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



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

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| **Code :** | **14BT2051** | **Duration :** | **3hrs** |
| **Sub. Name :** | **PILOT PLANT AND SCALE UP PRACTICE** | **Max. Marks :** | **100** |

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

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| **Q. No.** |  | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. |  | Discuss the principles of similarity. | CO1 | 20 |
| **(OR)** | | | | |
| 2. |  | The velocity **V** of a fluid beyond which streamline force cease and turbulence begins depends on the radius **r** of the tube, density **ρ** andviscosity **η** of the fluid**.** Using the dimensional analysis, obtain an expression which relates **V,r, η** and **ρ.** | CO1 | 20 |
|  |  |  |  |  |
| 3. |  | Enumerate the plant design factors. | CO1 | 20 |
| **(OR)** | | | | |
| 4. |  | Describe the safety factors followed in the pilot plant design. | CO1 | 20 |
|  |  |  |  |  |
| 5. |  | Explain the steps involved in the design of heat exchanger. | CO1 | 20 |
| **(OR)** | | | | |
| 6. |  | An evaporator is fed with 15,000kg/hr of solution containing 5% solute by weight. The feed is at 35°C which is concentrated to a solution of 25% solute per weight. The evaporator is operating with atmospheric pressure in the vapour space. Steam is supplied 1.4 kg/cm3.Boiling point evalution is negligible. Properties of solution may be taken as that of water. 750 kcal/hr m2°C may be taken as overall heat transfer coefficient of evaporator. Calendria is of mild steel tubes inner diameter 16mm,outer diameter 19mm and 24mm triangular pitch may be assumed. Design an evaporator. | CO2 | 20 |
|  |  |  |  |  |
| 7. |  | Explain the steps involved in the design of rotary dryer. | CO2 | 20 |
| **(OR)** | | | | |
| 8. |  | A dryer using counter current flow is to be used to dry 11363kg/hr of wet solid containing 5%weight water to 0.1% weight. The wet solid enters the dryer at 26°C. Ambient air inside 26°C dry bulb temperature and 17°C wet bulb temperature will be heated to 150°C in a first tube heater using steam at 10.5kg/cm2. The specific heat of solid salt is 879.2J/kg K. Estimate the length and diameter of the dryer required. | CO2 | 20 |
|  | | **Compulsory**: |  |  |
| 9. |  | Define the following:  a)GMP and SOP b)Law of Dimensional analysis  c)Laupichler’s equation d) Buckingam’s theorem equation  e)Analog model f)Unit and system of unit  g)Four categories of physical quantities h)Pilot plant  i) Pilot plant scale up j) Limitations of Dimensional analysis. | CO3 | 20 |