Course Code: 16AG716 **R16**

SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
(AUTONOMOUS)
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QUESTION BANK (DESCRIPTIVE)

Subject with Code : Dairy and Food Engineering (16AG716) **Course & Branch**: B.Tech – AG

Year & Sem: IV-B.Tech & I-Sem **Regulation:** R16

UNIT-I

DAIRY DEVELOPMENT IN INDIA, COMPOSITION, PROPERTIES AND UNIT OPERATIONS OF MILK

1.	**a.**	What is NDDB? When this act was established in India.	[L1][CO1]	**[3M]**
	b.	Define and distinguish between the different forms of milk and milk products	[L4][CO1]	**[9M]**
2.		Define milk and write about the importance of milk in national scenario.	[L1][CO1]	**[12M]**
3.	**a.**	What are the important properties of milk, which affect the processing	[L1][CO1]	**[6M]**
	b.	Explain the factors which are affecting composition of milk	[L2][CO1]	**[6M]**
4.	**a.**	Write short notes on density and specific gravity of milk. Also explain the determination of specific gravity by Lactometer	[L2][CO1]	**[8M]**
	b.	If the Lactometer reading becomes 31.0 at 66°F, what is the corrected specific gravity of milk?	[L3][CO]	**[4M]**
5.	**a.**	How the density and viscosity of milk affect the milk processing operations?	[L1][CO1]	**[4M]**
	b.	Differentiate between boiling point and freezing point of milk	[L4][CO1]	**[4M]**
	c.	Write about Total solids and total SNF. What is the amount of total solids and SNF with a milk having 3% fat and density of milk is 1016 kg/m^3 (@20°C).	[L3][CO1]	**[4M]**
6.	**a.**	Discuss about colour, flavor and refractive index of milk.	[L2][CO1]	**[9M]**
	b.	Define overrun with related expressions.	[L3][CO1]	**[3M]**
7.	**a.**	Wtrie about Centrifugation and what are the major appications of centrifuges	[L1][CO1]	**[9M]**
	b.	Write down the application of Disc bowl centrifuge	[L1][CO1]	**[3M]**
8.	**a.**	Explain the working principle of Tubular bowl centrifuge with neat sketch.	[L2][CO1]	**[5M]**
	b.	Explain the working principle of Disc centrifuge with neat sketch	[L2][CO1]	**[7M]**
9.	**a.**	Write about the colostrum	[L1][CO1]	**[6M]**
	b.	What are the changes occurred during boiling of milk	[L1][CO1]	**[6M]**
10.		Duscuss specific heat, thermal conductivity, pH, acidity, surface tension and expansion of milk	[L2][CO1]	**[12M]**

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UNIT-II

MILK RECEIVING, PROCESS FLOW CHARTS, PASTEURIZATION AND STERILIZATION OF MILK

1.		Write short notes on a) Milk reception by cans b) Receiving of bulk milks c) Milk transport tanks d) Accessories in storage tank (explain and indicate why they are essential) e) Sanitation of milk storage tank	[L1][CO2]	**[12M]**
2.	**a.**	What are the methods for measuring bulk milk?	[L1][CO2]	**[4M]**
	b.	What are the important considerations during unloading of bulk milk tanks?	[L1][CO2]	**[4M]**
	c	Explain the different types of milk silos.	[L2][CO2]	**[4M]**
3.	**a.**	Draw the process flow chart for preparation of pasteurized milk	[L2][CO2]	**[6M]**
	b.	Draw the process flow chart for preparation of sterilised milk (In-bottle sterilization)	[L2][CO2]	**[6M]**
4.	**a.**	Draw the process flow chart for preparation of ice cream	[L2][CO2]	**[6M]**
	b.	Draw the process flow chart for preparation of cheddar cheese	[L2][CO2]	**[6M]**
5.	**a.**	You have received 100 kg of cow milk with 4.5% fat. How much water is to be added to it to make it to 3% fat?	[L3][CO2]	**[4M]**
	b.	You are having 100 kg of the milk with 2% fat. What should you do to get the final fat of 3%?	[L3][CO2]	**[4M]**
	c.	What should be the ratio of the milk with 4.5% fat and water to be added so that the final milk is of 3% fat?	[L3][CO2]	**[4M]**
6.	**a.**	What should be the ratio of milk with 3% fat and cream with 45% fat to get the final milk with 4.5% fat?	[L3][CO2]	**[6M]**
	b.	What should be the ratio of milk with 1.5% fat (doubled toned milk) and 80% cream to get the final milk with 3% fat?	[L3][CO2]	**[6M]**
7.	**a.**	Explain the differences between blanching, pasteurization and sterilization	[L2][CO2]	**[3M]**
	b.	Explain the basis of selection of temperature and time for pasteurization.	[L2][CO2]	**[3M]**
	c.	What are the different methods of vat pasteurization? Explain the specific care to be taken during batch type pasteurization with a mention of the pasteuriser controls.	[L2][CO2]	**[6M]**
8.	**a.**	Draw the flow chart of HTST pasteurization system and explain the flow process	[L2][CO2]	**[8M]**
	b.	How the temperature, flow rate and pressure are controlled in HTST pasteurisers?	[L1][CO2]	**[4M]**
9.		Define Sterilization. What are the objectives of sterilization. Explain the difference between the conventional canning and aseptic processing	[L2][CO2]	**[12M]**
10.		Write the classification of UHT sterilization process and draw the flow chart of a continuous UHT sterilization process	[L2][CO2]	**[12M]**

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UNIT-III

HOMOGENIZATION, PACKAGING, BUTTER MANUFACTURE AND DAIRY PLANT DESIGN AND LAYOUT

1.		Define homogenized milk. State the advantages of homogenization of milk. What are the four different forms of fat globules in milk?	[L1][CO3]	**[12M]**
2.		Explain the different parts of the homogenizer with suitable figures and also state their functions.	[L2][CO3]	**[12M]**
3.	**a.**	What are the pressure and temperature maintained during homogenization of milk? Why only those values?	[L2][CO3]	**[6M]**
	b.	Explain the effect of different operational parameters during homogenization	[L2][CO3]	**[6M]**
4.	**a.**	Define (a) Butterfat (b) AMF (c) Butter oil (d) Butter	[L1][CO3]	**[6M]**
	b.	Draw the flow chart for butter manufacture and state the principal equipment used.	[L2][CO3]	**[6M]**
5.	**a.**	What are the different types of butter making process?	[L1][CO3]	**[4M]**
	b.	Briefly describe (a) continuous floatation churns (b) ripening of cream (c) working of butter (d) main constituents of butter	[L2][CO3]	**[8M]**
6.		Explain butter yield calculations with related expressions.	[L2][CO3]	**[12M]**
7.	**a.**	What are the basic requirements of food packaging	[L1][CO3]	**[4M]**
	b.	Explain the packaging of milk, cultured milk, concentrated milk anddried milk products.	[L2][CO3]	**[8M]**
8.		Write short notes on i) Filling milk by gravity, ii) Piston type filling system iii) Metering cup filling system.	[L1][CO3]	**[12M]**
9.		What are the Requirements of planning layouts.	[L1][CO3]	**[12M]**
10.		Explain the different types of plant layouts.	[L2][CO3]	**[12M]**

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UNIT-IV
EVAPORATION OF MILK

1.	**a.**	Define evaporation. Write the objectives of evaporation.	[L1][CO4]	**[4M]**
	b.	What are the basic functions of an evaporator? Draw the schematic flow diagram of an evaporator to show the basic components of the evaporation system.	[L2][CO4]	**[8M]**
2.		Write different types of evaporators. Explain the short tube and long tube evaporators with neat sketch.	[L2][CO4]	**[12M]**
3.		Explain the design of single effect evaporator with neat sketch and related expressions.	[L2][CO4]	**[12M]**
4.		Explain the design of multiple effect evaporator with neat sketch and related expressions.	[L2][CO4]	**[12M]**
5.		Explain forced circulation and agitated thin film evaporator with neat sketch.	[L2][CO4]	**[12M]**
6.		Write the advantages and limitations of various methods of multiple effect evaporation.	[L1][CO4]	**[12M]**
7.	**a.**	Discuss about boiling point elevation.	[L2][CO4]	**[5M]**
	b.	What are the factors affecting the selection of an evaporator, rate of heat transfer, economy of operation and evaporation process?	[L1][CO4]	**[7M]**
8.		A single effect evaporator is required to concentrate a solution from 10% solids to 30% solids at the rate of 250kg of feed per hour. If the pressure in the evaporator is 77kPa absolute, and if steam is available at 200kPa gauge, calculate the quantity of steam required f er hour and the area of heat transfer surface if the overall heat transfer coefficient is 1700 $Jm^{-2}S^{-Io}C^{-I}$. Assume that the temperature of the feed is 18°C and that the boiling point of the solution under the pressure of 77kPa absolute is 91°C. Assume, also, that the specific heat of the solution is the same as for water, that is 4.186 x 10^3 $Jkg^{-I0}C^{-I}$, and the latent heat of vaporization of the solution is the same as that for water under the same conditions. From steam tables, condensing temperature of steam at 200kPa gauge (300kPa abs.) is 134°C and latent heat 2164 $kJkg^{-I}$; the condensing temperature at 77kPa (abs.) is 91°C and latent heat is 2281 kJ kg^{-1}.	[L3][CO4]	**[12M]**
9.		Apple juice is being concentrated in a natural-circulation single-effect evaporator. At steady-state conditions, dilute juice is the feed introduced at a rate of 0.67 kg/s. The concentration of the dilute juice is 11% total solids. The juice is concentrated to 75% total solids. The specific heats of dilute apple juice and concentrate are 3.9 and 2.3 kJ/(kg °C), respectively. The steam pressure is measured to be 304.42 kPa. The inlet feed temperature is 43.3°C. The product inside the evaporator boils at 62.2°C. The overall heat-transfer coefficient is assumed to be 943 W/(m 2 °C). Assume negligible boiling-point elevation. Calculate the mass flow rate of concentrated product, steam requirements, steam economy, and the heat-transfer area. From the steam table: Temperature of steam at 304.42 kPa =134°C; Enthalpy for saturated vapor at 134°C = 2725.9 kJ/kg; Enthalpy for saturated liquid at 134°C	[L3][CO4]	**[12M]**

		=563.41 kJ/kg; Enthalpy for saturated vapor at 62.2°C = 2613.4 kJ/kg.		
10.		Milk containing 3.7% fat and 12.8% total solids is to be evaporated to a produce a product containing 7.9% fat. What is the yield of product from 100 kg of milk and what is the total solids concentration in the final product, assuming that there are no losses during the process?	[L3][CO4]	**[12M]**

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UNIT-V
FREEZING, EXTRACTION, FILTRATION, MEMBRANE SEPARATION AND THERMAL PROCESSING

1.	**a.**	Explain the freezing of foods. Enlist the freezing equipment's.	[L2][CO5]	**[5M]**
	b.	Explain the working mechanism of air blast freezer with neat sketch.	[L2][CO5]	**[7M]**
2.		Derive the planks equation for predicting the freezing time with neat sketch.	[L3][CO5]	**[12M]**
3.		A spherical food product is being frozen in an air-blast freezer. The initial product temperature is 10°C and the cold air -40°C. The product has a 7 cm diameter with density of 1000 kg/m3, the initial freezing temperature is -1.25°C, the thermal conductivity of the frozen product is 1.2 W/(m K), and the latent heat of fusion is 250 kJ/kg. Compute the freezing time.	[L3][CO5]	**[12M]**
4.	**a.**	Define solvent extraction. Write the phases and types of solvent extraction.	[L1][CO5]	**[6M]**
	b.	Explain the general principles of extraction.	[L2][CO5]	**[6M]**
5.	**a.**	Enlist the types of extraction processes. Explain single stage batch processing.	[L2][CO5]	**[5M]**
	b.	Explain multistage countercurrent extraction with neat sketch.	[L2][CO5]	**[7M]**
6.	**a.**	Discuss leaching (solid-liquid extraction) of foods.	[L2][CO5]	**[6M]**
	b.	Explain the supercritical fluid extraction with neat sketch.	[L2][CO5]	**[6M]**
7.	**a.**	Discuss membrane processing and write the uses of membrane filtration.	[L2][CO5]	**[6M]**
	b.	Explain ultra filtration and write the characteristics of ultra fitration.	[L2][CO5]	**[6M]**
8.	**a.**	Discuss reverse osmosis and write the characteristics of reverse osmosis.	[L2][CO5]	**[6M]**
	b.	Write advantages, limitations and applications of reverse osmosis	[L1][CO5]	**[6M]**
9.		Discuss thermal processing of foods. Briefly explain thermal death time (F-value) and decimal reduction time (D-value).	[L2][CO5]	**[12M]**
10.	**a.**	Define Z-value and Q_{10}- value with related expression.	[L1][CO5]	**[6M]**
	b.	Explain the changes in milk produced by heating.	[L2][CO5]	**[6M]**

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