

BTS (C) 026 (E)

**B.Tech. Degree III Semester Examination**  
**January 2002**

**SE 304 CHEMICAL ENGINEERING I**

Time: 3 Hours

Maximum Marks: 100

(Answer **FIVE** questions selecting **ONE** from **each module**)

**MODULE - I**

- I. (a) Explain the following terms commonly encountered in chemical thermodynamics:-  
Open system, Closed system, Internal energy, Work, Heat. (10)
- (b) Derive the relation  $dS = \frac{C_v}{T} \cdot dT + \left(\frac{\partial P}{\partial T}\right)_v \cdot dV$ . (10)

**OR**

- II. (a) State the thermodynamic equation of state. Explain the significance of Maxwell's equations. (10)
- (b) What are the salient features of Carnot cycle? (10)

**MODULE - II**

- III. (a) Define chemical potential. What is its physical significance? (10)

(Turn over)

- III. (b) Find the change in entropy when two moles of hydrogen expand from a volume of 30 cubic metre under a pressure of 2 atm to a volume of 100 cubic metre under a pressure of 1 atm. Assume that hydrogen is an ideal gas with
- $$C_p = 7.4 \frac{\text{cal}}{\text{mol. K}} \quad (10)$$

OR

- IV. (a) Define equilibrium constant of a chemical reaction. What is the significance of standard Gibbs function? (10)
- (b) How does an elementary reaction differ from a non-elementary reaction? Compare a batch reactor with a continuous reactor. (10)

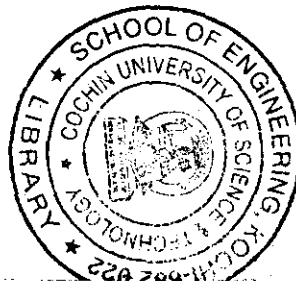
MODULE - III

- V. (a) Explain the working principle of thermo couples. Briefly describe the working of different types of pyrometers. (10)
- (b) Describe the operation of different elastic-element pressure measuring devices. (10)

OR

- VI. (a) How does a velocity meter for flow measurement vary from head meters? What are the limitations of a Pitot tube? (10)
- (b) Briefly discuss the salient features of visual devices for level measurement (10)

Contd.....3.

MODULE - IV

- VII. (a) What is the function of a final control element? Enumerate the different types of final control elements used in automatic process control. (10)
- (b) Explain the terms:
- (i) Open-loop system
  - (ii) Closed-loop system
  - (iii) Feedback control (10)

OR

- VIII. (a) What are the objectives of applying an automatic controller to a process? Compare proportional control with on-off control. (10)
- (b) With the help of an example, explain the working of transducing devices. (10)

MODULE - V

- IX. (a) Describe the various applications of mass spectroscopy. (10)
- (b) Discuss the role of UV spectroscopy in water and waste water analysis. (10)
- OR
- X. (a) Explain how X-ray diffraction can be used for establishing the structure of ceramic materials. (10)
- (b) Discuss the advantages and disadvantages of visible spectroscopy. (10)

\*\*\*