

B. Tech Degree III Semester Examination, November 2009**SE 304 CHEMICAL ENGINEERING I***(Common for 1999 & 2002 Schemes)*

Time : 3 Hours

Maximum Marks : 100

- I. (a) Prove that $C_p = \left(\frac{\partial H}{\partial T} \right)_p$. (5)
- (b) The contents in a stirred tank reactor are being agitated by means of a 2 hp stirrer. The heat generated due to stirring is dissipated to the surroundings at a rate of 3000 KJ/h. Determine the change in internal energy. (15)
- OR**
- II. (a) Explain Carnot refrigeration cycle. (10)
- (b) Define Joule – Thomson expansion and show that Joule – Thomson coefficient for an ideal gas is zero. (10)
- III. (a) State Le-Chatlier's principle. (2)
- (b) How is equilibrium constant related to standard free energy change? (6)
- (c) What are the different types of reactors? Explain *any one*. (12)
- OR**
- IV. (a) What are elementary and non-elementary reactions with suitable examples? (5)
- (b) Explain free energy change and entropy change. (5)
- (c) What is the effect of temperature on reaction rate? What are the factors affecting rate of a chemical reaction. (10)
- V. (a) Explain the working principle of a Mc-Leod Vacuum gauge. (5)
- (b) What are the different types of flow measuring instruments? (8)
- (c) With a neat sketch explain the working of a rotameter. (7)
- OR**
- VI. (a) Explain static and dynamic characteristics of an instrument. (5)
- (b) Explain any one instrument that can be used for high temperature measurement. (10)
- (c) What is the principle used in thermo couples? (5)
- VII. Describe various types of feed back controllers. (20)
- OR**
- VIII. Write short notes on :-
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|-----------------------------|-----------------|
| (i) Strain gauge | (ii) Load cells |
| (iii) Final Control Element | (iv) Transducer |
- (20)
- IX. (a) What is the principle of mass spectrometry? Explain with a neat diagram the working of a mass spectrometer. (10)
- (b) Briefly explain –
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|------------------------------|--|
| (i) Vibrational Spectroscopy | |
| (ii) NMR Spectroscopy | |
- (10)
- OR**
- X. Write short notes on :
- | | |
|----------------------------|--|
| (i) Polymerisation | |
| (ii) Structure of ceramics | |
| (iii) X-ray diffraction | |
| (iv) Alloys. | |

(4 x 5 = 20)

