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



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

|  |  |  |  |
| --- | --- | --- | --- |
| **Code :** | **14FP2010** | **Duration :** | **3hrs** |
| **Sub. Name :** | **UNIT OPERATIONS IN FOOD PROCESS ENGINEERING - II** | **Max. Marks :** | **100** |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Explain the steam distillation process and derive the equation for finding the quantity of feed supplied for distillation. | CO1 | 10 |
| b. | Justify that the binary mixer of gases moving in opposite direction will have same diffusivity coefficient. | CO1 | 10 |
| **(OR)** | | | | |
| 2. | a. | Discuss the construction and working of combined rectification and stripping process. | CO1 | 10 |
| b. | Differentiate extraction from distillation process. | CO1 | 10 |
|  |  |  |  |  |
| 3. | a. | Elaborate the multistage counter current extrators with a neat sketch. | CO2 | 10 |
| b. | List out the various applications of extraction in food processing. | CO1 | 10 |
| **(OR)** | | | | |
| 4. | a. | Demonstrate the super critical fluid extraction process(SCFE) in detail. | CO3 | 10 |
| b. | Write the merits and constraints of SCFE process. | CO2 | 10 |
|  |  |  |  |  |
| 5. | a. | An experiment was conducted to extract biocolour from carrot with water. The saturated concentration of the colour in water is found to be 1.5 kg/m3. In a lab scale extractor containing about one litre volume, it has taken 10 minutes to extract the colour from carrot to an extent of 985 ppm. Under similar condition in a commercial plant of 10 m3 capacity, it is desired to extract 12 kg of colour into the water. How much time does it take for extraction? | CO2 | 10 |
| b. | Interpret the various tray type absorption equipments. | CO3 | 10 |
| **(OR)** | | | | |
| 6. | a. | Analyze how adsorption takes place with the help of Fixed bed adsorbing unit. | CO3 | 10 |
| b. | Enlist the name of the adsorbents and their characteristics. | CO2 | 5 |
| c. | Write short notes on different packing materials used for tower packing. | CO2 | 5 |
|  |  |  |  |  |
| 7. | a. | Explain the construction and working of Draft Tube Baffle crystallizer (DTB) with a neat sketch. | CO3 | 10 |
| b. | Outline the applications of crystallization in food industries. | CO3 | 10 |
| **(OR)** | | | | |
| 8. | a. | Evaluate the various membrane modules used in separatiom processes. | CO2 | 10 |
| b. | Anultrafiltration membrane was examined microscopically and found to have about 2,00,000 pores with an average diameter of 0.6 x 10-6 m per mm2 of membrane surface. The thickness of the membrane is 140x10-6 m. The viscosity of the permeate is 0.0013 Pa.s. Estimate the following : a) Porosity of the membrane (€), b) Hydraulic Permeability (LP) and c) Permeate Flux(J) for a Trans membrane Pressure Difference(∆PTM) of 1.5 Pa. | CO2 | 10 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. |  | Compose the materials used in membrane making and discuss the different types of membrane separation process. | CO3 | 20 |