Register No.: ..... Name: .....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIFTH SEMESTER B.TECH DEGREE EXAMINATION (Regular), DECEMBER 2022 FOOD TECHNOLOGY

(2020 SCHEME)

Course Code: **20FTT303**

Course Name: **Unit Operations in Food Processing**

Max. Marks: **100** **Duration: 3 Hours**

Assume missing data suitably

PART A

(Answer all questions. Each question carries 3 marks)

1. Write the principle of evaporation
2. List out the factors affecting rate of evaporation
3. Comment on filter aid and its types
4. List out the equipment's used for filtration
5. Write short notes on mixing index
6. Determine the theory of solid mixing
7. Explain multistage counter current extraction
8. Write short notes on extraction equipment's
9. Differentiate between distillation and extraction
10. Explain when steam distillation is used in food processing?

PART B

(Answer one full question from each module, each question carries 14marks)

MODULE I

11. a) Explain in brief forced circulation evaporator with an external horizontal heating surface with reference to its construction and working. (7)

    b) A solution containing 10 % solids is to be concentrated to a level of 50 % solids. Steam is available at a pressure of 0.20 MPa [saturation temperature of 393 K (120°C)]. Feed rate to the evaporator is 30000 kg/h. The evaporator is working at reduced pressure such that boiling point is 323 K (50°C). The overall heat transfer coefficient is 2.9 kW/(m²/K). Estimate the steam economy and heat transfer surface for: (i) Feed introduced at 293 K (20°C) (ii) Feed introduced at 308 K (35°C). Data: Specific heat of feed = 3.98 kJ/(kg·K) Latent heat of condensation of steam at 0.20 MPa = 2202 kJ/kg Latent heat of vaporization of water at 323 K (i.e. at pressure in the vapor space = 2383 kJ/kg). (7)

OR

12. a) Draw neat diagrams of mixed feed arrangement and parallel feed arrangement (7)
    b) Compare falling film and rising film evaporator (7)

MODULE II

13. a) Explain working of plate and frame filter with a neat diagram (7)
    b) Derive the expression for constant rate and constant pressure filtration (7)

OR

14. a) Compare Rotary filters and centrifugal filters (10)
    b) What is the relevance of specific cake resistance in filtration? (4)

MODULE III

15. a) Explain the working of mixers used for high- medium-viscosity liquids (7)
    b) Determine the theory of liquid mixing (7)

OR

16. a) What are the criteria of mixer effectiveness? (7)
    b) Describe the working of impeller mixers (7)

MODULE IV

17. a) Define liquid extraction and state briefly the fields of application of extraction (7)
    b) Describe on any two liquid-liquid extraction equipment (7)

OR

18. a) Explain liquid-liquid extraction using triangular diagram (7)
    b) Explain the mechanism and working of supercritical fluid extraction (7)

MODULE V

19. a) What is Osmotic Distillation? Describe the application in food processing (7)
    b) Explain Mc-Cabe Thiele method. (7)

OR

20. a) Explain vacuum distillation with neat diagram (7)
    b) Elaborate on Tray column and describe its parts (7)

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