

**A 12**

**Sreenidhi Institute of Science & Technology**

(An Autonomous Institution)

**Code No: 121BT02**

**B. TECH. I – Year II – Semester Examinations, July, 2014 (Regular)**

**PROCESS ENGINEERING CALCULATIONS (BT)**

**Time: 3 Hours Max. Marks: 70**

**Note: No additional answer sheets will be provided.**

**Part-A**

**Max.Marks:20**

**Answer all QUESTIONS.**

1. What procedures are employed for calculating Enthalpy changes?

2. Define: i. Saturation ii. Partial Saturation**.**

3. Explain the general Energy balance expression for an open system.

4. Give the definitions of following:

i. Mole fraction ii. Mass fraction.

5. What is the density of N2 at 270 and 100 kpa expressed in

i. SI units ii. American Engineering units

6. i) Explain the principle involved in distillation.

ii) Define Relative saturation and molal saturation.

7. Give the microscopic energy balance equation for a generalized system.

8. Give the meaning for the following.

i. Isothermal ii. Isobaric iii. Adiabatic

9. Give the unsteady state mass balance equation for a CSTR in which A  B, Isothermal first or derreaction.

10. Establish the material balance equation for a fed-batch reactor.

**Part – B**

**Max. Marks: 50**

**ANSWER ANY FIVE QUESTIONS. EACH QUESTION CARRIES 10 MARKS.**

1. An aqueous solution of K2CO3 contains 50 % salt and specific gravity of the solution is 1530 Kg/m3. Determine the following: (a) Mole percent of the salt in the solution.

(b) Volume percent of water, assuming the density of the water is 1000 kg/m3 and there is no volume change on mixing. (c) Molality of the solution.

(d) Molarity of the solution. (e) Normality of the solution.

2. What is the vapor pressure plot? Explain. Also discuss the effect of temperature and pressure on vapor pressure.

3. Mention the steps involved in doing Material and Energy balances.

4. With the help of neat flow chart explain Recycle, By pass and Purge Process.

5. a) Define Enthalpy and mention the steps involved in doing Enthalpy calculations.

b) Differentiate between wet bulb temperature and dry bulb temperature.

6. Discuss the significance of psychrometric charts. How are they constructed? Explain in detail.

7. Develop the performance equation of an ideal CSTR?

8**.** The percent absolute humidity of air at 860 and a total pressure of 750 mm Hg is 20%. Calculate

i. Percent relative humidty. ii.Partial pressure of water vapour in air., iii.Dew point of air ?

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