Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov/Dec – 2019**

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| **Code :** | **14BT2003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **PRINCIPLES OF CHEMICAL ENGINEERING** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. |  | Air is pumped through an orifice immersed in liquid. The size of the bubbles leaving the orifice depends on the diameter of the orifice and the properties of the liquid.  The equation representing this situation is  where g = gravitational acceleration =32.174 ft/s2, ρL = liquid density = 1 gm/cm3, ρG = gas density = 0.081 lb/ft3 , Db = bubble diameter, σ = gas –liquid surface tension = 70.8 dyn/cm,  Do = orifice diameter = 1 mm, Calculate bubble diameter Db in cm. | CO1 | 20 |
| **(OR)** | | | | |
| 2. |  | Explain the concept of drying and mechanism of rotary dryer with suitable mass balance equation. | CO3 | 20 |
|  |  |  |  |  |
| 3. |  | The solubility of sodium chloride in water at 290K is 35.8 kg/100 kg of water. Express the solubility as the following.  i) Mass fraction and mass percent of NaCl, ii) Mole fraction and mole percent of NaCl, iii) KmolNaCl per 1000 kg of water. | CO2 | 20 |
| **(OR)** | | | | |
| 4. | a. | Develop the equation of ideal gas law with suitable assumptions. | CO2 | 10 |
| b. | An automobile tyre is introduced to a pressure of 195 kPa at 273 K. If the pressure inside the tyre is not exceed to 250kPa, what is the maximum temperature to which the tyre may be heated? | CO2 | 10 |
|  |  |  |  |  |
| 5. | a. | Coal contains 85% carbon and 15% ash. The cinder formed in the combustion of coal contains 80% ash and 20% carbon. Determine the weight of cinder formed by the combustion of 100 kg coal and the percentage of carbon converted to cinder. | CO3 | 16 |
| b. | Define tie element with suitable example. | CO3 | 4 |
| **(OR)** | | | | |
| 6. |  | Explain the mechanism of Evaporation with a suitable diagram of short tube evaporator. | CO3 | 20 |
|  |  |  |  |  |
| 7. |  | Explain the mechanism of triple effect evaporator system with suitable diagram and mass balance equations. | CO3 | 20 |
| **(OR)** | | | | |
| 8. |  | Derive the theory of batch filtration with suitable equations. | CO3 | 20 |
|  | | **Compulsory**: |  |  |
| 9. |  | Explain the mechanism of Filtration process in terms of solid –liquid separation with suitable equations. | CO3 | 20 |