

CUET PG 2025 DAIRY TECHNOLOGY Question Paper with Solutions

Time Allowed :1 Hour 30 Mins	Maximum Marks :300	Total Questions :75
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General Instructions

Read the following instructions very carefully and strictly follow them:

1. The examination duration is 90 minutes. Manage your time effectively to attempt all questions within this period.
2. The total marks for this examination are 300. Aim to maximize your score by strategically answering each question.
3. There are 75 mandatory questions to be attempted in the Agro forestry paper. Ensure that all questions are answered.
4. Questions may appear in a shuffled order. Do not assume a fixed sequence and focus on each question as you proceed.
5. The marking of answers will be displayed as you answer. Use this feature to monitor your performance and adjust your strategy as needed.
6. You may mark questions for review and edit your answers later. Make sure to allocate time for reviewing marked questions before final submission.
7. Be aware of the detailed section and sub-section guidelines provided in the exam. Understanding these will aid in effectively navigating the exam.

1. NDDB at Anand (Gujarat) was set up in _____

- (A) 1987
- (B) 1990
- (C) 1980
- (D) 1982

Correct Answer: (A) 1987

Solution:

Step 1: Understanding the Concept:

The question asks for the setup year of the National Dairy Development Board (NDDB) located in Anand, Gujarat. It's important to distinguish between its initial founding and its establishment as a statutory body.

Step 2: Detailed Explanation:

The National Dairy Development Board (NDDB) was initially founded as a society in 1965. However, the Parliament of India passed the NDDB Act in 1987.

This Act declared the NDDB an institution of national importance and merged the former Indian Dairy Corporation with it, creating a new statutory corporate body.

Therefore, while the origins of NDDB trace back to 1965, its establishment in its current form as a statutory body occurred in 1987.

Given the options, 1987 is the correct answer referring to this significant legislative event.

Step 3: Final Answer:

Based on the establishment of NDDB as a statutory body by the NDDB Act, the correct year from the given options is 1987.

Quick Tip

In history-based questions, be aware of different key dates. A "founding" date can be different from a date it was granted "statutory status" or underwent a major reorganization. The options provided are often a clue to which specific event the question is targeting.

2. Jamunapari breed is a breed of-

- (A) Buffalo
- (B) Sheep
- (C) Cow
- (D) Goat

Correct Answer: (D) Goat

Solution:

Step 1: Understanding the Concept:

This question requires the identification of the animal species to which the Jamunapari breed belongs. This is a common type of question in agriculture and animal husbandry exams.

Step 2: Detailed Explanation:

The Jamunapari (also known as Jamnapari) is a well-known breed of domestic goat.

It originated in the Indian subcontinent, specifically in the Etawah district of Uttar Pradesh.

It is prized for both its milk production and meat, and it's one of the largest goat breeds.

It is easily recognizable by its large, drooping ears and prominent Roman nose.

Step 3: Final Answer:

The Jamunapari is a breed of goat.

Quick Tip

Creating flashcards for important livestock breeds (cows, buffaloes, goats, sheep, poultry) and their key characteristics (origin, primary use, distinguishing features) is an effective study method for this topic.

3. The approximate yield of ghee in kg from 100 kg buffalo milk is

- (A) 9.0
- (B) 4.0
- (C) 6.5
- (D) 5.0

Correct Answer: (C) 6.5

Solution:

Step 1: Understanding the Concept:

The yield of ghee from milk depends primarily on the fat content of the milk. Buffalo milk is known for its high-fat content compared to cow milk.

Step 2: Key Formula or Approach:

Ghee yield can be estimated based on the average fat percentage in the milk and the efficiency of the conversion process.

Ghee is essentially pure milk fat (clarified butter). The formula is:

$$\text{Ghee Yield} \approx (\text{Weight of Milk}) \times (\text{Fat } \%) \times (\text{Recovery Efficiency})$$

Step 3: Detailed Explanation:

1. Fat Content: Buffalo milk typically has a fat content ranging from 6% to 8%, with an average often considered around 7%.

2. Calculate Fat Mass: For 100 kg of buffalo milk with an average fat content of 7%, the total fat available is:

$$100 \text{ kg} \times \frac{7}{100} = 7 \text{ kg of fat}$$

3. Ghee Recovery: Not all fat can be converted into ghee. There are losses of moisture and solids-not-fat (SNF) during the clarification process. The recovery rate is typically around 90-93%. Let's assume a recovery rate of 92%.

4. Calculate Ghee Yield:

$$\text{Yield} = 7 \text{ kg of fat} \times 0.92 \approx 6.44 \text{ kg}$$

This calculated value of 6.44 kg is very close to the option 6.5 kg. Therefore, 6.5 kg is the most appropriate answer representing the approximate yield.

Step 4: Final Answer:

The approximate yield of ghee from 100 kg of buffalo milk is 6.5 kg.

Quick Tip

Remember the typical fat percentages for common milk types: Buffalo milk (6-8%) and Cow milk (3.5-5%). This will help you quickly estimate yields of fat-based products like butter and ghee.

4. Match the LIST-I with LIST-II

LIST-I (Breeds of Buffalo)		LIST-II (Origin of breed)	
A.	Murrah	I.	South-western part of Gujarat
B.	Jaffarbadi	II.	Mehsana in Gujarat
C.	Mehsana	III.	Gir forest of Kathiawar area
D.	Surti	IV.	Rohtak in Haryana

Choose the correct answer from the options given below:

- (A) A-I, B-II, C - III, D - IV
- (B) A-I, B - III, C - II, D - IV
- (C) A-I, B-II, C - IV, D - III
- (D) A-IV, B - III, C - II, D-I

Correct Answer: (D) A-IV, B - III, C - II, D-I

Solution:

Step 1: Understanding the Concept:

This is a matching question that tests knowledge of the native tracts or origins of different Indian buffalo breeds.

Step 2: Detailed Explanation:

Let's match each breed from List-I with its origin from List-II:

- **A. Murrah:** This is a high-yield dairy breed originating from the Rohtak, Hisar, and Jind districts of Haryana. So, **A matches with IV.**

- **B. Jaffarbadi:** This is a heavy breed native to the Gir forest region of the Kathiawar area in Gujarat. So, **B matches with III.**
- **C. Mehsana:** This breed originated in the Mehsana district of Gujarat and surrounding areas. So, **C matches with II.**
- **D. Surti:** This breed is found in the Kaira, Anand, and Vadodara districts of Gujarat, which corresponds to the south-western part of Gujarat. So, **D matches with I.**

The correct combination is A-IV, B-III, C-II, D-I.

Step 3: Final Answer:

Looking at the options, the combination A-IV, B-III, C-II, D-I corresponds to option (D).

Quick Tip

For matching questions, use the process of elimination. Even if you only know one or two matches for certain, you can often eliminate several incorrect options, increasing your chances of finding the right answer.

5. Caring of new born calf includes -

- A. Immediately after the calf is born, make sure that all mucous is removed from the nose and mouth.
- B. Apply tincture of iodine to the navel at birth, and dust with boric acid powder.
- C. Under most conditions, the calf will be on its feet and ready for suckling within an hour.
- D. Be sure the calf gets first milk (colostrum) at least for 48 hours.

Choose the correct answer from the options given below:

- (A) A, B and D only
- (B) A, B and C only
- (C) A, B, C and D
- (D) B, C and D only

Correct Answer: (C) A, B, C and D

Solution:

Step 1: Understanding the Concept:

The question asks to identify the correct and essential practices for the care of a newborn calf to ensure its health and survival.

Step 2: Detailed Explanation:

Let's evaluate each statement:

- **A. Removing mucous:** This is a critical first step. Clearing the airways (nose and mouth) of mucous and fetal membranes allows the calf to start breathing properly immediately after birth. This statement is correct.
- **B. Navel care:** The navel cord is a potential entry point for infections. Applying an antiseptic like tincture of iodine helps to disinfect and dry the navel, preventing infections like navel ill (omphalitis). This statement is a correct and standard practice.
- **C. Standing and suckling:** A healthy calf should exhibit the instinct to stand and search for the udder to suckle soon after birth, typically within an hour. This indicates good vigor and health. This statement is correct.
- **D. Colostrum feeding:** Colostrum (first milk) is rich in antibodies (immunoglobulins) that provide passive immunity to the calf, protecting it from diseases. The calf's ability to absorb these antibodies is highest in the first few hours of life. It is crucial for the calf to receive colostrum for the first 2-3 days (48-72 hours). This statement is correct.

Since all four statements describe essential and correct practices for newborn calf care, all of them should be included.

Step 3: Final Answer:

All statements A, B, C, and D are correct practices. Therefore, option (C) is the correct choice.

Quick Tip

Remember the "4 Cs" of calf care: Colostrum, Cleanliness, Comfort, and Calories. This mnemonic can help you recall the key areas of focus for ensuring a healthy start for a newborn calf.

6. Butyro Refracto meter is used to measure

- A. Purity of ghee
- B. B R reading of ghee
- C. Fat content in milk
- D. Vitamin content in milk

Choose the correct answer from the options given below:

- (A) A and C are correct
- (B) A, B, C, D are wrong
- (C) A, B, C, D are correct

(D) A and B are correct

Correct Answer: (D) A and B are correct

Solution:

Step 1: Understanding the Concept:

The question asks about the application of a Butyro-refractometer in the context of dairy products. A refractometer is an instrument that measures the refractive index of a substance.

Step 2: Detailed Explanation:

Let's analyze the given uses:

- **A. Purity of ghee:** Ghee (clarified butterfat) has a specific range for its refractive index. The Butyro-refractometer measures this value, known as the BR reading. If ghee is adulterated with other fats or oils (like vanaspati or vegetable oil), its refractive index will change. Thus, the instrument is a primary tool for checking the purity of ghee. This statement is correct.
- **B. B R reading of ghee:** This is the direct measurement taken by the instrument. "BR reading" stands for Butyro-refractometer reading. This statement is inherently correct.
- **C. Fat content in milk:** The fat content in milk is typically measured using methods like the Gerber method (centrifugation) or electronic milk analyzers, not a Butyro-refractometer. This statement is incorrect.
- **D. Vitamin content in milk:** Vitamin content is measured using more sophisticated chemical analysis techniques like chromatography (HPLC), not by a refractometer. This statement is incorrect.

Therefore, the Butyro-refractometer is used to measure the BR reading of ghee, which in turn is used to determine its purity.

Step 3: Final Answer:

Statements A and B are correct. This corresponds to option (D).

Quick Tip

Associate specific instruments with their primary function in a dairy lab: Lactometer for specific gravity of milk, Gerber Centrifuge for fat percentage, and Butyro-refractometer for the purity of ghee/butterfat.

7. _____ is secreted from the posterior pituitary gland and is must for the ejection (milk let-down) of milk.

- (A) Somatotropin
- (B) Parathyroid
- (C) Adrenals
- (D) Oxytocin

Correct Answer: (D) Oxytocin

Solution:

Step 1: Understanding the Concept:

The question asks to identify the hormone responsible for the milk ejection reflex (also known as milk let-down) and its gland of secretion. This is a fundamental concept in lactation physiology.

Step 2: Detailed Explanation:

Let's examine the options:

- **(A) Somatotropin:** Also known as Growth Hormone (GH), it is secreted by the *anterior* pituitary gland and is primarily involved in growth and metabolism. While it plays a role in maintaining lactation (galactopoiesis), it does not cause milk let-down.
- **(B) Parathyroid:** This refers to the parathyroid hormone (PTH), which is secreted by the parathyroid glands. Its main function is to regulate calcium and phosphate levels in the blood. It is not involved in milk ejection.
- **(C) Adrenals:** The adrenal glands secrete hormones like adrenaline and cortisol. These are stress hormones and can actually inhibit the milk let-down reflex.
- **(D) Oxytocin:** This hormone is produced in the hypothalamus and stored and released from the *posterior* pituitary gland. Stimuli like suckling or the sight/sound of the calf trigger its release. Oxytocin acts on the myoepithelial cells surrounding the alveoli in the mammary gland, causing them to contract and eject the milk into the ducts. This process is called the milk let-down reflex.

Step 3: Final Answer:

Oxytocin is the hormone secreted from the posterior pituitary gland that is essential for the ejection of milk.

Quick Tip

Remember the two key hormones in lactation and their glands: **Prolactin** (from the *anterior* pituitary) is for milk *synthesis*, while **Oxytocin** (from the *posterior* pituitary) is for milk *ejection*.

8. 100 kg of buffalo milk will yield _____ kg of Khoa

- (A) 16
- (B) 22
- (C) 10
- (D) 30

Correct Answer: (B) 22

Solution:

Step 1: Understanding the Concept:

Khoa (or Khoya) is a partially dehydrated whole milk product. Its yield primarily depends on the Total Solids (TS) content of the milk used. Buffalo milk is preferred for Khoa production because of its higher TS content compared to cow milk.

Step 2: Key Formula or Approach:

The approximate yield of Khoa can be estimated based on the average Total Solids content of the milk.

$$\text{Yield of Khoa} \approx \text{Weight of Milk} \times \frac{\text{Total Solids \% in milk}}{\text{Total Solids \% in Khoa}} \times 100$$

A simpler estimation is that the yield is typically a percentage of the initial milk weight, reflecting the concentration of solids.

Step 3: Detailed Explanation:

Buffalo milk has an average Total Solids (TS) content of about 16-18%.

Khoa has a Total Solids content of about 70-75%.

During the process of making Khoa, a significant amount of water is evaporated until the milk solids are concentrated.

The general conversion ratio for buffalo milk to Khoa is approximately 5:1, meaning 5 kg of milk yields 1 kg of Khoa. This corresponds to a yield of about 20%.

So, for 100 kg of buffalo milk, the yield would be:

$$100 \text{ kg} \times \frac{1}{5} = 20 \text{ kg}$$

Or, based on typical industrial yields, the recovery is often around 20-22 kg of Khoa per 100 kg of buffalo milk.

Among the given options, 22 kg is the most accurate and commonly cited yield.

Step 4: Final Answer:

Based on the high total solids content of buffalo milk, the typical yield of Khoa is around 22 kg per 100 kg of milk.

Quick Tip

Remember the approximate product yields from 100 kg of milk: Khoa (from buffalo milk) $\approx$ 20-22 kg; Chhana/Paneer $\approx$ 18-20 kg; Ghee $\approx$ 6-7 kg. These benchmark figures are frequently asked in exams.

9. The over run in butter generally ranges between

- (A) 16-18%
- (B) 10-12%
- (C) 21-23%
- (D) 13-15%

Correct Answer: (C) 21-23%

Solution:

Step 1: Understanding the Concept:

Butter overrun refers to the percentage increase in the weight of butter produced from a given amount of milk fat. This increase is due to the incorporation of moisture, salt, and curd (non-fat solids) into the butter during the churning process.

Step 2: Key Formula or Approach:

The formula to calculate overrun is:

$$\text{Overrun \%} = \frac{\text{Weight of Butter} - \text{Weight of Fat Used}}{\text{Weight of Fat Used}} \times 100$$

Step 3: Detailed Explanation:

By legal standards (e.g., FSSAI in India), butter must contain a minimum of 80% milk fat. The remaining 20% consists of water (max 16%), salt (max 3%), and curd.

Let's assume we want to produce 100 kg of butter that just meets the 80% fat standard.

This 100 kg of butter will contain 80 kg of fat and 20 kg of non-fat components (water, salt, etc.).

Using the formula:

$$\text{Weight of Butter} = 100 \text{ kg}$$

$$\text{Weight of Fat Used} = 80 \text{ kg}$$

$$\text{Overrun \%} = \frac{100 - 80}{80} \times 100 = \frac{20}{80} \times 100 = 0.25 \times 100 = 25\%$$

This 25% is the theoretical maximum overrun for butter with 80% fat. In practice, manufacturers aim for a slightly higher fat content to be safe, so the actual commercial overrun is typically slightly lower, in the range of 21-23%.

Step 4: Final Answer:

The typical commercial overrun in butter manufacturing ranges from 21-23% to maximize yield while adhering to legal standards.

Quick Tip

A simple way to remember overrun is to think about the legal minimum fat content. If butter must be 80% fat, the other 20% is the "overrun" component. The overrun percentage is calculated on the amount of fat, not the total butter, hence it's always higher than the non-fat percentage.

10. The major challenges of Indian dairy and livestock farming are -

- A. Deficient animal health care service**
- B. Insufficient trained manpower**
- C. Government policies and lack of resources**
- D. Increased adoption level and more skilled persons are available**

Choose the correct answer from the options given below:

- (A) A, B and D only
- (B) A, B and C only
- (C) A, B, C and D
- (D) B, C and D only

Correct Answer: (B) A, B and C only

Solution:

Step 1: Understanding the Concept:

The question asks to identify the major problems or challenges faced by the dairy and livestock

sector in India. This requires an understanding of the current state of the industry.

Step 2: Detailed Explanation:

Let's analyze each statement:

- **A. Deficient animal health care service:** This is a well-known challenge. Access to veterinary services, diagnostics, and quality medicines is limited, especially in rural areas, leading to high mortality and morbidity rates in livestock.
- **B. Insufficient trained manpower:** There is a shortage of skilled professionals, including veterinarians, extension workers, and dairy technicians, which hampers the adoption of modern scientific practices in farming.
- **C. Government policies and lack of resources:** While many policies exist, their implementation can be weak due to a lack of resources, infrastructure, and effective delivery mechanisms. This is a significant challenge.
- **D. Increased adoption level and more skilled persons are available:** This statement describes a positive trend or a solution, not a challenge. It claims that adoption and skills are increasing, which is the opposite of a problem.

Therefore, statements A, B, and C correctly identify major challenges, while D is an incorrect statement in the context of challenges.

Step 3: Final Answer:

The major challenges are A, B, and C. The correct option is (B).

Quick Tip

In questions asking for "challenges," "problems," or "disadvantages," be cautious of options that state a positive development or a solution. They are often included to test your reading comprehension.

11. The BR reading of ghee normally varies from ____

- (A) 50-56
- (B) 41-43
- (C) 38-40
- (D) 28-30

Correct Answer: (B) 41-43

Solution:

Step 1: Understanding the Concept:

The "BR reading" refers to the measurement taken using a Butyro-refractometer. This instrument measures the refractive index of fats and oils. For ghee, this reading is a standard quality and purity test. The reading is standardized at a specific temperature, usually 40°C.

Step 2: Detailed Explanation:

Pure ghee, whether from cow or buffalo milk, has a characteristic refractive index. Adulteration with cheaper vegetable oils or animal body fats alters this refractive index.

According to FSSAI (Food Safety and Standards Authority of India) standards, the Butyro-refractometer reading for ghee at 40°C should be within the range of 40.0 to 44.0.

Let's analyze the given options in light of this standard range:

- 50-56: Too high.
- 41-43: This range falls perfectly within the standard acceptable range of 40-44.
- 38-40: The lower end is below the standard minimum of 40.0.
- 28-30: Far too low.

Step 3: Final Answer:

The normal BR reading for ghee at 40°C is in the range of 40-44. The option that best fits this is 41-43.

Quick Tip

Remember key quality parameters for milk and milk products as they are frequently tested. For ghee, the BR reading (40-44 at 40°C) and Reichert-Meissl (RM) value (minimum 28) are the most important ones to memorize.

12. In buffalo milk the percentage of water is -

- (A) 86.5%
- (B) 84.2%
- (C) 75.4%
- (D) 86.6%

Correct Answer: (B) 84.2%

Solution:

Step 1: Understanding the Concept:

This question requires knowledge of the average composition of buffalo milk. Milk is primarily composed of water and total solids (TS). The total solids include fat, protein, lactose, and minerals. The percentage of water is inversely related to the percentage of total solids.

Step 2: Detailed Explanation:

Buffalo milk is known for its high concentration of total solids compared to cow milk. The average composition of buffalo milk is:

- **Total Solids (TS):** 16% - 18%
- **Fat:** 6% - 8%
- **Solids-Not-Fat (SNF):** 9% - 10%

The percentage of water can be calculated by subtracting the total solids percentage from 100%.

$$\text{Water \%} = 100\% - \text{Total Solids \%}$$

Using an average TS value of 16-17%:

$$\text{Water \%} = 100\% - 16.5\% = 83.5\%$$

Let's check the options:

- 86.5%: This is closer to the water content of cow milk.
- 84.2%: This value corresponds to a total solids content of $100 - 84.2 = 15.8\%$, which is a very reasonable figure for buffalo milk.
- 75.4%: This would imply an extremely high total solids content of 24.6%, which is unrealistic.
- 86.6%: Similar to option A, this is too high for buffalo milk.

Step 3: Final Answer:

The most accurate value for the water percentage in buffalo milk among the given options is 84.2%.

Quick Tip

Remember the key difference: Buffalo milk has **higher** total solids and fat, which means it has **lower** water content than cow milk. Cow milk typically has about 87% water.

13. The titrable acidity of cow milk varies from -

- (A) 0.13 to 0.14 Percent LA
- (B) 0.08 to 0.1 Percent LA
- (C) 0.17 to 0.18 Percent LA
- (D) 0.18 to 0.19 Percent LA

Correct Answer: (A) 0.13 to 0.14 Percent LA

Solution:

Step 1: Understanding the Concept:

Titrateable Acidity (TA) measures the total acidity of a milk sample. Freshly drawn milk exhibits a certain level of natural acidity due to its constituents like casein proteins, phosphates, citrates, and dissolved CO₂. This is different from developed acidity, which is caused by the fermentation of lactose into lactic acid by bacteria. The question asks for the normal range of this natural acidity in fresh cow milk, expressed as percent Lactic Acid (% LA).

Step 2: Detailed Explanation:

The natural acidity of fresh, good-quality cow milk is quite consistent.

The accepted standard range for the titrateable acidity of fresh cow milk is 0.13% to 0.15% Lactic Acid.

Let's evaluate the given options:

- **(A) 0.13 to 0.14 Percent LA:** This range falls perfectly within the accepted standard for fresh cow milk.
- **(B) 0.08 to 0.1 Percent LA:** This is too low and may indicate adulteration with water or neutralization.
- **(C) 0.17 to 0.18 Percent LA:** This range is slightly high for fresh cow milk and might indicate the beginning of bacterial action or a condition like mastitis. This range is more typical for buffalo milk, which has higher solids.
- **(D) 0.18 to 0.19 Percent LA:** This is definitely high and suggests that the milk has started to sour (developed acidity).

Step 3: Final Answer:

The normal range for titratable acidity in fresh cow milk is 0.13 to 0.14 Percent LA.

Quick Tip

For exams, remember the acidity ranges: Cow milk $\approx$ 0.13-0.15% LA, and Buffalo milk $\approx$ 0.16-0.18% LA. Buffalo milk has higher acidity due to its higher content of proteins and phosphates (solids).

14. The specific gravity of milk is lowered by the addition of -

- (A) Skim milk
- (B) Water and cream
- (C) Sugar
- (D) Salt

Correct Answer: (B) Water and cream

Solution:**Step 1: Understanding the Concept:**

Specific gravity (SG) is the ratio of the density of a substance to the density of a reference substance, usually water. The specific gravity of milk is determined by its components. Adding a substance with a lower SG will decrease the overall SG, while adding a substance with a higher SG will increase it.

Step 2: Key Formula or Approach:

We need to compare the specific gravity of the additives with the specific gravity of normal milk.

- Average SG of whole milk: $\approx$ 1.028 - 1.032
- SG of water: 1.000
- SG of milk fat (cream): $\approx$ 0.93 (less dense than water)
- SG of Solids-Not-Fat (SNF): $\approx$ 1.6
- SG of skim milk (high in SNF, low in fat): $\approx$ 1.036 (higher than whole milk)

Step 3: Detailed Explanation:

Let's analyze the effect of each addition:

- **(A) Skim milk:** Has an SG of ≈ 1.036 , which is higher than whole milk. Adding it would *increase* the SG.
- **(B) Water and cream:** Water has an SG of 1.000, and cream (fat) has an SG of ≈ 0.93 . Both are significantly lower than the SG of milk. Adding either or both will *lower* the SG of the mixture. This is a common form of adulteration.
- **(C) Sugar:** Dissolving sugar in milk increases the concentration of solids, thereby increasing its density and SG.
- **(D) Salt:** Similar to sugar, adding salt increases the dissolved solids and thus *increases* the SG.

Step 4: Final Answer:

The addition of water and cream will lower the specific gravity of milk.

Quick Tip

Remember this simple rule for lactometer readings (which measure specific gravity): Adding water lowers the reading. Removing fat (making skim milk) increases the reading. Adding both water and removing fat can be done to try and normalize the reading, which is a sophisticated form of adulteration.

15. The process of removing 99% of the bacteria in milk by centrifugal force is known as -

- (A) Standardization
- (B) Regeneration
- (C) Bactofugation
- (D) Gravity separation

Correct Answer: (C) Bactofugation

Solution:

Step 1: Understanding the Concept:

The question asks for the name of a specific dairy processing technique that uses centrifugal

force to physically remove bacteria from milk.

Step 2: Detailed Explanation:

Let's define the terms in the options:

- **(A) Standardization:** This is the process of adjusting the fat and/or solids-not-fat (SNF) content of milk to a desired, uniform level. It does not primarily aim to remove bacteria.
- **(B) Regeneration:** This is a heat exchange process within a pasteurizer where the hot, pasteurized milk is used to pre-heat the incoming cold raw milk, thus saving energy. It is a thermal process, not a separation process.
- **(C) Bactofugation:** This process uses a specially designed high-speed centrifuge, called a bactofuge, to separate bacteria and spores from milk. Bacteria and spores are denser than milk serum, so they are thrown outwards and removed as a sludge (bactofugate). The process is highly efficient and can remove over 99% of spores and a high percentage of bacteria.
- **(D) Gravity separation:** This is an older, slower method of separating cream from milk based on the natural tendency of fat globules to rise to the surface. It is not effective for removing bacteria.

Step 3: Final Answer:

The process of using centrifugal force to remove bacteria from milk is called Bactofugation.

Quick Tip

Link keywords to processes: "Centrifuge + Bacteria" = Bactofugation; "Centrifuge + Fat" = Cream Separation; "Adjusting Fat %" = Standardization; "Heat Exchange" = Regeneration. Creating these mental links can help you answer questions quickly and accurately.

16. High Temperature Short Time (HTST) pasteurization gives a continuous flow of milk which is heated to -

- (A) 72°C for 15 seconds
- (B) 63°C for 30 minutes
- (C) 44°C for 44 seconds
- (D) 34°C for 34 seconds

Correct Answer: (A) 72°C for 15 seconds

Solution:

Step 1: Understanding the Concept:

Pasteurization is a heat treatment process designed to kill pathogenic microorganisms in milk and reduce the number of spoilage organisms, thereby extending its shelf life. There are different standard time-temperature combinations for this process. The question specifically asks for the standard for High Temperature Short Time (HTST) pasteurization.

Step 2: Detailed Explanation:

Let's analyze the given options:

- **(A) 72°C for 15 seconds:** This is the internationally recognized standard for HTST pasteurization, also known as flash pasteurization. It is used for continuous flow systems and is the most common method in modern large-scale dairies.
- **(B) 63°C for 30 minutes:** This is the standard for Low Temperature Long Time (LTLT) pasteurization, also known as the batch or holder method. It is an older method used for smaller quantities.
- **(C) 44°C for 44 seconds:** This temperature is too low for effective pasteurization.
- **(D) 34°C for 34 seconds:** This temperature is in the range of incubation for many bacteria and is not a pasteurization temperature.

Step 3: Final Answer:

The correct time-temperature combination for HTST pasteurization is 72°C for a minimum of 15 seconds.

Quick Tip

Memorize the three main pasteurization standards:

- **LTLT (Batch):** 63°C for 30 minutes.
- **HTST (Flash):** 72°C for 15 seconds.
- **UHT (Ultra-High Temp):** 135°C-150°C for 1-2 seconds.

These are very frequently asked questions.

17. Barny defect of milk is due to -

- (A) Intake of bitter weeds
- (B) Using late lactation milk

- (C) Overheating of milk
- (D) Improper ventilation of milking byre / barn

Correct Answer: (D) Improper ventilation of milking byre / barn

Solution:

Step 1: Understanding the Concept:

Milk can easily absorb odors from its surroundings. "Barny" or "cowy" flavor is a common off-flavor defect. The question asks for its cause.

Step 2: Detailed Explanation:

- **(A) Intake of bitter weeds:** This would cause a "weedy" or "bitter" flavor defect, not a barny one.
- **(B) Using late lactation milk:** Milk from cows in late lactation can sometimes have a "salty" or "rancid" flavor due to changes in composition and enzyme activity, but not typically a barny flavor.
- **(C) Overheating of milk:** This causes a "cooked" or "scorched" flavor due to the denaturation of whey proteins and other chemical changes.
- **(D) Improper ventilation of milking byre / barn:** A poorly ventilated barn has a high concentration of odors from manure and the animals themselves. Warm milk readily absorbs these volatile compounds, leading to a "barny" or "cowy" off-flavor. This is the primary cause of this specific defect.

Step 3: Final Answer:

The barny defect in milk is caused by the absorption of odors from a poorly ventilated environment where the milking takes place.

Quick Tip

Associate common milk off-flavors with their causes: Oxidized (light/metal), Rancid (lipase/fat breakdown), Cooked (heat), Barny (environment), Malty (bacterial), Weedy (feed).

18. The products that are obtained by evaporating part of water of whole milk or fully or partly skimmed milk with or without addition of sugar are -

- (A) Condensed milk
- (B) A value milk
- (C) Z value milk
- (D) F_0 value milk

Correct Answer: (A) Condensed milk

Solution:

Step 1: Understanding the Concept:

This question asks for the generic term for milk products made by concentrating milk solids through the partial removal of water.

Step 2: Detailed Explanation:

- **(A) Condensed milk:** This is the correct generic term. It encompasses products made by evaporating water from milk. This category includes both "sweetened condensed milk" (with sugar added) and "evaporated milk" (without sugar added). The definition in the question perfectly matches the description of condensed milks.
- **(B) A value milk:** 'A value' is not a type of milk product. It is likely a typo or an incorrect term.
- **(C) Z value milk:** The Z-value is a term used in thermal microbiology. It represents the temperature change required to change the D-value (decimal reduction time) by a factor of 10. It is a parameter for sterilization, not a milk product.
- **(D) F_0 value milk:** The F_0 -value is another term from thermal processing, representing the equivalent time in minutes at 121.1°C delivered to a product to achieve a certain level of sterility. It is a measure of the lethality of a heat process, not a product.

Step 3: Final Answer:

The correct term for products obtained by evaporating water from milk, with or without sugar, is condensed milk.

Quick Tip

Differentiate between dairy product names and processing terms. F-value, Z-value, and D-value are all related to the mathematics of heat sterilization, not types of milk products.

19. Sweetened condensed milk is the product obtained from cow or buffalo milk or combination thereof or from standardized milk by partial removal of water and

-
- (A) Addition of cane sugar
 - (B) Addition of salt
 - (C) Addition of milk powder
 - (D) Addition of citric acid

Correct Answer: (A) Addition of cane sugar

Solution:

Step 1: Understanding the Concept:

The question asks to complete the definition of "sweetened condensed milk". The name itself provides a strong clue. This product is preserved not by heat sterilization, but by high sugar concentration.

Step 2: Detailed Explanation:

Sweetened condensed milk is manufactured by evaporating a portion of the water from milk and then adding a significant amount of sugar.

- **(A) Addition of cane sugar:** This is the defining ingredient. The high concentration of sugar (sucrose or cane sugar) increases the osmotic pressure to a level that inhibits the growth of most microorganisms, thus preserving the product.
- **(B) Addition of salt:** Salt is not a primary ingredient in sweetened condensed milk.
- **(C) Addition of milk powder:** Milk powder might be used to standardize the milk solids, but it is not the key additive that defines the product as "sweetened". The primary process is water removal, not addition of solids.
- **(D) Addition of citric acid:** Citric acid is an acidulant and would cause the milk proteins to coagulate. It is not used in this product.

Step 3: Final Answer:

The defining characteristic of sweetened condensed milk, besides water removal, is the addition of cane sugar for preservation and sweetness.

Quick Tip

Remember the key difference: **Sweetened Condensed Milk** = Water removal + Sugar preservation. **Evaporated Milk** = Water removal + Heat sterilization (canning).

20. The product obtained from cow or buffalo milk or from standardized milk by partial removal of water is-

- (A) Sweetened condensed milk
- (B) Sweetened condensed skim milk
- (C) Full cream Sweetened condensed skim milk
- (D) Evaporated milk

Correct Answer: (D) Evaporated milk

Solution:

Step 1: Understanding the Concept:

This question provides a definition and asks to identify the corresponding milk product. The key part of the definition is "partial removal of water" with no mention of sugar being added.

Step 2: Detailed Explanation:

Let's analyze the options based on the definition:

- **(A) Sweetened condensed milk:** This product involves both water removal AND the addition of sugar for preservation. The definition in the question omits the addition of sugar, so this is incorrect.
- **(B) Sweetened condensed skim milk:** This is a variation made from skim milk, but it still requires the addition of sugar.
- **(C) Full cream Sweetened condensed skim milk:** This term is contradictory ("full cream" and "skim"). Regardless, it implies the addition of sugar.
- **(D) Evaporated milk:** This is the correct term for milk that has had about 60% of its water removed by evaporation and is then canned and sterilized by heat. It contains no added sugar. The definition in the question precisely describes this product.

Step 3: Final Answer:

The product obtained by only partially removing water from milk (and subsequently heat-sterilizing it) is evaporated milk.

Quick Tip

Focus on the keywords in definitions. The absence of the word "sugar" in the definition of a concentrated milk product is a strong indicator that the answer is "evaporated milk".

21. Basundi is a popular product of

- (A) Rajasthan and Haryana
- (B) Haryana and Assam
- (C) Andhra Pradesh, Gujarat, Karnataka, Kerala
- (D) Bengal and Odissa

Correct Answer: (C) Andhra Pradesh, Gujarat, Karnataka, Kerala

Solution:

Step 1: Understanding the Concept:

This question tests the knowledge of the regional origins of traditional Indian dairy products. Basundi is a sweetened, condensed milk dish.

Step 2: Detailed Explanation:

Basundi is a dessert made by simmering milk on low heat until it is reduced by about half, and then sweetened with sugar and flavored with cardamom and nuts.

- It is extremely popular in the western Indian states of **Gujarat** and Maharashtra.
- It is also very common in the southern Indian states of **Karnataka, Andhra Pradesh, Telangana, and Tamil Nadu.**
- **Rajasthan and Haryana** are known for products like Ghevar and Rabri, but Basundi is less prominent.
- **Bengal and Odisha** are famous for sweets made from Chhana (coagulated milk protein), such as Rasgulla and Sandesh. A similar product to Basundi here is called Rabri.

Based on this, the option that contains the most prominent regions for Basundi is (C).

Step 3: Final Answer:

Basundi is a popular product in several western and southern states, including Andhra Pradesh, Gujarat, and Karnataka.

Quick Tip

Create a small table or map of India and list the famous traditional dairy products for each major state or region (e.g., Bengal - Chhana sweets; Gujarat - Shrikhand, Basundi; Punjab - Lassi, Paneer). This visual aid can be very helpful for memory.

22. Generally _____ kg of common salt is added to 100 kg table butter during manufacturing

- (A) 1.2
- (B) 1.6
- (C) 2.5
- (D) 1.0

Correct Answer: (C) 2.5

Solution:

Step 1: Understanding the Concept:

The question asks for the typical amount of salt added during the manufacture of salted table butter. Salt is added for flavor and to act as a preservative.

Step 2: Detailed Explanation:

In the manufacturing of salted butter, salt is added during the "working" stage after the buttermilk has been drained. The amount of salt can vary based on consumer preference and regional standards.

However, the typical commercial range for salted butter is between 1.5% and 2.5%.

Let's convert the options to percentages for 100 kg of butter:

- (A) 1.2 kg per 100 kg = 1.2%
- (B) 1.6 kg per 100 kg = 1.6%
- (C) 2.5 kg per 100 kg = 2.5%
- (D) 1.0 kg per 100 kg = 1.0%

While 1.6% is within the range, 2.5% represents the higher end of the common commercial range and is a very standard level for well-salted butter. Legally, salt content up to 3% is often permitted. Among the given choices, 2.5 kg is a very common and acceptable level.

Step 3: Final Answer:

A common level of salt addition to 100 kg of table butter is 2.5 kg (or 2.5%).

Quick Tip

For composition questions, remember the typical ranges. For salted butter, the fat content is $\approx 80\%$, moisture is $\approx 16\%$, and salt is $\approx 1.5\text{--}2.5\%$. Unsalted butter will have slightly more moisture to make up the difference.

23. According to the PFA rules, 1976, milk powder should contain not more than-

- (A) 5% of moisture
- (B) 10% of moisture
- (C) 15% of moisture
- (D) 20% of moisture

Correct Answer: (A) 5% of moisture

Solution:

Step 1: Understanding the Concept:

The question asks for the maximum permissible moisture content in milk powder according to food regulations (specifically citing the older PFA Rules, which have been succeeded by FSSAI regulations, but the standards for this parameter remain similar). Low moisture content is critical for the shelf stability of milk powder.

Step 2: Detailed Explanation:

Milk powder is produced by removing almost all the water from milk. The goal is to reduce the water activity to a level so low that microbial growth is impossible and deteriorative chemical reactions are minimized.

High moisture content (above 5-6%) can lead to:

- Caking and lumping of the powder.
- Browning reactions (Maillard reaction).
- Fat oxidation.
- Microbial growth if moisture levels are very high.

Therefore, food laws strictly regulate the maximum moisture content. The standard specified under the Prevention of Food Adulteration (PFA) Rules, 1976, and carried over under FSSAI, states that the moisture content in milk powder (both whole and skim) shall not be more than 5.0% by weight.

Step 3: Final Answer:

The maximum allowable moisture content in milk powder is 5%.

Quick Tip

For dried food products like milk powder, moisture content is always the most critical quality parameter. The target is always a low single-digit percentage. If you see options like 10%, 15%, or 20%, they are almost certainly incorrect for a shelf-stable powder.

24. Rancid flavour in dried milk is due to -

- (A) Low pre-heating temperature
- (B) Drum surface has pits
- (C) Storage at high temperature
- (D) High moisture during storage

Correct Answer: (A) Low pre-heating temperature

Solution:

Step 1: Understanding the Concept:

Rancidity in dairy products is a specific off-flavor caused by the breakdown of milk fat (hydrolysis of triglycerides) into free fatty acids (like butyric acid), which have a sharp, unpleasant taste and odor. This breakdown is catalyzed by the enzyme lipase.

Step 2: Detailed Explanation:

Let's analyze the causes:

- **(A) Low pre-heating temperature:** Before milk is concentrated and dried to make powder, it undergoes a high-temperature heat treatment (pre-heating). A primary purpose of this step is to inactivate enzymes present in the raw milk, especially the heat-resistant lipase. If the pre-heating is insufficient (too low a temperature or too short a time), the lipase enzyme survives the process. It can then act on the fat during storage of the powder, causing hydrolytic rancidity. This is a primary cause of this defect.
- **(B) Drum surface has pits:** This is a problem in drum drying that can lead to scorched particles, causing a burnt or cooked flavor, not rancidity.
- **(C) Storage at high temperature:** High storage temperature primarily accelerates other defects like oxidative rancidity (a different chemical process) and Maillard browning, but the root cause of hydrolytic rancidity is the presence of the active lipase enzyme.
- **(D) High moisture during storage:** High moisture can accelerate many chemical reactions and allow microbial growth, but it doesn't cause rancidity on its own without the presence of the lipase enzyme.

Step 3: Final Answer:

The primary cause of rancid flavor (hydrolytic rancidity) in milk powder is the survival of the lipase enzyme due to inadequate pre-heating of the milk before drying.

Quick Tip

Distinguish between the two types of rancidity:

- **Hydrolytic Rancidity:** Enzyme (lipase) + Water $\rightarrow$ Free Fatty Acids. Prevented by heat treatment.
- **Oxidative Rancidity (Tallowy flavor):** Oxygen + Unsaturated Fat $\rightarrow$ Aldehydes/Ketones. Prevented by removing oxygen (e.g., gas flushing) and avoiding light/metal catalysts.

25. Given below are two statements, one is labelled as Assertion (A) and other one labelled as Reason (R).

Assertion (A): Bloats is microbial defect of condensed milk.

Reason (R): Contamination with and growth of yeast *Torula lactis condensii* at high temperature.

In light of the above statements, choose the correct answer from the options given below:

- (A) Both (A) and (R) are true and (R) is the correct explanation of (A).
- (B) Both (A) and (R) are true but (R) is NOT the correct explanation of (A).
- (C) (A) is true but (R) is false.
- (D) (A) is false but (R) is true.

Correct Answer: (A) Both (A) and (R) are true and (R) is the correct explanation of (A).

Solution:

Step 1: Understanding the Concept:

This question requires an analysis of a specific microbial spoilage defect in sweetened condensed milk, called "bloats" or "swells", and its causative agent.

Step 2: Detailed Explanation:

Analysis of Assertion (A): "Bloats is microbial defect of condensed milk." Sweetened condensed milk is preserved by its very high sugar concentration (high osmotic pressure). However, some osmophilic (sugar-tolerant) microorganisms can still grow. When these microbes ferment the sugar, they produce gas (carbon dioxide), which causes the sealed can to swell or "bloat". Therefore, Assertion (A) is true.

Analysis of Reason (R): "Contamination with and growth of yeast *Torula lactis condensii* at high temperature." The primary spoilage organisms in sweetened condensed milk are sugar-

tolerant yeasts. A specific species, now more commonly known as *Torulopsis lactis-condensi* or *Candida lactis-condensi*, is well-known for causing this gas production and subsequent bloating. This growth can occur during storage, especially at warmer temperatures (e.g., above 20°C), which could be referred to as "high temperature" in this context. Therefore, Reason (R) is also true.

Relationship between (A) and (R): The bloating defect (A) is directly caused by the gas produced from the growth and fermentation by the specific yeast mentioned in (R). Thus, (R) is the correct scientific explanation for (A).

Step 3: Final Answer:

Both Assertion (A) and Reason (R) are true statements, and Reason (R) provides the correct explanation for Assertion (A).

Quick Tip

For Assertion-Reason questions, follow a three-step process: 1. Check if (A) is true. 2. Check if (R) is true. 3. If both are true, check if (R) is the correct scientific reason for (A) by asking "Why does (A) happen? Because of (R)."

26. COB test is used for detection of

- (A) Urea in milk
- (B) Developed acidity of milk
- (C) Sugar in Milk
- (D) Bicarbonate in milk

Correct Answer: (B) Developed acidity of milk

Solution:

Step 1: Understanding the Concept:

The COB test, which stands for "Clot on Boiling," is a rapid platform test used in dairy processing plants to assess the heat stability of raw milk.

Step 2: Detailed Explanation:

Fresh milk has a certain natural acidity and is heat-stable. However, if milk is not stored properly, bacteria will grow and ferment the lactose into lactic acid. This is called "developed acidity".

As the acidity increases (and the pH drops), the casein proteins in the milk become less stable. When such milk is heated to boiling, the proteins coagulate and form a clot or curd. The COB test involves simply boiling a small sample of milk.

- If the milk remains liquid, it passes the test (COB negative).
- If the milk clots or curdles, it fails the test (COB positive), indicating it has high developed acidity and is not suitable for heat processing like pasteurization.

Therefore, the test is a direct indicator of developed acidity. Urea, sugar, and bicarbonate are adulterants that are detected by other specific chemical tests.

Step 3: Final Answer:

The Clot on Boiling (COB) test is used to detect high levels of developed acidity in milk.

Quick Tip

Remember the common platform tests for milk quality: COB (for developed acidity/heat stability), alcohol test (another test for heat stability), and lactometer reading (for detecting added water).

27. P_H of normal fresh milk is between

- (A) 6.1 to 6.3
- (B) 7.1 to 7.3
- (C) 6.0 to 6.1
- (D) 6.6 to 6.8

Correct Answer: (D) 6.6 to 6.8

Solution:

Step 1: Understanding the Concept:

The question asks for the normal pH range of fresh milk. pH is a measure of acidity or alkalinity. A pH of 7 is neutral, below 7 is acidic, and above 7 is alkaline.

Step 2: Detailed Explanation:

Freshly drawn milk from a healthy cow is slightly acidic. This natural acidity is not due to lactic acid but is a result of the presence of components like casein proteins, acid phosphates, citrates, and dissolved carbon dioxide.

The accepted normal pH range for fresh cow's milk is typically 6.5 to 6.7. For buffalo milk, it is slightly lower, around 6.7 to 6.8.

Let's analyze the options:

- (A) 6.1 to 6.3: This pH is too low and would indicate significant developed acidity (souring).

- (B) 7.1 to 7.3: This is alkaline and could be an indication of mastitis, an udder infection.
- (C) 6.0 to 6.1: This is very acidic; the milk would be sour.
- (D) 6.6 to 6.8: This range correctly encompasses the normal pH values for both cow and buffalo milk.

Step 3: Final Answer:

The pH of normal fresh milk is in the slightly acidic range of 6.6 to 6.8.

Quick Tip

Remember that fresh milk is slightly acidic, with a pH just below neutral (7.0). Any significant deviation from the 6.6-6.8 range indicates a problem: lower pH suggests bacterial spoilage, while higher pH (alkaline) can be a sign of mastitis.

28. Triple effect evaporator is utilised for

- (A) Separation of milk
- (B) Condensing of milk
- (C) Whey separation
- (D) Fermentation of milk

Correct Answer: (B) Condensing of milk

Solution:

Step 1: Understanding the Concept:

The question asks for the primary function of a triple-effect evaporator in the dairy industry. An evaporator is a piece of equipment designed to remove water from a liquid.

Step 2: Detailed Explanation:

An evaporator works by boiling a liquid to turn water into vapor, which is then removed, leaving a more concentrated liquid behind. In the dairy industry, this process is known as "condensing" or "concentration".

A "multiple-effect" evaporator (like a double or triple-effect) is a system of multiple evaporators (called effects) linked together to improve energy efficiency. The water vapor produced in the first effect is used as the heating source for the second effect, and so on.

This technology is used to produce condensed milk, evaporated milk, and to pre-concentrate milk before making milk powder.

The other options are incorrect:

- (A) Separation of milk (fat from skim milk) is done by a cream separator (centrifuge).
- (C) Whey separation from cheese curd is done by draining.
- (D) Fermentation of milk is a biochemical process used to make products like yogurt and is done in fermentation tanks.

Step 3: Final Answer:

A triple-effect evaporator is used for the energy-efficient condensing (concentration) of milk by removing water.

Quick Tip

Associate key equipment with its function: Evaporator = Condensing/Water Removal; Centrifuge/Separator = Separation of components by density (fat, bacteria, impurities); Homogenizer = Fat globule size reduction; Pasteurizer = Heat treatment for safety.

29. The function of clarifiers is

- (A) Removal of dense foreign matter, dirt, cellular debris
- (B) Separation of fat and skim milk
- (C) Removal of fat
- (D) Recovery of whey protein solids

Correct Answer: (A) Removal of dense foreign matter, dirt, cellular debris

Solution:

Step 1: Understanding the Concept:

A clarifier is a piece of dairy processing equipment that uses centrifugal force to clean raw milk before further processing.

Step 2: Detailed Explanation:

A clarifier is a centrifuge specifically designed to remove solid impurities from milk. When milk is spun at high speed, the components separate based on their density.

- **(A) Removal of dense foreign matter...:** Solid particles like dirt, dust, straw, as well as biological material like somatic cells (leucocytes) and bacterial clumps, are denser than the milk serum. The centrifugal force throws these particles to the outer wall of the centrifuge bowl, where they collect as a sludge. This is the primary function of a clarifier.

- **(B) & (C) Separation/Removal of fat:** This is the function of a *cream separator*, which is a different type of centrifuge designed with discs to efficiently separate the less dense fat (cream) from the denser skim milk. A clarifier is not designed for this.
- **(D) Recovery of whey protein solids:** This is typically done using membrane filtration techniques like ultrafiltration, not clarification.

Step 3: Final Answer:

The main function of a clarifier is to clean milk by removing denser impurities such as dirt and cellular debris.

Quick Tip

Remember the difference between a Clarifier and a Separator: a **Clarifier** has one inlet and one outlet (for cleaned milk), its goal is to remove solids. A **Cream Separator** has one inlet and two outlets (one for cream, one for skim milk), its goal is to separate fat.

30. Given below are two statements, one is labelled as Assertion (A) and other one labelled as Reason (R).

Assertion (A): Single stage homogenization increases viscosity considerably.

Reason (R): It produces clusters in which the membranes of individual fat globules join each other, although the fat itself is not in contact.

In light of the above statements, choose the most appropriate answer from the options given below.

- (A) Both (A) and (R) are correct and (R) is the correct explanation of (A).
- (B) Both (A) and (R) are correct but (R) is NOT the correct explanation of (A).
- (C) (A) is correct but (R) is not correct.
- (D) (A) is not correct but (R) is correct.

Correct Answer: (A) Both (A) and (R) are correct and (R) is the correct explanation of (A).

Solution:

Step 1: Understanding the Concept:

This question addresses the effect of single-stage homogenization on the physical properties of milk, specifically its viscosity, and the mechanism behind this effect.

Step 2: Detailed Explanation:

Analysis of Assertion (A): Homogenization is a process that breaks down large fat globules into much smaller ones. In a single-stage homogenizer, milk is forced at high pressure through a narrow valve. This breaks the fat globules, but the newly created fat surface area is vast, and

there isn't enough natural membrane material (proteins, phospholipids) to cover it all immediately. As a result, the small, unprotected fat globules tend to stick together, forming large clumps or clusters. These clusters interfere with the flow of the liquid, causing a significant increase in viscosity. Thus, Assertion (A) is true.

Analysis of Reason (R): This statement describes the mechanism of cluster formation. The newly formed fat globules share the available protein membranes, leading to the formation of clusters where the individual globules are linked by these shared membranes. The fat inside each globule remains separate. This is an accurate description of the "fat clumping" phenomenon in single-stage homogenization. Thus, Reason (R) is true.

Relationship between (A) and (R): The formation of the fat globule clusters as described in (R) is the direct physical reason for the increase in viscosity stated in (A). Therefore, (R) is the correct explanation for (A).

Step 3: Final Answer:

Both Assertion (A) and Reason (R) are correct, and (R) correctly explains (A). (Note: This is why two-stage homogenizers are used; the second, lower-pressure stage breaks up these clusters).

Quick Tip

Remember the role of the two stages in homogenization: **Stage 1** (high pressure) breaks the fat globules. **Stage 2** (low pressure) breaks the clusters formed after stage 1, preventing excessive viscosity increase.

31. In pasteurization process, if the product has been properly pasteurized, it is forwarded through unit, while that which is unpasteurized is diverted into the balance tank for reprocessing. The valve used for this purpose is

- (A) Q_{10} valve
- (B) F_0 valve
- (C) Flow dispersion valve
- (D) Flow diversion valve

Correct Answer: (D) Flow diversion valve

Solution:

Step 1: Understanding the Concept:

The question describes a critical safety component of a High-Temperature Short-Time (HTST) pasteurizer system. This component ensures that only milk that has been heated to the correct temperature proceeds for cooling and packaging.

Step 2: Detailed Explanation:

In an HTST system, milk flows continuously. A temperature sensor is placed at the end of the holding tube. This sensor is connected to a special three-way valve.

- **Flow Diversion Valve (FDV):** This is the correct name for the valve. If the sensor detects that the milk temperature is at or above the legal minimum (e.g., 72°C), the FDV stays in the "forward flow" position, allowing the milk to continue to the cooling section. If the temperature drops below the set point, the FDV automatically switches to the "diverted flow" position, sending the under-processed milk back to the raw milk balance tank to be re-pasteurized. This is a fail-safe mechanism.
- **Q_{10} and F_0 valve:** Q_{10} and F_0 are terms related to the kinetics of chemical reactions/microbial death with temperature, not types of valves.
- **Flow dispersion valve:** This is not a standard term for the safety valve in a pasteurizer.

Step 3: Final Answer:

The safety valve that diverts under-pasteurized milk back for reprocessing is called the Flow Diversion Valve (FDV).

Quick Tip

The name "Flow Diversion Valve" is very descriptive of its function: it *diverts* the *flow* of milk if it's not safe. This makes it easy to remember. It is the heart of the HTST pasteurizer's safety system.

32. Kalakand is a

- (A) Fermented product
- (B) Acid coagulated product
- (C) Sweetened heat coagulated product
- (D) Dried milk product

Correct Answer: (C) Sweetened heat coagulated product

Solution:**Step 1: Understanding the Concept:**

The question asks to classify Kalakand, a traditional Indian dairy sweet, based on its preparation method.

Step 2: Detailed Explanation:

Kalakand is made by continuously stirring and boiling milk until it thickens and reduces. During this process, a small amount of an acidulant (like citric acid or alum) is often added to cause partial coagulation, which gives Kalakand its characteristic grainy texture. Sugar is added towards the end of the process. The final product is a semi-solid, sweetened, granular mass.

Let's analyze the options:

- **(A) Fermented product:** No fermentation or starter culture is used. Incorrect.
- **(B) Acid coagulated product:** While some acid is used, the primary process is intense heat concentration (like making Khoa). Products like Paneer or Chhana are purely acid-coagulated without this intense heat desiccation. So, this is an incomplete description.
- **(C) Sweetened heat coagulated product:** This is the most accurate description. The product is defined by extensive heating (heat coagulation/desiccation), the addition of sugar (sweetened), and the resulting coagulated texture.
- **(D) Dried milk product:** Kalakand is a moist, semi-solid product, not a dried powder. Incorrect.

Step 3: Final Answer:

Kalakand is best described as a sweetened heat coagulated product.

Quick Tip

Classify Indian dairy sweets by their base: Khoa-based (Burfi, Peda, Kalakand), Chhana-based (Rasgulla, Sandesh), Fermented/Dahi-based (Shrikhand, Mishti Doi), and heat-concentrated (Basundi, Rabri).

33. _____ is not a sterilizing agent used in Dairy Industry

- (A) Chlorine
- (B) Quaternary ammonium compounds
- (C) Hydrogen peroxide
- (D) Sulphuric acid

Correct Answer: (D) Sulphuric acid

Solution:

Step 1: Understanding the Concept:

The question asks to identify which of the listed chemicals is not used as a sterilizing or sanitizing agent for equipment in the dairy industry. Sanitizers are chemical agents that reduce the number of microorganisms to a safe level.

Step 2: Detailed Explanation:

- **(A) Chlorine:** Chlorine-based compounds (e.g., sodium hypochlorite) are widely used, effective, and inexpensive sanitizers in the dairy industry.
- **(B) Quaternary ammonium compounds (QACs):** QACs are another major class of sanitizers used for food contact surfaces. They are effective and leave a residual antimicrobial film.
- **(C) Hydrogen peroxide:** A solution of hydrogen peroxide, often combined with heat, is a powerful sterilizing agent, famously used for sterilizing the packaging material in aseptic packaging systems (e.g., Tetra Pak).
- **(D) Sulphuric acid:** This is a highly corrosive and dangerous strong mineral acid. It is not used for sanitizing or sterilizing food processing equipment because it would severely damage the stainless steel surfaces and pose an extreme safety hazard. It is used in labs (e.g., for the Gerber fat test) and for industrial purposes like pH control of wastewater, but not for sanitation.

Step 3: Final Answer:

Sulphuric acid is not used as a sterilizing agent in the dairy industry.

Quick Tip

Common dairy sanitizers fall into a few groups: Halogens (chlorine, iodine), Quaternary Ammonium Compounds (QACs), Acid-Anionic sanitizers, and Peroxides (hydrogen peroxide). Strong mineral acids like sulphuric or hydrochloric acid are generally not used for sanitation due to their corrosive nature.

34. The process in which the sterilizer is emptied and refilled between each process cycle are-

- (A) Direct sterilization
- (B) Conductive heating
- (C) Concentric heating
- (D) Batch sterilization

Correct Answer: (D) Batch sterilization

Solution:

Step 1: Understanding the Concept:

The question describes a method of sterilization based on its operational flow. The key characteristic is that a discrete quantity of product is processed at a time, and the equipment is stopped, emptied, and refilled for the next cycle.

Step 2: Detailed Explanation:

- **(A) Direct sterilization:** This refers to continuous processes where the heating medium (like steam) is directly mixed with the product (e.g., steam injection, steam infusion).
- **(B) Conductive heating:** This is a mode of heat transfer where heat moves through a solid material. It is a physical principle, not a process cycle type.
- **(C) Concentric heating:** This is not a standard term for a sterilization process.
- **(D) Batch sterilization:** This is the correct term. In this process, a specific quantity or "batch" of the product (e.g., cans of evaporated milk) is loaded into a sterilizer (like a retort or autoclave). The sterilization cycle is run, and then the sterilizer is cooled, depressurized, and emptied. It is then refilled with the next batch. This is in contrast to a "continuous sterilization" process where the product flows through the sterilizer without stopping.

Step 3: Final Answer:

The process described is batch sterilization.

Quick Tip

Think of the difference between "batch" and "continuous" like cooking at home. Making soup in a single pot is a batch process. A factory assembly line where food is constantly moving through an oven is a continuous process.

35. Sandiness in milk powders is due to

- (A) Proteins
- (B) Fats
- (C) Calcium
- (D) Lactose

Correct Answer: (D) Lactose

Solution:

Step 1: Understanding the Concept:

"Sandiness" is a textural defect in some dairy products, characterized by a rough, gritty mouth-feel similar to fine sand. The question asks for the component responsible for this defect in milk powder.

Step 2: Detailed Explanation:

Lactose is the sugar present in milk. Milk is a supersaturated solution of lactose. During the manufacturing of products where water is removed (like milk powder, ice cream, or condensed milk), the concentration of lactose increases dramatically.

If the processing conditions (especially the rate of cooling and drying) are not properly controlled, the lactose can crystallize out of the solution into large, hard crystals of alpha-lactose monohydrate. These crystals are slow to dissolve in the mouth, and their size is large enough to be detected by the tongue, creating the "sandy" or "gritty" sensation.

Proteins, fats, and calcium do not cause this specific defect.

Step 3: Final Answer:

The defect of sandiness in milk powders and other concentrated dairy products is caused by the crystallization of lactose.

Quick Tip

Whenever you see the defect "sandiness" in a dairy context, the cause is almost always lactose crystallization. This is a very common question related to ice cream, milk powder, and condensed milk.

36. _____ is the nutritious food containing fat, denatured protein, burnt lactose and minerals.

- (A) Plain condensed whey
- (B) Ghee-residue
- (C) Sweetened condensed whey
- (D) Whey paste

Correct Answer: (B) Ghee-residue

Solution:

Step 1: Understanding the Concept:

The question asks to identify a dairy byproduct based on its composition: fat, denatured protein, burnt lactose, and minerals. This composition results from a high-heat manufacturing

process.

Step 2: Detailed Explanation:

Let's analyze the manufacturing process and resulting composition:

- **Ghee-residue:** Ghee is produced by clarifying butter or cream at high temperatures (typically above 110°C) to remove water and milk solids-not-fat (MSNF). The solid particles that settle out and are filtered off constitute the ghee-residue. This residue consists of proteins that have been denatured by the high heat, lactose that has caramelized or "burnt" (causing the characteristic brown color), entrapped fat, and minerals. This perfectly matches the description in the question.
- **Condensed whey/Whey paste:** These products are made by concentrating whey. While they contain protein, lactose, and minerals, the lactose is not typically "burnt" as the processing temperatures are lower than in ghee making.

Step 3: Final Answer:

Ghee-residue is the nutritious food byproduct that contains fat, denatured protein, burnt lactose, and minerals resulting from the high-temperature clarification of butterfat.

Quick Tip

Associate the term "burnt lactose" or "caramelized" with high-temperature processes like making ghee or Khoa. The byproduct of ghee production, ghee-residue, is a classic example.

37. In ultra high temperature (UHT) treatment, milk is heated at temperature of -

- (A) 120°C to 125°C
- (B) 145°C to 150°C
- (C) 100°C to 105°C
- (D) 80°C to 85°C

Correct Answer: (B) 145°C to 150°C

Solution:

Step 1: Understanding the Concept:

Ultra-High Temperature (UHT) processing is a method of heat treatment that sterilizes liquid food, like milk, by heating it to a very high temperature for a very short period (a few seconds). This process kills spores and makes the product shelf-stable at ambient temperatures.

Step 2: Detailed Explanation:

The standard time-temperature combinations for milk heat treatment vary significantly:

- **HTST Pasteurization:** 72°C for 15 seconds.
- **In-container Sterilization:** Typically 115-121°C for 15-20 minutes.
- **UHT Treatment:** The internationally accepted range is generally 135°C to 150°C for 1 to 4 seconds.

Let's analyze the given options based on this:

- (A) 120°C to 125°C: This is the temperature range for conventional in-container sterilization, not UHT.
- (B) 145°C to 150°C: This range falls within the upper end of the established UHT processing range. It represents the "ultra-high" temperature required.
- (C) 100°C to 105°C: This is just at or slightly above boiling point and is insufficient for UHT sterilization.
- (D) 80°C to 85°C: This is a higher temperature for pasteurization, but far below UHT standards.

Step 3: Final Answer:

The only option that falls within the correct range for UHT treatment is 145°C to 150°C.

Quick Tip

Remember the progression of heat treatments: Pasteurization (below 100°C) kills pathogens, while Sterilization (above 120°C) kills everything, including spores. UHT is a specific type of sterilization characterized by very high temperatures (135-150°C) for very short times (seconds).

38. Ice-cream may contain permitted stabilizers and emulsifiers not exceeding _____ percent by weight.

- (A) 0.5
- (B) 0.10

- (C) 0.15
(D) 0.20

Correct Answer: (A) 0.5

Solution:

Step 1: Understanding the Concept:

This question pertains to food laws and regulations, specifically the maximum permitted level of additives (stabilizers and emulsifiers) in ice cream. These ingredients are used in small quantities to control the texture, melting properties, and shelf life of the product.

Step 2: Detailed Explanation:

Food safety authorities, such as the FSSAI (Food Safety and Standards Authority of India), set legal limits on the use of food additives to ensure consumer safety and product quality.

For ice cream, these regulations specify that the total concentration of permitted stabilizers and emulsifiers, when used alone or in combination, must not exceed a certain percentage of the final product's weight.

The established legal limit in India and many other regions is **0.5%**. Using amounts higher than this can lead to undesirable gummy textures and is not permitted.

Step 3: Final Answer:

According to food regulations, the total amount of stabilizers and emulsifiers in ice cream should not exceed 0.5 percent by weight.

Quick Tip

Remember key legal standards for dairy products, as they are often asked in exams. For ice cream, the key numbers are minimum 10% milk fat, minimum 36% total solids, and maximum 0.5% for combined stabilizers/emulsifiers.

39. Match the LIST-I with LIST-II

LIST-I (Constituents of Ice cream)		LIST-II (Role of constituents)	
A.	Milk fat	I.	Enriches and mellows the ice cream, giving it a full, rich, creamy flavour.
B.	Milk-solids-not-fat (MSNF)	II.	Improve body and texture of ice cream.
C.	Stabilizers	III.	To prevent the formation of objectionably large ice crystals in ice-cream.
D.	Emulsifiers	IV.	Improve upon and provide a uniform whipping quality to the mixture.

Choose the correct answer from the options given below:

- (A) A-I, B-II, C - III, D - IV
- (B) A-I, B-III, C - II, D - IV
- (C) A-I, B-II, C - IV, D - III
- (D) A-IV, B - III, C - II, D-I

Correct Answer: (D) A-IV, B - III, C - II, D-I

Solution:

Step 1: Understanding the Concept:

This question tests the understanding of the specific functions of the four main components of an ice cream mix: fat, MSNF, stabilizers, and emulsifiers.

Step 2: Detailed Explanation:

Let's match each constituent from List-I with its primary role from List-II:

- **A. Milk fat:** Is the primary source of the rich, creamy flavor and smooth texture in ice cream. It "enriches and mellows" the product. **So, A matches IV.**
- **B. Milk-solids-not-fat (MSNF):** Comprising proteins and lactose, MSNF contributes to the flavor but its main role is to absorb water and improve the overall body and texture of the ice cream, preventing it from being weak or watery. **So, B matches III.**
- **C. Stabilizers:** These are hydrocolloids (gums) that bind free water in the mix. By doing so, they increase viscosity and, most importantly, prevent the growth of large, coarse ice crystals during freezing and storage. **So, C matches II.**
- **D. Emulsifiers:** These surface-active agents help in creating a finer fat globule dispersion and control fat destabilization during freezing. This results in a smoother texture and a uniform whipping quality, allowing for stable incorporation of air. **So, D matches I.**

The correct set of matches is A-IV, B-III, C-II, D-I.

Step 3: Final Answer:

Matching the constituents with their roles and checking the options, the correct choice is (D).

Quick Tip

A simple way to remember: **Fat** = Richness/Flavor; **MSNF** = Body/Structure; **Stabilizer** = No Ice Crystals (smoothness); **Emulsifier** = Whipping/Dryness.

40. Defects in ice cream are -

- A. Rancid flavour**
- B. Soggy body**
- C. Fluffy texture**
- D. Foamy meltdown quality**

Choose the correct answer from the options given below:

- (A) A and B only
- (B) A, B and C only
- (C) B, A and D only
- (D) A, B, C, and D

Correct Answer: (D) A, B, C, and D

Solution:

Step 1: Understanding the Concept:

The question asks to identify which of the listed conditions are considered defects in the quality of ice cream. Ice cream quality is judged on its flavor, body and texture, and melting characteristics.

Step 2: Detailed Explanation:

Let's evaluate each statement:

- **A. Rancid flavour:** This is a serious flavor defect caused by the breakdown of milk fat by the lipase enzyme. It is highly undesirable.
- **B. Soggy body:** This is a body and texture defect where the ice cream is heavy, dense, and wet, often due to low overrun or high solids. It is undesirable.
- **C. Fluffy texture:** This is a texture defect caused by excessively high overrun (too much air), making the ice cream lack substance and feel like foam. It is undesirable.
- **D. Foamy meltdown quality:** When ice cream melts, it should produce a smooth liquid. A meltdown that is foamy, frothy, or curdy indicates an unstable emulsion or other formulation issues. It is a defect.

All four listed items are well-recognized defects in ice cream evaluation.

Step 3: Final Answer:

Since A, B, C, and D are all considered defects in ice cream, the correct option is (D).

Quick Tip

Ice cream defects are categorized into three main areas: Flavor (e.g., rancid, cooked, unnatural), Body and Texture (e.g., icy, soggy, fluffy), and Melting Quality (e.g., slow, foamy, curdy). All the options listed fall into these categories.

41. Slow melting quality of ice cream is due to -

A. Excessive stabilizer content.

B. Inadequate homogenization.

C. Excessive overrun

D. Excessive emulsifier content.

Choose the correct answer from the options given below:

(A) C and D only

(B) A and B only

(C) A and D only

(D) B and C only

Correct Answer: (C) A and D only

Solution:

Step 1: Understanding the Concept:

The question asks to identify the causes of a specific ice cream defect: slow or delayed melting. This defect is undesirable as it makes the ice cream seem unnatural.

Step 2: Detailed Explanation:

Let's analyze the potential causes:

- **A. Excessive stabilizer content:** Stabilizers form a gel network that binds water and increases viscosity. Too much stabilizer creates a very strong gel that resists melting, causing a "gummy" texture and slow meltdown. This is a primary cause.
- **B. Inadequate homogenization:** This typically leads to a weak emulsion, which can cause churning and a curdy meltdown, but it is not a primary cause of slow melting.
- **C. Excessive overrun:** A high volume of air bubbles acts as an insulator, slowing down the transfer of heat into the ice cream, which in turn slows the melting rate. This is also a valid cause.
- **D. Excessive emulsifier content:** High levels of emulsifiers can lead to excessive fat agglomeration, creating a strong internal fat network that can hold the shape of the ice

cream even as the ice melts, resulting in a slow, foamy meltdown. This is also a cause.

We have identified A, C, and D as valid causes. Since the options are pairs, we must choose the best combination. In many formulations, stabilizers and emulsifiers (A and D) work together (or against each other) to control the meltdown properties. Their excessive use is a very direct cause of poor melting characteristics. While high overrun (C) also contributes, the combination of excessive stabilizer and emulsifier is a classic cause of this defect. Option (A, D) combines two strong, direct causes related to the mix formulation.

Step 3: Final Answer:

Excessive stabilizer content and excessive emulsifier content are major causes of slow melting quality in ice cream. Therefore, option (C) is the most appropriate answer.

Quick Tip

Think about what holds ice cream together: a gel network from stabilizers and a fat network from emulsifiers. Too much of either will make the structure too strong and resistant to melting. Air (overrun) acts as an insulator, also slowing melting.

42. The yield of acid casein ranges between _____ to _____ from skim milk

- (A) 2.2 to 2.4%
- (B) 2.0 to 2.2%
- (C) 4.0 to 4.5%
- (D) 2.8 to 3.2%

Correct Answer: (D) 2.8 to 3.2%

Solution:

Step 1: Understanding the Concept:

The question asks for the typical yield (in percent by weight) of acid casein produced from skim milk. The yield depends directly on the amount of casein protein present in the skim milk.

Step 2: Key Formula or Approach:

$$\text{Casein Content} \approx \text{Total Protein in Skim Milk} \times 0.80$$

The yield will be slightly higher than the actual casein content due to co-precipitation of some minerals and residual moisture, but it is primarily determined by the protein level.

Step 3: Detailed Explanation:

Skim milk typically contains between 3.2% and 3.8% total protein. Casein constitutes about

80% of this total protein.

- For milk with 3.4% protein: Casein content = $3.4 \times 0.8 = 2.72\%$.
- For milk with 3.8% protein: Casein content = $3.8 \times 0.8 = 3.04\%$.

Therefore, the theoretical yield of pure casein would be in the range of 2.7% to 3.1%. The actual industrial yield of acid casein (which includes some minerals) aligns well with this. Let's check the options:

- (A) 2.2 to 2.4%: This would correspond to very low-protein milk, below average.
- (B) 2.0 to 2.2%: Very low.
- (C) 4.0 to 4.5%: Too high, skim milk does not contain this much casein.
- (D) 2.8 to 3.2%: This range accurately reflects the yield from average to high-protein skim milk. A typical yield figure often quoted is around 3 kg of casein per 100 kg of skim milk, which is 3%.

Step 4: Final Answer:

The expected yield of acid casein from skim milk falls in the range of 2.8% to 3.2%.

Quick Tip

As a rule of thumb, remember that skim milk contains about 3% casein. This will help you quickly estimate the correct range for casein yield in multiple-choice questions.

43. A stabilizer used in ice cream is -

- (A) Mono - glycerides
- (B) Sodium alginate
- (C) Di - glycerides
- (D) Glycol esters

Correct Answer: (B) Sodium alginate

Solution:

Step 1: Understanding the Concept:

The question asks to differentiate between a stabilizer and an emulsifier from a given list of food additives used in ice cream.

Step 2: Detailed Explanation:

- **Stabilizers** are large molecules (polysaccharides or proteins) that bind water and increase viscosity, preventing the formation of large ice crystals. Examples include various gums (guar, locust bean), carboxymethyl cellulose (CMC), and alginates.
- **Emulsifiers** are smaller molecules with both a water-loving (hydrophilic) and a fat-loving (lipophilic) part. They help mix fat and water. Examples include mono- and di-glycerides and polysorbates.

Let's classify the options:

- (A) Mono - glycerides: This is a classic **emulsifier**.
- (B) Sodium alginate: This is a polysaccharide salt extracted from seaweed. It is a well-known **stabilizer**.
- (C) Di - glycerides: This is a classic **emulsifier**, often found in combination with mono-glycerides.
- (D) Glycol esters: For example, Propylene Glycol Monostearate (PGMS), is an **emulsifier**.

Step 3: Final Answer:

Among the given options, only Sodium alginate is a stabilizer. The rest are emulsifiers.

Quick Tip

Remember that stabilizers are typically "gums" or long-chain polymers (like alginate, guar gum, CMC), while emulsifiers are "glycerides" or "esters" (like mono/di-glycerides, polysorbate 80).

44. The sugar percentage of Shrikhand is generally

- (A) 60%
- (B) 40%
- (C) 42%

(D) 30%

Correct Answer: (C) 42%

Solution:

Step 1: Understanding the Concept:

The question asks for the typical sugar concentration in Shrikhand, a traditional Indian dessert. Shrikhand is made from strained dahi (curd), known as Chakka, to which a large amount of sugar is added.

Step 2: Detailed Explanation:

Shrikhand is characterized by its thick, creamy consistency and high sweetness. The ratio of Chakka to sugar is a key factor in its final composition. Typically, sugar is added at a rate of 80 to 100 parts per 100 parts of Chakka.

The final product composition is usually targeted to have a total solids content of around 58-60%. According to FSSAI (Food Safety and Standards Authority of India) regulations, the total sugar (as sucrose) in Shrikhand should not exceed 72.5% on a dry matter basis (i.e., as a percentage of total solids).

Let's calculate the sugar percentage based on this regulation for a product with 58% total solids:

$$\text{Max Sugar \%} = 58\% \text{ Total Solids} \times 0.725 = 42.05\%$$

This calculation shows that 42% is a very common and legally compliant sugar level for Shrikhand. While 40% is also a common value, 42% aligns perfectly with the standard calculation based on food regulations.

Step 3: Final Answer:

The sugar percentage of Shrikhand is generally around 40-45%, with 42% being a very typical and standard value.

Quick Tip

For traditional Indian sweets like Shrikhand, remember that sugar acts as both a sweetener and a preservative. The concentration is therefore quite high, typically in the 40-45% range.

45. The RM value of ghee generally varies between

- (A) 20-25
- (B) 28-32
- (C) 13-18
- (D) 9-12

Correct Answer: (B) 28-32

Solution:

Step 1: Understanding the Concept:

The RM value, or Reichert-Meissl value, is a chemical constant used to assess the purity of butterfat (ghee). It specifically measures the quantity of volatile, water-soluble short-chain fatty acids (like butyric acid), which are uniquely abundant in milk fat compared to other fats and oils.

Step 2: Detailed Explanation:

A high RM value is a characteristic signature of pure ghee. Adulteration with vegetable oils, vanaspati, or animal body fats, which lack these short-chain fatty acids, will drastically lower the RM value.

Food laws (like FSSAI in India) set a minimum legal limit for the RM value of ghee to prevent adulteration.

Let's analyze the options:

- (A) 20-25: This is below the legal minimum for most types of ghee and indicates probable adulteration.
- (B) 28-32: This is the classic and expected range for pure ghee from cows or buffaloes. The legal minimum is generally 28 (or 26 in some areas).
- (C) 13-18 (D) 9-12: These values are extremely low and would indicate gross adulteration.

Step 3: Final Answer:

The normal RM value for pure ghee varies between 28 and 32.

Quick Tip

Memorize the two most important chemical constants for ghee purity:

- **RM Value:** Minimum 28. Measures short-chain fatty acids.
- **BR Reading:** 40-44 at 40°C. Measures refractive index.

These are very common questions for quality control.

46. Phosphatase test is used for checking

- (A) Efficiency of sterilization
- (B) Efficiency of separation of milk
- (C) Detection of sugar in milk

(D) Efficiency of pasteurization

Correct Answer: (D) Efficiency of pasteurization

Solution:

Step 1: Understanding the Concept:

The phosphatase test is a crucial quality control test in the dairy industry. It relies on the properties of an enzyme naturally present in raw milk.

Step 2: Detailed Explanation:

Raw milk contains an enzyme called alkaline phosphatase. The key property of this enzyme is that its resistance to heat is slightly greater than that of the most heat-resistant pathogenic bacteria found in milk (e.g., *Coxiella burnetii*).

The time-temperature combinations used for pasteurization (e.g., 63°C for 30 minutes or 72°C for 15 seconds) are specifically designed to destroy all pathogens. Conveniently, these conditions are also sufficient to completely inactivate the alkaline phosphatase enzyme.

Therefore, if a sample of pasteurized milk is tested and found to have no active phosphatase, it is considered to have been properly pasteurized. If the test is positive (phosphatase is active), it indicates either under-pasteurization or post-pasteurization contamination with raw milk.

The other options are incorrect:

- Sterilization uses much higher temperatures and is checked by testing for sterility (absence of all microorganisms).
- Separation efficiency is checked by measuring the fat content in the skim milk.
- Sugar is detected by specific chemical tests.

Step 3: Final Answer:

The phosphatase test is used to check the efficiency of pasteurization.

Quick Tip

A simple mnemonic to remember this is: **P**hosphatase test for **P**asteurization efficiency. Both start with 'P'. This is one of the most fundamental quality tests in a dairy.

47. Commercial uses of lactose are -

- A. In infant food.**
- B. In caramel or fudges.**
- C. In solid pharmaceutical preparations such as pills and tablets.**
- D. In manufacturing whey proteins.**

Choose the correct answer from the options given below:

- (A) A, B and D only
- (B) A, B and C only
- (C) A, B, C and D
- (D) B, C and D only

Correct Answer: (B) A, B and C only

Solution:

Step 1: Understanding the Concept:

The question asks to identify the correct commercial applications of lactose, which is the sugar extracted from milk whey.

Step 2: Detailed Explanation:

Let's analyze each statement:

- **A. In infant food:** This is a major use. Cow's milk has less lactose than human milk. So, lactose is added to infant formula based on cow's milk to adjust the carbohydrate level to be closer to that of human breast milk. This statement is correct.
- **B. In caramel or fudges:** Lactose has low solubility and crystallizes into small crystals, which contributes to the texture of some confections. It also participates in the Maillard browning reaction, contributing to color and flavor in baked goods and caramel. This statement is correct.
- **C. In solid pharmaceutical preparations...:** Lactose is widely used as an excipient (an inert filler or binder) in the pharmaceutical industry to manufacture tablets and capsules due to its inertness, good compressibility, and low cost. This statement is correct.
- **D. In manufacturing whey proteins:** This statement is incorrect. Whey proteins are manufactured from whey, which is a solution of lactose, whey proteins, and minerals. To produce whey protein concentrate (WPC) or isolate (WPI), lactose is *removed* from the whey using processes like ultrafiltration. Lactose is a co-product of whey protein manufacturing, not an ingredient used in it.

Step 3: Final Answer:

The correct commercial uses of lactose are in infant food, confectionery, and pharmaceuticals. Therefore, statements A, B, and C are correct.

Quick Tip

Think of lactose as a versatile byproduct. It's a nutrient for infant formula, a texturizer and browning agent in food, and a cheap, inert filler for medicine tablets.

48. In which of the following product edible casein is not used?

- (A) Ice cream
- (B) Coffee whiteners
- (C) Imitation milk
- (D) Whevit

Correct Answer: (D) Whevit

Solution:

Step 1: Understanding the Concept:

The question asks to identify the product from the list that does not use casein or its derivatives (caseinates) as an ingredient. Casein is the main protein in milk, known for its functional properties like emulsification, water binding, and nutritional value.

Step 2: Detailed Explanation:

- **(A) Ice cream:** Sodium caseinate is sometimes used as a stabilizer and emulsifier in ice cream to improve its body and texture.
- **(B) Coffee whiteners:** Sodium caseinate is a key ingredient in most non-dairy coffee whiteners. It encapsulates the fat droplets, providing excellent whitening power and preventing oil separation.
- **(C) Imitation milk:** In imitation or filled milk, where milk fat is replaced by vegetable fat, caseinates are often used as the protein source and to emulsify the fat.
- **(D) Whevit:** The name "Whevit" is derived from "Whey". It is a brand name for a whey-based beverage. The protein source in such a product is whey protein, not casein. Adding casein would be contrary to the product's concept.

Step 3: Final Answer:

Whevit is a whey-based product and therefore does not use edible casein as an ingredient.

Quick Tip

Pay attention to the product names in such questions. A name like "Whevit" or "Whey-Up" is a strong clue that the primary protein source is whey, not casein. Casein and whey are the two distinct protein fractions of milk.

49. All dairy fermentations use lactic acid bacteria for -

- (A) Acidification and flavour production
- (B) Salting
- (C) Sweetening
- (D) Bitterness

Correct Answer: (A) Acidification and flavour production

Solution:

Step 1: Understanding the Concept:

This question asks for the primary and universal function of Lactic Acid Bacteria (LAB) in the production of fermented dairy products like yogurt, cheese, and buttermilk.

Step 2: Detailed Explanation:

Lactic Acid Bacteria are the cornerstone of dairy fermentations. Their primary metabolic function is to consume lactose (milk sugar) and convert it into lactic acid. This has two major effects:

1. **Acidification:** The production of lactic acid lowers the pH of the milk. This acidity inhibits the growth of spoilage and pathogenic bacteria, thus preserving the product. It also causes the casein proteins to coagulate, forming the characteristic gel of yogurt or the curd of cheese.
2. **Flavour production:** Along with lactic acid, which provides a clean, tart taste, LAB also produce a range of other compounds like diacetyl (buttery flavor), acetaldehyde (green apple flavor in yogurt), and other esters and aldehydes. These contribute significantly to the unique aroma and flavor profile of each fermented product.

The other options are incorrect. Salting is a separate processing step, sweetening is usually done by adding sugar, and bitterness is a flavor defect, not a desired outcome.

Step 3: Final Answer:

The fundamental role of lactic acid bacteria in all dairy fermentations is acidification and flavour production.

Quick Tip

The name of the bacteria itself gives away its main function: **Lactic Acid Bacteria** produce **Lactic Acid**. This acid is key to preservation, texture, and taste. Flavor compounds are the other major contribution.

50. The selective criteria for Cheddar cheese cultures are-

- A. Rapid acid production
- B. Bacteriophage resistance
- C. Salt sensitivity
- D. Ripening activity

Choose the correct answer from the options given below:

- (A) A, B and D only
- (B) A, B and C only
- (C) A, B, C and D
- (D) B, C and D only

Correct Answer: (A) A, B and D only

Solution:

Step 1: Understanding the Concept:

The question asks for the desirable characteristics (selection criteria) for the starter cultures used in the manufacturing of Cheddar cheese.

Step 2: Detailed Explanation:

Let's evaluate each criterion:

- **A. Rapid acid production:** This is critical. A predictable and fast rate of acid production is needed to control the cheese-making process, expel whey (syneresis), and achieve the correct texture and pH for cheddaring. This is a desired trait.
- **B. Bacteriophage resistance:** Bacteriophages (or 'phages') are viruses that infect and kill bacteria. A phage infection can wipe out the starter culture, leading to slow or no acid production, which results in a failed batch of cheese. Therefore, resistance to phage attack is a vital criterion. This is a desired trait.
- **C. Salt sensitivity:** This is an undesirable trait. During Cheddar manufacturing, a significant amount of salt (around 2-3%) is added to the curd. The starter culture must be **salt-tolerant** to survive this step and continue its function during the initial stages of ripening. Salt sensitivity would be a reason to reject a culture.

- **D. Ripening activity:** After the cheese is made, the enzymes released by the starter bacteria play a crucial role in breaking down proteins and fats during the aging (ripening) period. This enzymatic activity is what develops the characteristic sharp flavor and texture of mature Cheddar. This is a desired trait.

Therefore, the important criteria are rapid acid production, bacteriophage resistance, and ripening activity.

Step 3: Final Answer:

The correct selective criteria are A, B, and D.

Quick Tip

For any cheese culture, think about what it needs to do its job: be a fast worker (rapid acid), be tough (phage resistance), survive the conditions (salt tolerance), and contribute to the final product (ripening). "Salt sensitivity" is the opposite of a desired trait.

51. Rose-Gotteleib method is used for extraction of

- (A) Milk Fat
- (B) Milk Sugar
- (C) Milk Protein
- (D) Vitamin

Correct Answer: (A) Milk Fat

Solution:

Step 1: Understanding the Concept:

The question asks to identify the milk component that is measured using the Rose-Gottlieb method. This is a standard reference method in analytical chemistry for food analysis.

Step 2: Detailed Explanation:

The Rose-Gottlieb method is a classic, highly accurate laboratory procedure for determining the fat content of milk and milk products. It is a gravimetric method, meaning it determines the amount of a substance by weighing.

The procedure involves dissolving the sample in ammonia and ethanol, followed by extraction of the fat using a mixture of two solvents, diethyl ether and petroleum ether. The solvents are then evaporated, and the remaining residue, which is the extracted fat, is weighed.

It is different from methods used for other components:

- Milk Protein is determined by the Kjeldahl method.

- Milk Sugar (Lactose) can be determined by polarimetry or colorimetric methods.
- Vitamins are measured using methods like HPLC.

Step 3: Final Answer:

The Rose-Gottlieb method is a reference method used for the extraction and quantification of milk fat.

Quick Tip

Associate the major analytical methods with the components they measure: **Rose-Gottlieb / Gerber / Mojonnier** → **Fat**; **Kjeldahl** → **Protein**. These are fundamental pairings in dairy chemistry.

52. Culture for Mozzarella cheese is -

- (A) *S.thermophilus* and *L.delbrueckii* subsp.bulgaricus
- (B) *S.thermophilus* and *L.helveticus* and *P. frudenreichii* sub sp. shermanii
- (C) *Leuc. mesenteroides* subsp. cremoris
- (D) *Propionibacterium*

Correct Answer: (A) *S.thermophilus* and *L.delbrueckii* subsp.bulgaricus

Solution:

Step 1: Understanding the Concept:

The question asks for the specific type of starter culture used in the production of Mozzarella cheese. The choice of culture is critical and depends on the processing conditions of the cheese variety.

Step 2: Detailed Explanation:

Mozzarella is a "pasta filata" or stretched-curd cheese. Its manufacturing process involves cooking the curd to a high temperature (around 40-45°C) and then heating and stretching it in hot water (around 75-85°C) once it reaches a specific pH (around 5.2).

This process requires cultures that can survive and produce acid at these high temperatures. Such cultures are called **thermophilic** (heat-loving).

Let's analyze the options:

- **(A) *S. thermophilus* and *L. delbrueckii* subsp. *bulgaricus*:** Both are thermophilic lactic acid bacteria. This is the classic culture combination used for yogurt and is also perfectly suited for making Mozzarella due to its ability to rapidly produce acid at high temperatures.

- (B) This mixture includes *Propionibacterium freudenreichii* subsp. *shermanii*, which is the culture responsible for the "eyes" (holes) and nutty flavor in Swiss-type cheeses. It's not used for Mozzarella.
- (C) *Leuconostoc mesenteroides* subsp. *cremoris*: This is a mesophilic (moderate-temperature) culture known for producing gas (CO₂) and aroma compounds (diacetyl). It is used for products like buttermilk and some cheeses, but not Mozzarella.
- (D) *Propionibacterium*: As mentioned above, this is the culture for Swiss cheese.

Step 3: Final Answer:

The correct thermophilic culture for Mozzarella cheese is a combination of *Streptococcus thermophilus* and a thermophilic *Lactobacillus*, such as *Lactobacillus delbrueckii* subsp. *bulgaricus*.

Quick Tip

Associate cheese types with culture temperatures: **Thermophilic** (high temp) cultures for Italian cheeses like Mozzarella and Parmesan, and yogurt. **Mesophilic** (medium temp) cultures for cheeses like Cheddar, Gouda, and cottage cheese.

53. MBRT of properly pasteurized milk shall not be less than

- (A) 5 hours
- (B) 3 hours
- (C) 2 hours
- (D) 1 hour

Correct Answer: (A) 5 hours

Solution:

Step 1: Understanding the Concept:

MBRT stands for the Methylene Blue Reduction Test. It is a rapid, indirect method to assess the microbiological quality of milk. The time it takes for the blue dye to become colorless (reduced) is an indicator of the bacterial load.

Step 2: Detailed Explanation:

The principle of the test is based on the metabolic activity of bacteria. When bacteria grow in milk, they consume oxygen and lower the oxidation-reduction potential of the milk. Methylene blue is a redox indicator that is blue in an oxidized state and colorless in a reduced state.

- **High bacterial count:** The oxygen is used up quickly, the potential drops, and the methylene blue is reduced (decolorized) in a short time.
- **Low bacterial count:** The metabolic activity is low, and it takes a long time for the dye to be reduced.

Properly pasteurized milk should have a very low count of viable bacteria. Therefore, its MBRT time should be very long. According to food safety standards (like FSSAI in India), the Methylene Blue Reduction Time for properly pasteurized milk must not be less than **5 hours**. This long time indicates that the pasteurization was effective in killing most of the bacteria.

Step 3: Final Answer:

The MBRT time for properly pasteurized milk shall not be less than 5 hours.

Quick Tip

For the MBRT, remember: **Longer time = Better quality**. Raw milk might be graded as "Good" if it takes 3-5 hours, but for pasteurized milk, the standard is much stricter, requiring the longest time bracket, which is 5 hours.

54. Microbiologically induced defect in cheese is

- A. Mold Growth
- B. Yeast Growth
- C. Gassy defect in cheese
- D. Discoloration in cheese

Choose the correct answer from the options given below:

- (A) A, B and D only
- (B) A, B and C only
- (C) A, B, C and D
- (D) B, C and D only

Correct Answer: (C) A, B, C and D

Solution:

Step 1: Understanding the Concept:

The question asks to identify which of the listed issues are considered defects in cheese caused by microbial activity. Cheese is a complex biological system where microbial growth is sometimes desired (e.g., starter cultures, ripening flora) and sometimes leads to spoilage or defects.

Step 2: Detailed Explanation:

Let's analyze each statement:

- **A. Mold Growth:** While some molds are essential for certain cheese varieties (e.g., *Penicillium roqueforti* in blue cheese), unwanted mold growth on the surface or interior of other cheeses is a common spoilage defect.
- **B. Yeast Growth:** Uncontrolled growth of wild yeasts can lead to off-flavors, gassiness, and discoloration, which are considered defects.
- **C. Gassy defect in cheese:** This defect, characterized by excessive holes or even splitting of the cheese block, is caused by undesirable gas-producing microorganisms like coliforms, clostridia, or certain yeasts. This is a classic microbial defect known as "early blowing" or "late blowing".
- **D. Discoloration in cheese:** The growth of pigmented bacteria, yeasts, or molds on the cheese surface or within cracks can cause unwanted colored spots (e.g., pink, black, brown), which is a quality defect.

Since all four statements describe potential defects caused by microorganisms, they are all correct.

Step 3: Final Answer:

All listed items—Mold Growth, Yeast Growth, Gassy defect, and Discoloration—are well-known microbiologically induced defects in cheese.

Quick Tip

In cheese making, microbes are both friends and foes. The key is control. The desired microbes (starter cultures, ripening flora) are friends. Uncontrolled contaminants (wild yeasts, molds, gas-producers) are foes that cause defects.

55. Manufacture of yoghurt involves following chronological steps-

- A. Standardization of mix and homogenization
- B. Heat treatment and cooling to inoculation temperature
- C. Inoculation with yoghurt cultures and incubation
- D. Cooling and Packaging

Choose the correct answer from the options given below:

- (A) A and D only
- (B) A, C and D only
- (C) A, B and D only

(D) A. B. C and D

Correct Answer: (D) A. B. C and D

Solution:

Step 1: Understanding the Concept:

The question asks for the correct chronological sequence of steps involved in the industrial manufacturing of yogurt.

Step 2: Detailed Explanation:

The standard process for yogurt making follows a precise order to ensure the correct final product texture, flavor, and safety.

1. **A. Standardization of mix and homogenization:** This is the first step. The milk base is prepared by adjusting the fat and solids-not-fat content (standardization) to the desired level. It is then homogenized to create a stable emulsion and a smoother texture.
2. **B. Heat treatment and cooling to inoculation temperature:** The standardized mix is then heated (e.g., 85-95°C for several minutes). This high heat treatment denatures whey proteins, which helps create a thicker gel, and kills any competing microorganisms. The mix is then cooled to the optimal incubation temperature for the starter culture (typically 40-43°C).
3. **C. Inoculation with yoghurt cultures and incubation:** The specific yogurt starter culture (usually a mix of *Streptococcus thermophilus* and *Lactobacillus bulgaricus*) is added to the cooled mix. The mix is then held at the incubation temperature for several hours until the desired pH (around 4.6) is reached through fermentation.
4. **D. Cooling and Packaging:** Once the fermentation is complete, the yogurt is rapidly cooled to below 10°C. This stops the fermentation process and preserves the product's quality. It is then packaged for distribution and sale.

The steps listed (A, B, C, D) are in the correct chronological order.

Step 3: Final Answer:

All the given steps are part of the yogurt manufacturing process and are listed in the correct chronological order.

Quick Tip

Remember the yogurt making process as: **Prepare** (Standardize/Homogenize) → **Pasteurize** (Heat/Cool) → **Ferment** (Inoculate/Incubate) → **Finish** (Cool/Package).

56. According to optimum growth temperature, bacteria associated with milk are not included in following group -

- (A) Psychrotropic
- (B) Mesophilic
- (C) Thermophilic
- (D) Endophilic

Correct Answer: (D) Endophilic

Solution:

Step 1: Understanding the Concept:

The question asks to identify the term that is not a standard classification for bacteria based on their optimal growth temperature, particularly in the context of dairy microbiology.

Step 2: Detailed Explanation:

Microbiologists classify bacteria into several groups based on their preferred temperature ranges for growth:

- **Psychrotrophic (or Psychrotolerant):** These bacteria can grow at refrigeration temperatures (0-7°C) but their optimum is higher. They are major spoilage organisms in refrigerated milk. Examples include *Pseudomonas*.
- **Mesophilic:** These bacteria grow best at moderate temperatures, typically between 20°C and 45°C. This group includes most human pathogens and many dairy starter cultures (e.g., for Cheddar cheese).
- **Thermophilic:** These bacteria prefer high temperatures, typically between 45°C and 70°C. They are used as starter cultures for high-temperature products like yogurt and Swiss cheese.
- **Endophilic:** This is not a standard term used to classify bacteria based on their temperature requirements. The term "philic" means "loving," and "endo" means "within." The term has no established meaning in the context of bacterial temperature classification.

Step 3: Final Answer:

Psychrotrophic, Mesophilic, and Thermophilic are the three major temperature-based groups of bacteria relevant to the dairy industry. Endophilic is not a part of this classification.

Quick Tip

The three key temperature groups in dairy are: **Psychro-** (cold-loving spoilage bacteria), **Meso-** (middle-temperature loving bacteria, including pathogens and many starters), and **Thermo-** (heat-loving bacteria for products like yogurt). Any other "-philic" term in a temperature context is likely a distractor.

57. The source of contamination of mastitis milk is -

- (A) Interior of udder
- (B) The milker
- (C) Utensils
- (D) Flies and other vermin

Correct Answer: (A) Interior of udder

Solution:

Step 1: Understanding the Concept:

The question asks for the direct source of the contamination found **in** mastitic milk. Mastitis is an infection of the mammary gland (udder).

Step 2: Detailed Explanation:

While external factors can transmit the disease, the question is about the source of the contaminants (bacteria, somatic cells) within the milk itself.

- **(A) Interior of udder:** Mastitis is an infection within the udder tissue. The bacteria multiply inside the udder, and the cow's body responds by sending a large number of white blood cells (somatic cells) to the site. Both the pathogenic bacteria and the high number of somatic cells are shed directly into the milk as it is formed and stored. Therefore, the infected interior of the udder is the direct source of the contamination that defines mastitic milk.
- **(B) The milker, (C) Utensils, (D) Flies:** These are all potential *vectors* or *routes of transmission* that can introduce mastitis-causing pathogens to the cow's teat end, leading to an infection. However, they are not the source of the contamination within the milk that has already been drawn from an infected cow.

Step 3: Final Answer:

The direct source of the high bacterial and somatic cell counts that contaminate mastitic milk is the infected interior of the udder itself.

Quick Tip

Differentiate between the *source of infection* (how the cow gets sick) and the *source of contamination in the milk* (why the milk from that cow is bad). For mastitis, the source of contamination in the milk is the infection already present inside the udder.

58. The common milk microorganisms grow best between the temperature -

- (A) 5°C to 10°C
- (B) 20°C to 40°C
- (C) 3°C to 4°C
- (D) -5°C to 0°C

Correct Answer: (B) 20°C to 40°C

Solution:

Step 1: Understanding the Concept:

The question asks for the optimal temperature range for the growth of "common milk microorganisms". This generally refers to the largest and most diverse group of bacteria found in milk, which are the mesophiles.

Step 2: Detailed Explanation:

Bacteria are classified by their optimal growth temperatures. Let's analyze the given ranges:

- **(A) 5°C to 10°C and (C) 3°C to 4°C:** This is the range for psychrotrophic bacteria, which are important for spoilage of refrigerated milk but are not the most "common" or numerous group overall.
- **(B) 20°C to 40°C:** This is the classic temperature range for mesophilic bacteria. This group includes a vast number of species, including many starter cultures (*Lactococcus*), spoilage organisms, and pathogens (*E. coli*, *Staphylococcus aureus*). They thrive at room and body temperatures, making this the ideal range for the most common milk microorganisms.
- **(D) -5°C to 0°C:** This is below the freezing point of water. While some microbes can survive, active growth is generally halted.

Step 3: Final Answer:

The temperature range of 20°C to 40°C is optimal for the growth of mesophilic bacteria, which represent the most common microorganisms associated with milk.

Quick Tip

When a question asks about "common" or "typical" bacteria without further qualification, it's usually referring to mesophiles. Think of room temperature or body temperature as their "sweet spot" for growth.

59. Lactometer reading test is used to test milk for detection of adulteration of -

- (A) Odour
- (B) Appearance
- (C) Water
- (D) Temperature

Correct Answer: (C) Water

Solution:

Step 1: Understanding the Concept:

The question asks about the primary purpose of using a lactometer in milk testing. A lactometer is a type of hydrometer, an instrument used for measuring the specific gravity (or density) of liquids.

Step 2: Detailed Explanation:

The specific gravity of normal milk is consistent, typically ranging from 1.028 to 1.032. This density is a result of its components: milk solids (fat, protein, lactose, minerals), which are denser than water, and the water itself.

- **Adulteration with Water:** Water has a specific gravity of 1.000. When water is added to milk, it dilutes the milk solids, causing the overall specific gravity of the mixture to decrease. A lactometer can easily detect this drop in specific gravity, indicating the addition of water.
- **Other options:** A lactometer does not measure odour, appearance (visual attributes), or temperature. While the reading must be corrected for temperature, the instrument itself does not measure temperature.

Step 3: Final Answer:

The lactometer reading is primarily used to detect the adulteration of milk with added water.

Quick Tip

Remember the simple principle: **Lacto** (milk) + **meter** (measure). It measures milk's density. Since water is the most common, cheapest, and least dense adulterant, the lactometer is the go-to tool to detect it. A low reading means added water.

60. Milk collection operation includes-

- A. Unloading and Grading
- B. Sampling
- C. Weighing
- D. Packaging

Choose the correct answer from the options given below:

- (A) A, B and D only
- (B) A, B and C only
- (C) A, B, C and D
- (D) B, C and D only

Correct Answer: (B) A, B and C only

Solution:

Step 1: Understanding the Concept:

The question asks to identify the activities that are part of the initial milk collection and reception operation at a dairy plant or collection center. This stage is focused on receiving raw milk from farmers or tankers.

Step 2: Detailed Explanation:

The typical workflow at a milk reception dock is as follows:

- **A. Unloading and Grading:** When a milk can or tanker arrives, it is unloaded. An operator then grades the milk, usually by sensory evaluation (smell, appearance) to check for any obvious defects before it is pooled with other milk.
- **B. Sampling:** A representative sample is taken from the consignment. This sample is used for quality control tests (like fat, SNF, acidity, platform tests) which are linked to payment and quality assessment.
- **C. Weighing:** The milk is then poured into a weigh bowl or passed through a flow meter to accurately determine the quantity of milk received. This is essential for record-keeping and payment.

- **D. Packaging:** This is a step in milk *processing*, not collection. Packaging occurs much later in the process, after the milk has been chilled, clarified, pasteurized, homogenized, etc.

Therefore, unloading/grading, sampling, and weighing are the core activities of the milk collection operation.

Step 3: Final Answer:

The correct components of the milk collection operation are A, B, and C.

Quick Tip

Think of the milk collection dock as the "front door" of the dairy. The operations here are all about receiving, checking, and recording the raw material. Processing and packaging happen "inside the house" later on.

61. Is not a platform test?

- (A) Sediment test
- (B) Turbidity test
- (C) Alcohol test
- (D) Smell and colour

Correct Answer: (B) Turbidity test

Solution:

Step 1: Understanding the Concept:

A "platform test" is a rapid test performed at the milk reception platform (dock) to quickly assess the quality of incoming raw milk and make a decision to accept or reject it. These tests must be fast and simple.

Step 2: Detailed Explanation:

Let's analyze the options:

- **(A) Sediment test:** This is a rapid platform test where a standard volume of milk is filtered through a cotton disc to visually check for insoluble dirt and foreign matter.
- **(B) Turbidity test:** This test is used to check the efficiency of *sterilization* in milk. It works on the principle that sterilization denatures whey proteins. If the sample is properly sterilized, adding a reagent will not cause turbidity. This is a laboratory test for processed milk, not a rapid platform test for raw milk.

- **(C) Alcohol test:** This is a rapid platform test where an equal volume of alcohol (usually 68-72% ethanol) is mixed with milk. If the milk coagulates, it indicates high developed acidity or disturbed salt balance, meaning it will not withstand heat processing.
- **(D) Smell and colour:** This is part of the organoleptic or sensory evaluation, the very first and most basic platform test performed by the milk grader.

Step 3: Final Answer:

The Turbidity test is a laboratory test for sterilized milk and is not a platform test for raw milk reception.

Quick Tip

Platform tests are for raw milk and must be QUICK. Think: can this be done in a minute or two on a busy receiving dock? Sensory tests, alcohol test, COB test, and sediment test fit this description. Tests for pasteurization (phosphatase) or sterilization (turbidity) are done in the lab on the finished product.

62. Food poisoning caused due to milk by causal organism present in milk is -

- (A) *Micrococcus pyrogenes*
- (B) *Bacillus anthracis*
- (C) *Borrehota varidae*
- (D) *Brucella abortus*

Correct Answer: (D) *Brucella abortus*

Solution:

Step 1: Understanding the Concept:

The question asks to identify a recognized causal organism of foodborne illness (food poisoning in a broad sense) that is transmitted through milk.

Step 2: Detailed Explanation:

Let's analyze the given organisms:

- **(A) *Micrococcus pyrogenes*:** This is an outdated term, often used as a synonym for *Staphylococcus aureus*. *S. aureus* is a major cause of food poisoning (intoxication) via heat-stable toxins, and it can be transmitted through milk, especially from cows with mastitis. So this is a plausible answer.

- **(B) *Bacillus anthracis*:** This organism causes anthrax, a serious zoonotic disease. While it can be transmitted from infected animals, it is not typically categorized as a common cause of "food poisoning".
- **(C) *Borrehota varidae*:** This is not a recognized scientific name and appears to be a fabricated distractor.
- **(D) *Brucella abortus*:** This bacterium is the classic cause of Brucellosis (Undulant Fever) in humans, a serious disease transmitted primarily through the consumption of unpasteurized milk and dairy products from infected cattle. It is a well-established and significant milk-borne pathogen.

Both *Staphylococcus aureus* and *Brucella abortus* are significant milk-borne pathogens. However, *Brucella abortus* is specifically known for causing a widespread disease historically linked to raw milk consumption. In the context of specific pathogenic organisms, it is a very strong and unambiguous answer.

Step 3: Final Answer:

Brucella abortus is a well-known pathogenic organism that causes the foodborne disease Brucellosis through the consumption of contaminated milk.

Quick Tip

Remember the key pathogens associated with raw milk: *Brucella abortus*, *Mycobacterium bovis* (Tuberculosis), *Listeria monocytogenes*, *Salmonella*, *Campylobacter jejuni*, and Toxin-producing *E. coli* and *Staphylococcus aureus*.

63. For the neutralization of cream, neutralizers to be added are -

- (A) Gelatin
- (B) Sucrose
- (C) Sodium bicarbonate and Calcium hydroxide
- (D) Lactose

Correct Answer: (C) Sodium bicarbonate and Calcium hydroxide

Solution:

Step 1: Understanding the Concept:

The question asks to identify the chemical agents used to neutralize excess acidity in cream before it is churned into butter. Neutralization is done to prevent quality defects in the final

butter.

Step 2: Detailed Explanation:

When cream develops high acidity, it can cause problems like curdling during pasteurization and lead to flavor defects in the butter. To counteract this, a mild alkali, or neutralizer, is added to reduce the acidity to an optimal level.

- **(A) Gelatin, (B) Sucrose, (D) Lactose:** These are a protein and sugars, respectively. They are not alkaline and cannot neutralize acid.
- **(C) Sodium bicarbonate and Calcium hydroxide:** Both are mild alkaline compounds that are approved for use in food. Sodium bicarbonate (NaHCO_3 , baking soda) and Calcium hydroxide (Ca(OH)_2 , slaked lime) are the standard neutralizers used in the creamery for this purpose. They react with the lactic acid in the cream to form salts and water, thus reducing the acidity.

Step 3: Final Answer:

The correct substances used for the neutralization of cream are Sodium bicarbonate and Calcium hydroxide.

Quick Tip

Think about basic chemistry: to neutralize an acid (like lactic acid in sour cream), you need to add a base (alkali). In food processing, only weak, food-grade bases like sodium bicarbonate or calcium/magnesium hydroxides can be used.

64. A fat concentrate which is obtained by churning cream ,gathering the fat into a compact mass is -

- (A) Butter
- (B) Khoa
- (C) Dried milk
- (D) Condensed Milk

Correct Answer: (A) Butter

Solution:

Step 1: Understanding the Concept:

The question provides a definition of a dairy product based on its manufacturing process and asks to identify the product. The key process words are "churning cream" and "gathering the

fat”.

Step 2: Detailed Explanation:

Let's analyze the process described:

- **Churning:** This is the process of agitating cream. The agitation breaks the fat globule membranes, causing the liquid milk fat to coalesce and separate from the watery phase (buttermilk). This process is known as phase inversion.
- **Gathering the fat into a compact mass:** After coalescing, the small fat particles form larger grains, which are then worked (kneaded) and gathered into a single compact mass.

This entire description is the classic definition of making **butter**.

The other options are made differently: Khoa and Condensed milk are made by evaporation (heat concentration), and Dried milk is made by spray or drum drying.

Step 3: Final Answer:

The fat concentrate obtained by churning cream is butter.

Quick Tip

Associate keywords with products: **Churning** → Butter; **Evaporation/Desiccation** → Khoa/Condensed Milk; **Drying** → Milk Powder; **Fermentation** → Yogurt/Dahi; **Coagulation** → Cheese/Paneer.

65. Tests for the quality of butter are -

- A. Coliform count
- B. Lipolytic count
- C. Yeast and mold count
- D. Sediment test

Choose the correct answer from the options given below:

- (A) A, B and D only
- (B) A, B and C only
- (C) A, B, C and D
- (D) B, C and D only

Correct Answer: (C) A, B, C and D

Solution:

Step 1: Understanding the Concept:

The question asks to identify the valid quality control tests performed on butter. Butter quality is assessed based on hygiene, potential for spoilage, and cleanliness.

Step 2: Detailed Explanation:

Let's evaluate each test:

- **A. Coliform count:** This is a standard indicator of post-pasteurization contamination and poor sanitation during the manufacturing and packaging process. A low coliform count is essential. This is a valid test.
- **B. Lipolytic count:** This refers to the enumeration of lipolytic microorganisms (bacteria that produce fat-splitting lipase enzymes). The presence of these organisms is highly undesirable as they can cause hydrolytic rancidity, a major flavor defect in butter. This is a valid test.
- **C. Yeast and mold count:** Yeasts and molds are common contaminants that can grow on the surface of butter, causing discoloration and off-flavors. Their count is a critical indicator of sanitation and the keeping quality of the butter. This is a valid test.
- **D. Sediment test:** This test determines the amount of insoluble extraneous matter (dirt, etc.) in the butter, which reflects the cleanliness of the cream and the manufacturing environment. This is a valid physical quality test.

All four tests are standard procedures used to assess the microbiological and physical quality of butter.

Step 3: Final Answer:

All the listed tests (Coliform count, Lipolytic count, Yeast and mold count, and Sediment test) are used for assessing the quality of butter.

Quick Tip

For quality tests of finished products, think about two main categories: hygiene indicators (like Coliforms, Yeast & Mold) and spoilage potential indicators (like Lipolytic or Proteolytic bacteria). Physical tests like sediment are also important for cleanliness.

66. Composition of butter oil is -

- A. Butter fat - 99.5 to 99.8%
- B. Moisture - 0.1 to 0.3%
- C. Acidity (oleic) - 0.2 to 0.5%
- D. Peroxide value - 0.0 to 0.1%

Choose the correct answer from the options given below:

- (A) A, B and D only
- (B) A, B and C only
- (C) A, B, C and D
- (D) B, C and D only

Correct Answer: (C) A, B, C and D

Solution:

Step 1: Understanding the Concept:

The question asks to identify the correct compositional and quality parameters for butter oil. Butter oil, also known as anhydrous milk fat (AMF), is a product made by removing almost all the water and non-fat solids from butter or cream, resulting in nearly pure milk fat.

Step 2: Detailed Explanation:

Let's analyze each parameter according to food standards (like FSSAI or Codex):

- **A. Butter fat - 99.5 to 99.8%:** This is correct. The defining characteristic of butter oil/AMF is its extremely high fat content, typically mandated to be a minimum of 99.8%. The given range is representative of high-quality butter oil.
- **B. Moisture - 0.1 to 0.3%:** This is correct. The removal of water is a key part of the manufacturing process. The legal maximum moisture content is very low, usually around 0.1% to 0.2%, so this range is acceptable.
- **C. Acidity (oleic) - 0.2 to 0.5%:** This represents the free fatty acid (FFA) content, which is an indicator of hydrolytic rancidity. For good quality butter oil, the FFA content should be low, typically below 0.5%. This range is a standard quality specification.
- **D. Peroxide value - 0.0 to 0.1%:** Peroxide value (PV) measures the initial stages of oxidative rancidity. For fresh, high-quality butter oil, the PV should be very low, ideally close to zero. The given range is indicative of a fresh product.

All four statements accurately describe the standard composition and quality specifications for butter oil.

Step 3: Final Answer:

Statements A, B, C, and D are all correct. Therefore, the correct option is (C).

Quick Tip

For products like butter oil or ghee, remember the key principle: it's almost pure fat. This means fat content is >99%, and everything else (moisture, acidity, etc.) must be very low, typically less than 1% combined.

67. Cheesy flavour in butter is due to -

- (A) Growth of proteolytic bacteria in cream
- (B) Over heating of cream
- (C) Over neutralization of cream
- (D) Use of sour cream

Correct Answer: (A) Growth of proteolytic bacteria in cream

Solution:

Step 1: Understanding the Concept:

The question asks for the cause of a specific off-flavor defect in butter known as "cheesy." This flavor is distinct from other defects like sour, rancid, or cooked flavors.

Step 2: Detailed Explanation:

- **(A) Growth of proteolytic bacteria in cream:** Proteolytic bacteria produce enzymes (proteases) that break down proteins, primarily casein. This breakdown produces peptides and other compounds that are characteristic of the flavors found in aged cheese. If such bacteria grow in the cream before churning, these flavor compounds are carried over into the butter, resulting in a cheesy defect. This is the correct cause.
- **(B) Over heating of cream:** This would cause a "cooked" or "scorched" flavor due to the denaturation of whey proteins and other heat-induced chemical reactions.
- **(C) Over neutralization of cream:** Adding too much neutralizer can lead to a soapy or "neutralizer" flavor.
- **(D) Use of sour cream:** Cream with high developed acidity (sour cream) will produce butter that has a sour or acidic taste, not a cheesy one.

Step 3: Final Answer:

The cheesy flavor in butter is caused by protein decomposition products resulting from the growth of proteolytic bacteria in the cream.

Quick Tip

Link the type of microbe to the flavor defect: **Proteolytic** (protein-eating) bacteria → **Cheesy/Bitter** flavors. **Lipolytic** (fat-eating) bacteria → **Rancid** flavors. **Lactic acid** bacteria → **Sour** flavors.

68. Match the LIST-I with LIST-II

LIST-I (Traditional dairy product)		LIST-II (Principle of manufacture of product)	
A.	Khoa	I.	Open pan dehydration to a semi solid consistency
B.	Dahi	II.	Fermentation
C.	Paneer	III.	Sweetened Khoa
D.	Peda	IV.	Acid coagulation and draining

Choose the correct answer from the options given below:

- (A) A-I, B - II, C - III, D - IV
- (B) A-I, B - III, C - II, D - IV
- (C) A-I, B-II, C - IV, D - III
- (D) A-III, B - IV, C - I, D - II

Correct Answer: (C) A-I, B-II, C - IV, D - III

Solution:

Step 1: Understanding the Concept:

This question requires matching traditional Indian dairy products with the fundamental principle of their manufacturing process.

Step 2: Detailed Explanation:

Let's match each product from List I to its process in List II:

- **A. Khoa:** This is a heat-desiccated milk product. It is made by vigorously boiling and stirring milk in a large, shallow open pan until most of the water evaporates and it reaches a semi-solid, dough-like consistency. **This matches with I.**
- **B. Dahi:** This is the Indian equivalent of yogurt. It is produced by the fermentation of milk using lactic acid bacteria, which convert lactose into lactic acid, causing the milk to form a gel. **This matches with II.**
- **C. Paneer:** This is a type of fresh, unripened cheese. It is made by adding an acid (like citric acid or lemon juice) to hot milk, which causes the casein to coagulate. The resulting curd is then separated from the whey by draining. **This matches with IV.**

- **D. Peda:** This is a popular Indian sweet. Its primary base is Khoa, to which sugar is added and mixed until a smooth paste is formed, which is then shaped. Therefore, the principle is that it is a sweetened Khoa product. **This matches with III.**

The correct set of matches is A-I, B-II, C-IV, D-III.

Step 3: Final Answer:

Based on the matching, the correct option is (C).

Quick Tip

Memorize the core manufacturing principle for key Indian dairy products: **Khoa** = Heat Evaporation; **Dahi** = Fermentation; **Paneer/Chhana** = Acid Coagulation; **Peda/Burfi** = Khoa + Sugar.

69. A concentrated and sweetened whole milk product containing several layers of clotted cream is -

- (A) Paneer
- (B) Rabri
- (C) Channa
- (D) Gulabjamun

Correct Answer: (B) Rabri

Solution:

Step 1: Understanding the Concept:

The question asks to identify a specific traditional Indian dairy dessert based on a description of its composition and texture. The key features are: concentrated, sweetened, and contains layers of clotted cream (malai).

Step 2: Detailed Explanation:

- **(A) Paneer:** An unsweetened, acid-coagulated fresh cheese. It does not contain layers of cream.
- **(B) Rabri:** This is the correct answer. Rabri is made by simmering whole milk on low heat for a long period to concentrate it. As the milk heats, a layer of cream (malai) forms on the surface. This layer is skimmed off and set aside. The process is repeated until the milk is significantly reduced. Finally, the reduced milk is sweetened and the collected layers of cream are added back, giving it a characteristic layered, lumpy texture.

- **(C) Channa:** The unsweetened, acid-coagulated milk solid base used for Bengali sweets.
- **(D) Gulabjamun:** Deep-fried balls of Khoa soaked in sugar syrup.

Step 3: Final Answer:

The product that matches the description of a concentrated, sweetened milk with layers of clotted cream is Rabri.

Quick Tip

The key to identifying Rabri is the "layers of clotted cream" or "malai". This unique texture differentiates it from other concentrated milk sweets like Basundi or Kheer.

70. Which of the following agencies does prescribe the level of treatment needed for a dairy plant?

- (A) FDA
- (B) IDF
- (C) EPA
- (D) WHO

Correct Answer: (A) FDA

Solution:

Step 1: Understanding the Concept:

The question asks to identify the agency that sets legally binding regulations for food processing, such as the specific time-temperature requirements for pasteurization in a dairy plant.

Step 2: Detailed Explanation:

- **(A) FDA (Food and Drug Administration):** This is a national regulatory agency in the United States. It has the legal authority to create and enforce regulations to ensure food safety. Its Pasteurized Milk Ordinance (PMO) is a key document that prescribes the exact levels of treatment (pasteurization, etc.) for dairy products. Similar national agencies exist in other countries (e.g., FSSAI in India, CFIA in Canada). This is the correct type of agency.
- **(B) IDF (International Dairy Federation):** The IDF is a non-governmental, non-profit international organization that provides a forum for the dairy sector to reach consensus on scientific and technical matters. It develops standards and guidelines but does not have legal enforcement power.

- **(C) EPA (Environmental Protection Agency):** This agency's role is to protect human health and the environment. It would regulate a dairy plant's waste disposal and emissions, not the food processing standards for the milk itself.
- **(D) WHO (World Health Organization):** WHO, along with the FAO, establishes international food standards through the Codex Alimentarius Commission. These are recommendations and a basis for national laws, but WHO itself does not directly regulate individual plants in a country.

A national regulatory body like the FDA is the one that "prescribes" legally mandated treatment levels.

Step 3: Final Answer:

The FDA is an example of a regulatory agency that prescribes the level of treatment needed for a dairy plant.

Quick Tip

Differentiate between regulatory agencies and advisory organizations. Regulatory bodies like the FDA (USA) or FSSAI (India) create legally enforceable laws. International organizations like IDF and WHO provide scientific guidance and model regulations.

71. Sweetened Dahi is also known as -

- (A) Misti dahi
- (B) Blue dahi
- (C) Rasmalai
- (D) Kheer

Correct Answer: (A) Misti dahi

Solution:

Step 1: Understanding the Concept:

The question asks for the common regional name for sweetened dahi (Indian yogurt).

Step 2: Detailed Explanation:

- **(A) Misti dahi:** This is the correct term. Originating from Bengal, "Misti" means sweet and "Doi" (or Dahi) means curd/yogurt. It is a traditional sweetened yogurt made by fermenting sweetened, often slightly concentrated, milk. It has a characteristic pinkish-brown color due to the caramelization of sugar.

- **(B) Blue dahi:** This is not a recognized term for a dairy product.
- **(C) Rasmalai:** This is a dessert made from chhana (acid-coagulated cheese) patties soaked in sweetened, thickened milk (rabri). It is not a type of dahi.
- **(D) Kheer:** This is a type of milk pudding, usually containing rice, vermicelli, or tapioca. It is not a fermented product.

Step 3: Final Answer:

Sweetened Dahi is famously known as Misti dahi.

Quick Tip

Learning the literal translation of product names can be a great help. "Misti" = Sweet, "Doi" = Curd. The name itself gives the answer.

72. HACCP stands for -

- (A) HAZARD ANALYSIS AND CRITICAL CONTROL POINT
- (B) HAZARD ANALYSIS AND CONTROL CRITICAL POINT
- (C) HAZARD ANALYSIS AND CHEMICAL CONTROL POINT
- (D) HAZARD ANALYST AND CONTROL CRITICAL POINT

Correct Answer: (A) HAZARD ANALYSIS AND CRITICAL CONTROL POINT

Solution:

Step 1: Understanding the Concept:

The question asks for the full form of the acronym HACCP, which is a globally recognized, systematic food safety management system.

Step 2: Detailed Explanation:

HACCP is a system that identifies, evaluates, and controls hazards that are significant for food safety. The system is built on seven principles, and its name describes the first two core ideas:

- **HA - Hazard Analysis:** First, you analyze the entire production process to identify any potential biological, chemical, or physical hazards.
- **CCP - Critical Control Point:** Then, you identify the specific points in the process where control can be applied to prevent, eliminate, or reduce a food safety hazard to an acceptable level. These are the "Critical Control Points."

Therefore, the correct full form is **Hazard Analysis and Critical Control Point**. The other options contain errors: (B) has the words "Control Critical" inverted, (C) incorrectly specifies only "Chemical" hazards, and (D) incorrectly uses the word "Analyst".

Step 3: Final Answer:

HACCP stands for HAZARD ANALYSIS AND CRITICAL CONTROL POINT.

Quick Tip

Focus on the logic of the system to remember the name. You first **Analyze** the **Hazards**, then you find the **Critical Points** where you can apply **Control**. This leads you directly to "Hazard Analysis and Critical Control Point".

73. For keeping liaison with CAC and to coordinate Codex activities in India, Food Safety and Standards Authority of India constitutes -

- (A) Export Quality Control
- (B) National Codex Contact Point
- (C) Export Inspection Council
- (D) Export Inspection Agencies

Correct Answer: (B) National Codex Contact Point

Solution:

Step 1: Understanding the Concept:

The question asks about the specific body established by the Food Safety and Standards Authority of India (FSSAI) to coordinate with the Codex Alimentarius Commission (CAC). The CAC is the international body that sets food standards.

Step 2: Detailed Explanation:

Each member country of the Codex Alimentarius Commission is required to establish a single point of contact to facilitate communication and coordinate all Codex-related activities within the country. This designated body is officially known as the **National Codex Contact Point (NCCP)**.

In India, the FSSAI has been designated as the NCCP. The NCCP is responsible for:

- Receiving and circulating all Codex documents and notifications.
- Coordinating with various ministries, industry associations, and consumer groups to formulate India's stance on various Codex standards.

- Representing India in Codex meetings.

The other options, such as the Export Inspection Council and Agencies, are primarily concerned with the quality control and inspection of products for export, which is a different mandate from coordinating international food standard activities.

Step 3: Final Answer:

The body constituted by FSSAI to liaise with the CAC is the National Codex Contact Point.

Quick Tip

The key to this question is the word "Codex". The correct answer, "National Codex Contact Point," directly includes this term, making it the most logical choice for an entity that coordinates "Codex activities".

74. The sugar content of flavoured milk ranges between

- (A) 4-5%
- (B) 2-3%
- (C) 5-7%
- (D) 12-14%

Correct Answer: (C) 5-7%

Solution:

Step 1: Understanding the Concept:

The question asks for the typical sugar content of flavoured milk. It's important to distinguish between the natural sugar (lactose) present in milk and the sugar (sucrose) added for sweetness. The question likely refers to the amount of *added* sugar.

Step 2: Detailed Explanation:

Plain milk naturally contains about 4.5% to 5% lactose. To make flavoured milk, sugar is added to provide sweetness that complements the added flavour (e.g., chocolate, strawberry).

The amount of added sugar is carefully balanced to make the product palatable without being overly sweet.

Let's analyze the options in the context of *added* sugar*:

- **(A) 4-5%:** This is a possible level for a less sweet product, but often a bit higher concentration is preferred.

- **(B) 2-3%:** This amount of added sugar would likely be insufficient to overcome the milk's natural taste and provide a distinctly sweet, flavoured product.
- **(C) 5-7%:** This is the most common commercial range for added sugar in flavoured milk. It provides a good level of sweetness that is widely accepted by consumers.
- **(D) 12-14%:** This level of added sugar would make the product excessively sweet, more like a dessert than a beverage. This range might be closer to the *total* sugar content (lactose + added sugar).

Since the question is asking for a general range and 5-7% is the industry standard for added sugar to achieve the desired taste profile, this is the most appropriate answer.

Step 3: Final Answer:

The typical range for added sugar in flavoured milk is 5-7%.

Quick Tip

Remember that flavoured milk has two sources of sugar: natural lactose (5%) and added sucrose. When asked for "sugar content," if the options are in the single digits, the question is likely referring to the *added* sugar.

75. Frequently used packaging materials in dairy industry are -

- A. Polythene(PE)
- B. LDPE
- C. HDPE
- D. Polypropylene(PP)

Choose the correct answer from the options given below:

- (A) A, B and D only
- (B) A, B and C only
- (C) A, B, C and D
- (D) B, C and D only

Correct Answer: (C) A, B, C and D

Solution:

Step 1: Understanding the Concept:

The question asks to identify the common types of plastic polymers used for packaging in the dairy industry. Different dairy products have different packaging requirements (e.g., rigid vs.

flexible, heat resistance).

Step 2: Detailed Explanation:

Let's analyze the use of each material:

- **A. Polythene (PE):** This is the general chemical name for a family of polymers that includes LDPE and HDPE. Since both are widely used, the general term is also correct.
- **B. LDPE (Low-Density Polyethylene):** This polymer is known for its flexibility and excellent heat-sealing properties. It is the primary material used for making flexible milk pouches (milk bags).
- **C. HDPE (High-Density Polyethylene):** This polymer is more rigid and robust than LDPE. It is used extensively for blow-molding rigid containers like milk jugs and bottles.
- **D. Polypropylene (PP):** This polymer is known for its good barrier properties and higher melting point compared to polyethylene. It is widely used for manufacturing tubs for butter and margarine, and cups for yogurt and dahi, as it can withstand hot-filling processes.

All four listed materials are very common and frequently used in various applications within the dairy packaging industry.

Step 3: Final Answer:

Since Polythene (PE), LDPE, HDPE, and Polypropylene (PP) are all frequently used, the correct option includes all of them.

Quick Tip

Associate the polymer with the package type:

- **LDPE** → Flexible pouches (milk bags)
- **HDPE** → Rigid jugs/bottles
- **PP** → Cups/tubs (yogurt, butter)

Since all these package types are common, all the materials are used.