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Question Paper Code: 1085096

B.E. / B.Tech. DEGREE EXAMINATIONS, NOV/ DEC 2024  
Fifth Semester  
Department of Agricultural Engineering  
U20AG502 – UNIT OPERATIONS IN AGRICULTURAL PROCESSING  
(Regulation 2020)

Time: Three Hours

Maximum: 100 Marks

Answer ALL questions

PART – A

(10 x 2 = 20 Marks)

1. State boiling point elevation.
2. Define circulation evaporator.
3. Enlist the requirement of a good filter media.
4. Define Attrition Mill.
5. State Rittinger's law.
6. Classify the different types of crushers.
7. List out the different types of leaching.
8. Define Raoult's law with an equation.
9. Explain steam distillation.
10. Define crystallization.

PART – B

(5 x 16 = 80 Marks)

11. (a) How much water would be required in a jet condenser to condense the vapours from an evaporator evaporating  $5000 \text{ kg h}^{-1}$  of water under a pressure of 15 cm of mercury? The condensing water is available at  $18^\circ\text{C}$  and the highest allowable temperature for water discharged from the condenser is  $35^\circ\text{C}$ . (16)

(OR)

- (b) Estimate the requirements of steam and heat transfer surface, and the evaporating temperatures in each effect, for a triple effect evaporator evaporating  $500 \text{ kg h}^{-1}$  of a 10% solution up to a 30% solution. Steam is available at 200 kPa gauge and the pressure in the evaporation space in the final effect is 60 kPa absolute. Assume that the overall heat transfer coefficients are 2270, 2000 and  $1420 \text{ J m}^{-2} \text{ s}^{-1} \text{ }^{\circ}\text{C}^{-1}$  in the first, second and third effects respectively. Neglect sensible heat effects and assume no boiling-point elevation, and assume equal heat transfer in each effect. (16)

12. (a) (i) Demonstrate the operation of Gas-solid cyclone separator with neat sketch. (12)  
(ii) Write short note on gas absorption equipment. (4)

(OR)

- (b) (i) Summarize the criteria for selection of filter press. (8)  
(ii) Explain the sedimentation process in simple gravity settling tank. (8)
13. (a) Classify the size reduction equipment. Explain in detail about all types of crushers used in agricultural operations with neat sketch. (16)

(OR)

- (b) Classify the types of grinders and Explain in detail about any two with neat sketch. (16)
14. (a) Derive an equation for constant equilibrium stage operating condition. (16)

(OR)

- (b) Explain briefly about the Rate of Gas absorption and Stage Equilibrium Gas absorption. (16)
15. (a) Discuss in detail about the draft – tube –baffle crystallizer (16)

(OR)

- (b) Explain briefly about the continuous distillation with rectification. (16)