Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – WINTER 2018

Subject Code:2161403 **Date:20/11/2018**

Subject Name:Food Engineering Operations - II

Time: 02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Compute the horse power requirement for homogenization if flow is 2000 l/h at 250 kg/cm^2. **03**

(b) Do as directed. **04**

i) State the indicator micro-organism for milk pasteurization.
ii) An excessive agitation in liquid food products is not recommended. Justify the statement.
iii) Define Vacreation.
iv) State the temperature range and time for UHT processing.

(c) What do you understand by flash distillation? Derive Rayleigh equation and state its applications. **07**

Q.2 **(a)** Briefly explain Schiebel column. **03**

(b) Explain the principle and working of rotocel extractor. **04**

(c) An aqueous ethanol solution, containing 32% in weight of the volatile component, is continuously fed to a rectification column with an objective to obtain two streams containing 80% and 8% in weight of ethanol. Also, it is desired to obtain a third stream containing 28% of the alcohol that is introduced, with feed its ethanol content 72% in weight. Calculate the number of theoretical plates for reflux ratio as 2. Assume that the feed is at its boiling point **07**

OR

(c) Explain in detail about crystal growth and magma. **07**

Q.3 **(a)** What are advantages of direct heating systems in sterilization plants? **03**

(b) Differentiate between first stage and second stage of homogenization. **04**

(c) Derive an equation for microbial inactivation rate. Highlight briefly on D value, Z value and F value. **07**

OR

Q.3 **(a)** Find the velocity at which the fat globules will begin to move upward, towards the surface in case of centrigugal separation. **03**

Given Parameters:

i. Diameter = 3 μm = 3×10^{-6} m

ii. $(\rho_s - \rho_f) = 48$ kg/m^3

iii. $\mu = 1.42$ cp

iv. R = 0.2 m

v. n= 5400 rpm

(b) Find two equivalent processes of 100^0C and 150^0C, which will deliver the same lethality as required F_{121} value of 4.5 minutes, Z value = 10.5^0C. **04**

(c) Discuss the effect of homogenization treatment on product attributes. **07**

Q.4 **(a)** Introduce briefly. **03**

i) Clarifixation

ii) Stoke's law

iii) 12 – D Process

(b) Differentiate between clarifiers and separators. **04**

(c) Discuss the factors affecting gravity separation of liquid food products. **07**

OR

Q.4 **(a)** Write short notes on Bactofugation treatment. **03**

(b) Draw a neat and well labeled HTST pasteurization processing representation along with product flow and accessories/equipments in place. **04**

(c) Enlist different types of material fouling on heat exchanger. Discuss the factors affecting fouling. **07**

Q.5 **(a)** Highlight on leaching and its application in food industry. **03**

(b) Write short notes on double pipe scrapped surface crystallizer. **04**

(c) What do you understand by cake filtration? State the significance of filter aid in filtration. **07**

OR

Q.5 **(a)** Highlight on immersion freezing and its application. **03**

(b) What do you understand by IQF freezing and Air blast freezing? **04**

(c) Derive an equation for recovery of two stage liquid – liquid extraction process. Sketch out and explain equilateral triangular diagram for single stage extraction. **07**

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