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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec – 2017**

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| **Code :** | **14FP3019** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ADVANCES IN FOOD PROCESS 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. | a. | Generalize the concept of thermal methods of food process, mention their advantages and disadvantages. | CO 1 | 10 |
|  | b. | State the purpose of freeze concentration and describe the process. | CO2 | 10 |
| (OR) | | | | |
| 2. | a. | A specific culture containing 900 spores/ml is divided among several containers and is subjected to a temperature 245° F for different time up to 50 min. The number of survivors/ml is given below after 50 min.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Time (min) | 0 | 10 | 20 | 30 | 40 | 50 | | Spores/ml | 900 | 200 | 30 | 9 | 2 | 0.3 |   Plot the data in a graph sheet and find out the D value and the slope | CO 1 | 10 |
|  | b. | Compare the ratio of destruction of Bacillus stereothermophillus which is having a D121, 4 mins and Z is 7°C. Compare the determination of B. stereothermophillus with browning of milk, which is having a D value of 1 min and Z value of 20°C at 121, 131, 141 and 151°C. | CO1 | 10 |
|  | | | | |
| 3. | a. | Calculate the lethality rate for the give kinetic data using improved general method. TDT is characterized by an Fo (at 121.1°C) of 2.52 min with az value of 10°C.  **Time (min):** 0, 5,10,15,20,25,30,35,40,45,50,55,60,65,70,75,80,85 and 90  **Temp.(ºC):**60,65,70,78,86,93,102,110,115,118,120,121,121,118, 111,101,85,74 and 60 | CO 1 | 10 |
|  | b. | Appraise the ohmic heating process. | CO 2 | 10 |
| (OR) | | | | |
| 4. |  | Draw and describe the construction and working of spray dryer, list out the merits and demerits of spray drying process. | CO 3 | 20 |
|  | | | | |
| 5. | a. | Orange juice with an initial moisture content of 390% (dry-weight basis) is poured into 0.3 cmlayers in a tray placed in a freeze drier operating at 40 Pa. It is to be dried to 10% moisture (dry-weight basis) at a maximum surface temperature of 60ºC. Assuming that the pressure at the ice front remains constant at 80 Pa, calculate (a) the drying time and (b) the drying time if the layer of food is increased to 0.6 cm and dried under similarconditions. (Additional data: the dried food has a thermal conductivity of 0.04 W/mK, a density of 470 kg /m3, a permeability of 2.4 x10-8 kg/s and the latent heatof sublimation is 2.95 x 103 kJ/ kg.) | CO 2 | 15 |
|  | b. | The activation energy for vitamin C thermal destruction for 11.2º Brix grape fruit juice was calculated to be equal to 4.98 kcal/mol based on k values between 65 and 93ºC. Calculate the z value for vitamin C thermal destruction in grapefruit juice. |  | 5 |
| (OR) | | | | |
| 6. |  | Explain the process of irradiation and mention the various changes that is taking place in the food constituents. | CO 2 | 20 |
|  | | | | |
| 7. |  | Generalize the concept of HPP, state the principle, describe equipment and list out the suitability of process to products. | CO 3 | 20 |
| (OR) | | | | |
| 8. | a. | Express your idea about aseptic processing of foods. | CO 1 | 10 |
|  | b. | Extend your knowledge on osmotic dehydration process. | CO 2 | 10 |
|  | |  |  |  |
|  | | **Compulsory:** |  |  |
| 9. |  | Explain in detail about membrane separation process and its application in food industry. | CO 3 | 20 |

ALL THE BEST