Reg. No. : | | | | | | | | | | | | |

Question Paper Code: R3A02

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Third Semester

Agricultural Engineering

R21UAG302 – UNIT OPERATIONS IN AGRICULTURAL PROCESSING

(Regulations R2021)

Duration: Three hours | Maximum: 100 Marks

PART A - (10 x 1 = 10 Marks)

1. Diameter of the cylinder in short tube evaporator is…… CO1 –U

   a) 2.5 m | b) 40-80 mm

   c) 2.5 cm | d) 40- 80 cm

2. ……is the methods to protect food from unwanted microbial growth CO1 – U

   a) Food preservation | b) Food processing

   c) Sterilization | d) Pasteurization

3. Solids particles are trapped inside the filter medium is called …….. CO1 – U

   a) Cake filtration | b) Deep bed filtration

   c) clarifying filtration | d) Both (b) and (c)

4. Identify the correct statement related to filter aid CO1 – U

   a) Free from moisture | b) Form a cake

   c) Not chemically inert | d) All the above

5. Choose the correct statement related to size reduction CO1 – U

   a) facilitating mixing and blending | b) uneven particle size distribution

   c) Both (a) and (b) | d) None of the above

6. Choose the correct one related to size reduction factors CO1 – U

   a) Stickiness | b) Slipperiness

   c) Hardness | d) All the above

7. Identify the correct statement related to liquid mixing CO1 – U

a) Propeller b) Turbine c) Paddles d) All the above

8. ……. is a convective type mixer for particulate solids CO1 – U

a) Paddle mixer b) Tumbler mixer

c) Double cone blender d) Both (a) and (b)

9. Which of the following is crystallization? CO1 – U

a) Solid-solid separation b) Solid-liquid separation

c) Solid-gas separation d) Liquid- gas separation

10. What do you mean by crystallization? CO1 – U

a) Concentration of atoms into a highly structured form

b) Solidification of atoms into a highly structured form

c) Solidification of solution

d) Concentration of solution

PART – B (5 x 2= 10Marks)

11. Write about food processing and types of food processing. CO1 – U
12. Difference between filtration and sedimentation CO2 – U
13. Give a neat sketch of hammer mill and plate mill. CO1 – U
14. Give a list of equipment used in solid mixing and explain any one of them. CO1 – U
15. Explain about crystallization and types of crystallization CO1 – U

PART – C (5 x 16= 80Marks)

16. (a) Classify different types of evaporators and explain the natural circulation evaporator with appropriate diagram? CO1 -U (16)

Or

(b) Design an evaporation system for concentrated juice using once-through and circulation evaporators. How would you maximize energy efficiency and product quality? CO2 -U (16)

17. (a) In designing a filtration system for a chemical processing plant, explain how you would apply the construction and working principles of a plate and frame filter. Describe how you would configure the filter to handle different types of slurries and adjust operating conditions to achieve efficient filtration and cake washing CO2 -App (16)

Or

(b) For a wastewater treatment plant, select and apply appropriate filtration equipment (e.g., rotary vacuum filter or filter press) based on the type of particles and fluid characteristics. Justify your choice and describe how you would optimize the filtration process. CO2 -App (16)

18.	(a)	"Analyze the particle size distribution produced by different size reduction equipment (e.g., jaw crusher, hammer mill, and crushing rolls) when processing a specific raw material. How does the choice of equipment impact the uniformity and quality of the final product?	CO3 -Ana	(16)
		Or		
	(b)	Compare the crushing efficiency of jaw crushers versus gyratory crushers in terms of power consumption and throughput. Analyze how the design and operation of each type of crusher influence their efficiency in processing hard versus soft materials	CO3 -Ana	(16)
19.	(a)	Discuss about solid mixing and explain equipment used in solid mixing.	CO1 -U	(16)
		Or		
	(b)	Outline the different types of mixers used for low- and medium-viscosity liquids. Describe their construction, operating principles, and typical applications in the food industry.	CO1 -U	(16)
20.	(a)	Describe the working principle of batch, steam, vacuum and differential distillation process with neat sketch.	CO2 -U	(16)
		Or		
	(b)	Discuss the classification of crystallizers. Provide an overview of different types, including tank crystallizers and agitated batch crystallizers, and explain their suitability for various industrial applications.	CO1 -U	(16)