

M. TECH. -I (CHEMICAL ENGINEERING) (CBCS - 2015  
COURSE) : SUMMER - 2018

SUBJECT: THERMODYNAMICS OF PHASE EQUILIBRIA

Day: Friday  
Date: 01-06-2018

Time: 11:00AM TO 2:00 P.M.  
Max. Marks: 60

S-2018-2992

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable calculator is allowed.
- 4) Answer to both the sections should be written in the **SEPARATE** answer book.
- 5) Assume suitable data, if necessary.

SECTION - I

Q.1 What is ideal solution? Describe Lewis-Randall law with significance. (10)

OR

Q.1 Derive the Claperon equation using the criterion of equilibrium. (10)

Q.2 Explain Henry's law in context to solubility of gas in liquid. (10)

OR

Q.2 Write short note on: (10)

- i) Vapor - liquid equilibrium in non-ideal mixtures.
- ii) Vapor - liquid equilibrium in ideal mixtures

Q.3 What are colligative properties? Explain any one. (10)

OR

Q.3 Explain in details about distribution coefficient with an example. (10)

SECTION - II

Q.4 a) Explain the concept of reaction coordinates. (05)

b) For the following reaction:  $CH_4 + H_2O \rightarrow CO + 3H_2$  (05)

Determine expression for the mole fraction  $y_i$  as function of  $E$  where initial condition are 2 mol of  $CH_4$ , 1 mol of  $H_2O$ , 1 mol of  $CO$  and 4 mol  $H_2$ .

OR

Q.4 Explain equilibrium criteria for chemical reaction in multiphase system, with an example. (10)

Q.5 Explain surface effects on heterogeneous phase equilibria. (10)

OR

Q.5 Explain effects of bubble size on the boiling temperature of pure substance. (10)

Q.6 What is exergy? Explain how the maximum useful work that can be obtained from the system. (10)

OR

Q.6 Explain solubilities of weak acids and weak bases. (10)

\* \* \* \* \*