KERALA AGRICULTURAL UNIVERSITY
B. Tech.(Food Technology) 2023 & previous admission
V Semester Final Examination – January 2026

Pafe.3127　　　　　　**Food Process Equipment Design (2+1)**　　　　**Marks: 50**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　Time: 2 hours

I　　**Fill in the blanks**　　　　　　　　　　　　　　　　　　　　**(10x1=10)**
　　1.　The volume of ice is about …..……. per cent greater than that of pure water hence expansion of food after freezing is expected.
　　2.　The space between the successive idlers should be approximately …..……..times to the width of belt.
　　3.　Steam injection and Steam infusion are ………… heat exchanger.
　　4.　It is generally agreed that the reaction rate is reduced by half by lowering the temperature by ……….°C.
　　5.　Dimensional limitation of Staggered Baffles is typically ………. of the tank diameter.
　　6.　The capacity of belt conveyor can be calculated as:
　　　　Capacity,m^3/h = (area of cross-section, m^2) x (………………) x 60
　　7.　Cyclone is a device which removes the bulk of the product particle from the conveying air stream by …………. force.
　　8.　…………. law is related to cooling of a substance.
　　9.　A shell and tube heat exchanger consists of a ………………… and a bundle of tubes.
　　10.　Stoke's law is used to find out …………………..

II　　**Write short notes on ANY FIVE of the following**　　　　　　**(5x2=10)**
　　1.　Enumerate the factors affecting bucket elevator's capacity.
　　2.　Define a pressure vessel based on diameter and pressure difference.
　　3.　Enlist Types of Baffles.
　　4.　Define HUF.
　　5.　Suggest and justify an economical and safe pressure vessel head for pressure up to 0.5 N/mm2.
　　6.　Suggest and justify an Agitator for Viscous Liquid during the Process of Thawing.
　　7.　Enlist two important suggestions to improve dryer performance.

III　　**Answer ANY FIVE of the following**　　　　　　　　　　　　**(5x4=20)**
　　1.　A milk chilling unit can remove heat from the milk at the rate of 41.87 MJ/hr. Heat leaks into the milk from the surroundings at an average rate of 4.187 MJ/hr. Find the time required for cooling a batch of 500 kg of milk from 45°C to 5°C . Take C_p of milk as 4.187 kJ/kg°C .
　　2.　Discuss important characteristics to be considered for selection of material of construction of any food equipment.
　　3.　Discuss major factors to be considered in selection of a dryer.
　　4.　Discuss the basic data/parameters needed for design of a pressure vessel.
　　5.　What are the various food handling equipment used in the food industry? Describe any one.
　　6.　Develop heat exchanger effectiveness equation for parallel flow and what does it mean?
　　7.　Design a solid agitator shaft for the process of agitation if maximum bending moment and maximum torque developed in the process are 220 and 120 Nm respectively. The material of the shaft have safe permissible tensile stress at the operating condition is 450 N/cm2 and shear stress is 66% of the tensile stress.