

B. Tech Degree III Semester Examination, November 2008**SE 304 CHEMICAL ENGINEERING I***(Common for 1999&2002 Schemes)*

Time.: 3 Hours

Maximum Marks : 100

- I. (a) State the first law of thermodynamics. Give its limitations. (7)
 (b) Explain Carnot's principle. (8)
 (c) A steam engine operates between 400 and 300 K under high pressure. What is the minimum amount of heat that must be withdrawn from the hot reservoir to obtain 1000 joules of work? (5)
- OR**
- II. (a) Derive the following :

$$\left(\frac{\partial T}{\partial V}\right)_s = -\left(\frac{\partial P}{\partial S}\right)_v$$

$$\left(\frac{\partial S}{\partial V}\right)_T = \left(\frac{\partial P}{\partial T}\right)_v$$
 (12)
 (b) Show that for an ideal gas Joule Thomson coefficient is zero. (8)
- III. (a) Give the classification of chemical reactors. (10)
 (b) Distinguish between elementary and non elementary reactions. (5)
 (c) Calculate the entropy change for a thousand fold expansion of a mole of ideal gas, isothermally at 300 K. (5)
- OR**
- IV. (a) Explain the effect of temperature on equilibrium constant. (8)
 (b) Define order and molecularity of chemical reactions. (5)
 (c) How is the equilibrium constant related to the standard free energy change? (7)
- V. (a) Briefly explain the dynamic characteristics of an instrument. (7)
 (b) Highlight the advantages and limitations of sight glass method. (5)
 (c) With a neat sketch, explain the working principle of venturimeter. (8)
- OR**
- VI. (a) Explain the working of optical pyrometer. (7)
 (b) Describe the working of McLeod vacuum gauge with a neat sketch. (7)
 (c) State Seebeck effect and Petlier effect. (6)
- VII. Write notes on :
 (i) Strain gauges (ii) Load cells
 (iii) Final control elements (iv) Transducers. (4 x 5 = 20)
- OR**
- VIII. Explain the various types of controllers. (20)
- IX. (a) Briefly explain the principle and working of nuclear magnetic resonance spectroscopy. (10)
 (b) With a neat diagram explain the working of a mass spectrometer. (10)
- OR**
- X. Write short notes on :
 (i) X-ray diffraction (ii) Structure of ceramics
 (iii) Addition polymerization (iv) Vibrational spectroscopy. (4 x 5 = 20)

