ and 0.105 MPa to a final state of $0.15m^3$ and 0.105 MPa, the pressure remaining constant during the process. There is a transfer of 37.6kJ of heat from the gas during the process. Calculate the change in internal energy.

16. Calculate ΔU and ΔH in kJ for 1 kmol water as it is vaporized at constant temperature of 373K and constant pressure of 101.3kPa. the specific volume of liquid and vapour at these conditions are $1.04 * 10^{-3}$ and $1.675m^3$ /kmol respectively. 1300 kJ of water is added for this change.

Unit 3: Thermodynamic quantity(13marks)

TWO marks question

17. Define critical temperature and critical pressure.
18. State Gibb's phase rule
19. Give the value of temperature and pressure at the triple point for water.

FOUR marks question

20. Explain the phase diagram of water system.
21. Explain the P-T diagram for a pure material.
22. Evaluate the degree of freedom for   a. Pure water in equilibrium with its vapour
       b. Binary liquid mixture of alcohol and water in equilibrium   with its vapour
23. Explain the phase diagram of sulphur system.
24. Give the Van derWaal's equation and explain the terms. Give the value of constants also.
25. One kmol of a gas occupies a volume of 0.5 m^3 at 313K. . Compare the pressures given by   a. ideal gas equation   b. Van der Waals equation
       Van der Waals constants are a= 0.365 Nm^4 / mol^2 and b = $4.28 * 10^{-5}m^3$ / mol