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



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

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| **Code :** | **14FP2007** | **Duration :** | **3hrs** |
| **Sub. Name :** | **UNIT OPERATIONS IN FOOD PROCESS ENGINEERING – I** | **Max. Marks :** | **100** |

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

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Discuss the different methods of moisture measurement. | CO1 | 10 |
| b. | Calculate the amount of moisture evaporated from 200 kg of sorghum for drying it from an initial moisture content of 26 per cent(wet basis) to a final moisture content of 14 per cent (wet basis). Apply both dry and wet basis methods. | CO1 | 10 |
| **(OR)** | | | | |
| 2. | a. | Explain the principle and working of spray dryer with a neat sketch. | CO2 | 10 |
| b. | Elaborate the fluidization process in detail with suitable diagrams. | CO2 | 10 |
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| 3. | a. | Explain the principle and working of plate and frame filter press with a neat sketch. Also enumerate the applications of filtration in food processing. | CO2 | 15 |
| b. | Calculate the settling velocity of food particles of 0.5 mm diameter in 20 percent salt solution of density 1135 kg/m3. The density of food particle is 1340 kg/m3 and the viscosity of the solution is 1.2 x 10-3 Pa.s. | CO3 | 5 |
| **(OR)** | | | | |
| 4. | a. | Draw the figure of basket type centrifuge and explain its working. Write the applications of centrifugation in food processing. | CO2 | 10 |
| b. | A centrifuge is used to separate food particles fronm a solution. The particles have a diameter of 6.2 x 10-5 m and its density is 1025 kg/m3. The centrifuge rotates at 5000 rpm and the effective radius at which separation occurs is 3.5 cm. The density of the fluid is 950 kg/m3 and viscosity 1.28 x 10 -3 Pa.s. Calculate the following:  i) angular velocity and  ii) settling velocity of the particle in the centrifuge. | CO3 | 10 |
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| 5. | a. | Explain the different types of feeding methods in triple effect evaporators with suitable figures. | CO2 | 15 |
| b. | An evaporator is used to concentrate fruit juice. A feed of 1000 kg/day of juice containing 30% sugar is evaporated producing a 68% solution.  i) Draw the process flow diagram and indicate the inputs and outputs.  ii) Calculate the weight of solution produced and amount of water evaporated. | CO1 | 5 |
| **(OR)** | | | | |
| 6. | a. | Draw a neat sketch of long tube rising film evaporator and explain its working process. | CO2 | 10 |
| b. | Demonstrate the working of vertical short tube evaporator with diagram. | CO2 | 10 |
| 7. | a. | Describe the working of kneader with a neat sketch and enumerate the applications of mixing in food processing. | CO2 | 10 |
| b. | During the preparation of a dough, 5 kg of sugar was mixed with 995 kg of flour in a sigma mixer. Three samples were taken after 10 minutes of mixing and analysed for the percentage of sugar in the mixture. The results were : 0.72, 0.84, 0.78. Calculate the mixing index and the time required for perfect mixing. Consider σα = 0.01 | CO3 | 10 |
| **(OR)** | | | | |
| 8. | a. | Explain the principle and working of ribbon mixer with a neat sketch. | CO1 | 10 |
| b. | Draw a neat diagram of planetary mixer and explain its working. | CO1 | 10 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | Explain the working of different types of disc attrition mills with suitable diagrams. | CO2 | 10 |
| b. | Draw the figure of hammer mill and explain its working. | CO2 | 10 |