**BVFPS201 T: DAIRY PRODUCTS PROCESSING TECHNOLOGY**

**UNIT-1**

**Cream**

**Syllabus:** Definition, classification, composition, nutritive value, Physico-chemical properties, manufacture of different types of cream, processing of cream; defects in  cream  and  their  prevention

**Questions**:

1. Write the classification of cream? 3

2. Write formula for percentage SNF in cream? 2

3. Write formula for percentage of titratable acidity of cream? 2

4. Write Stocke’s law for gravity methods and centrifugal separation milk fat globules? ( 2+2 )

5. How different factors influence fat percentage of cream? 5

6. How different factors affect for fat loss in skim milk? 5

7. What is skimming efficiency? 2

8. What is separator slime? 2

9. Define neutralization of cream? Write it’s objective? (1+2)

10. How neutralization of cream is done? 5

11. Write on pasteurization of cream? 5

12. Write causes and prevention following defect of cream- 5

 highly acid, oxidized, rancid, feathering in hot coffee, bitter, cheesy, coarse acid, fruity.

**BUTTER**

**Syllabus:**

Definition, composition; nutritive value, processing and production steps, overrun, butter making machines, quality testing of table butter, butter‐ defects, causes and their prevention, packaging and storage

**Questions:**

1. Write classification of butter. 4

2. Write composition of butter. 3

3. Write flow diagram of butter manufacture. 3

4. Write on cooling and ageing of cream. 3

5. Define ripening of cream, write it’s objective, it’s procedure. (1+2+2)

6. What is churning? 2

7. Write factors influencing churn ability of cream and body of butter. 5

8. Write on churning of cream and addition of butter colour. (2+2)

9. Write on factors effecting fat loss in butter milk. 3

10. Write on washing of butter or write on purpose of washing of butter.

 11. Write objects of salting during butter making. 2

12. Write method of salting. 3

13. Write purpose working procedure. (2+2)

14.Write packaging of butter and it’s storage. (3+3)

15. Define overrun of butter. 2

16. Write Fisher and Hookers phase reversal theory, Rahn’s foam theory and King’s modern theories of churning. (3+3+3+)

17. Write causes and prevention of following defects- fishy flavor, rancid, oxidized, stale, yeasty, crumbly, Greasy, gummy, leaky, mealy, sticky, gritty?

**Butter oil and ghee**

**Syllabus:**

Definition, composition, nutritive value, processing, equipment, quality tests

**Questions:**

1. Define butter oil. (2)
2. Write chemical composition of butter oil. (2)
3. Write following method of manufacture of butter oil a) Direct evaporation b) Decantation c) Centrifugal seperation followed by vacuum drying d) Directly from cream by de-emulsification and centrifugal separation (each 3)
4. Write the factors infulencing keeping quality of butteroil. (3)
5. What is the permitted level of BHA in ghee/butter and WMP/partly SMP? (2)
6. Write causes and prevention of following defects - Brownish colour, coarse texture, rancid flavour, oxidized/oily/ metalic/ tallowy flavour.

Question for ghee - follow in unit 5

**UNIT-2**

**Syllabus:**

Ice cream and frozen desserts: Definition, composition, nutritive value, role of the constituents in ice cream, types, Processing steps, equipment, quality testing, defects causes and prevention, packaging and storage.

**Questions:**

1. Classify ice cream. (4)

2. Write the ISI standard of ice cream. (1)

3. What is the minimum percentage of milk fat in ice cream. (1)

4. What is the maximum percentage of sucralose and stabilizer and emulsifier in ice cream? (2)

5. Write the role of following constituents in ice cream - milk fat, MSNF, sugar, stabilizer, emulsifier, colour and flavours? (2 each)

6. Write the advantage and disadvantages of following ice cream constituents - milk fat, MSNF, sugar, stabilizer, emulsifier, total solids, flavour and colour. ( 1+1 each )

7. Write the flow diagram for ice cream making. (4)

8. Write the names of stabilizer and emulsifier used in ice cream. (2+2)

9. What is the role of stabilizer and emulsifier in ice cream? (2+2)

10. From which plant vanilla flavour is obtained? (1)

11. Who invented vanilla? (1)

12. What is the principle flavouring matter in vanilla? (1)

13. From which plant chocolate is obtained? (1)

14. Who invented chocolate flavour? (1)

15. Which flavour rank first and second most used in ice cream manufacture? (1)

16. What is the time and temperature combination for batch and HTST method pasteurization in icecream? (2)

17. Write a short note on - a. cooling and ageing b. freezing and mixing c. hardening

 d. Overrun related to ice cream manufacture. (3 for each)

18. What is the temperature of hardening of ice cream? (1)

19. Write a short note on softy. (3)

20. Write cause and prevention of following defects of ice cream –

 a . Flavour : High, low, acid/sour, bitter, cooked, flat, unnatural, rancid, oxidized/oily/metallic/tallowy,

b. Body: crimbly, soggy, weak

c. Texture : buttery, coarse/icy, fluffy, sandy,

d. Melting quality : curdy meltdown, foamy meltdown, slow melting, colour unnatural, miscellaneous shrinkage. (2 for each)

21. Prepare 10 kg of mix containing 12 % fat, 11 % fat SS , 15 % sugar and 0.4 % stabilizer, available ingredients are.

Milk containing 4.5 % fat and 9.0 % SS

Cream containing 4.0 % fat and 5.0% SS

SMP containing 0.7 % fat and 96 % SS

**UNIT-3**

**CONDENSED MILK**

**Syllabus:**

Definition, composition, role of milk constituents in condensed milk, manufacture of condensed milk, Heat stability and its control , uses, defects, causes and prevention of condensed milk.

**Questions:**

1. What is condensed milk? (2)
2. What is evaporated milk? (2)
3. What is sweetened condensed milk? (2)
4. What is unsweetened condensed milk? (2)
5. What is sweetened condensed skim milk?
6. What is unsweetened condensed skim milk / Evaporated skimmed milk? (2)
7. Write Indian Standard specifications for condensed milk. (2)
8. Write method to prepare condensed milk. (8)
9. Write various platform tests for intake milk. (4)
10. Write sugar ratio of condensed milk. (2)
11. Describe the process of milk condensing during condensed milk preparation . (5)
12. Describe different types of evaporator with figure. (8)
13. Write cooling and crystallization process in condensed milk preparation. (5)
14. Write seeding during condensed milk preparation. (5)
15. Write method to prepare evaporated milk. (8)
16. Write short note on Pilot sterilization test. (4)
17. Write purpose of Pilot sterilization test . (2)
18. Define heat stability of milk . (2)
19. Write factors influencing heat stability of milk. (5)
20. What is salt balance? (2)
21. Write causes and prevention for following defects of condensed milk –

 a)Mould buttons

 b)Bacterial thickening

 c)Bloats (microbial) (each 2 marks)

 d)Sandiness due to lactose

 e)Sandiness due to sucrose

 23. Write short note on finishing the batch in condensed milk preparation. (4)

**DRIED MILK**

**Syllabus:**

Types of standards for dried milk, Role of milk constituents, Manufacture of SMP and WMP using roller and spray drying, cyclone separation, instantization, quality testing, defects, causes and prevention, packaging and storage. malted milk powder, infant milk food

**Questions:**

1. Write objectives of dried milk production. (2)

2. Write ISI standard for WMP and SMP. (3)

3. Write composition of WMP and SMP. (2)

4. Write role of milk constituents in dried milk. (4)

5. What is freeze drying or liophilization? (2)

6. Write advantages and disadvantages of freeze drying. (2+2)

7. What do mean by sublimation? (2)

8. Write principle of roller drying. (2)

9. Write advantages and disadvantages of roller drying. (3+2)

10. Write classification of roller drier. (2)

11. What is the length, diameter of drum of roller driers? (1+1)

12. What is the pressure of steam of roller driers? (1)

13. What is the step between two drum in double drum roller drying? (1)

14. What is the pressure of vacuum chamber in vacuum driers in roller drier? (1)

15. What is the speed of drum in roller drier? (1)

16. The product is removed after the drum has completed..................... revolution in drum drying system. (1)

17. In roller drying system the product is in contact with the drum for..................... second or less at temperature of about.....................°C, depending on steam pressure. (2)

18. The requirement of steam is........................../kg of water evaporated. (1)

19. It may be necessary to resurface the drum after....................... to.......................... hour operation. (1)

20. The drum should be coated with............ or.......... when not in regular use. (1)

21. The knife must be reground regularly (after approximately every.......... hour) in drum drying. (1)

22. What is the name of knife which removes milk powder from drum dryer? (1)

23. Write flow diagram of drum drying system. (2)

﻿ 24. Write principle of spray drying system. (2)

 25. Write advantages of spray drying system. (2)

26. Write disadvantages of spray drying system. (2)

27. Write classification of spray driers. (3)

28. Write different methods for milk automizing system. (6)

29. What is the pressure used in pressure spray atomizing? (1)

30. What is the diameter orifice in pressure spray atomizing? (1)

31. In which revolution speed the atomizing device rotate? (1)

32. What is the inlet and outlet temperature of air in spray drying system? (2)

33. What is the relative humidity of drying air in spray drying system? (1)

34. Mention air velocity, air residence time and active evaporation time in spray drying system. (3)

35. What is the thickness of insulation in spray drier? (1)

36. How milk dust is recovered in spray drying system? (6)

37. What is the powder particle size in spray drying system? (1)

38. Write short note on cyclone separator. (3)

39. Write flow diagram of spray drying system. (2)

40. Write flow diagram for method of manufacture by spray process of WMP and SMP. (3+3)

41. Define instantization / agglomeration. (2)

42.Write purpose of instantization / agglomeration. (2)

43. Write factor influencing instantization. (2)

44. Write the basic method for instantization (success factors). (3)

45. Write major system /process for instantization (mention only name). (2)

46. Write comparison of physico-chemical properties of drum dried and spray dried milk. (3)

47. Classify density on the basis of dried milk. (3)

48. Mention the bulk density of skim milk powder. (1)

49. Write name of two free- flowing agent and its used percent. (2)

50. Write short note on reconstitutability of milk powder. (6)

51. Write various factors influence the rate of oxidation. (3)

52. Write causes and prevention of following defects of dried milk -----

a) Stale /Old flavour

b) Oxidized/Tallowy

c) Rancid

d) Burnt (each 2 marks)

e) Lumpy

f) Caked

g) Browning

**DRIED MILK PRODUCTS**

**Syllabus:**

Malted milk powder, infant milk food

**Questions:**

1. Write PFA standard of malted milk food. (2)

2. Write malted milk foods method of manufacture. (4)

3. Write Indian standard specifications for infant milk food. (3)

4. Write method of manufacture of infant milk foods. (6)

UNIT-4

**Syllabus:**

Cheese: Definition, composition, standards, origin and history of cheese, status and scope in India and abroad, types, manufacture of different varieties of cheese: Cheddar, Swiss, Mozzarella, Cottage, processed cheese, cheese spread and processed cheese foods; equipment, Microbiological changes during preparation ripening in cheese. Role of milk constituents and changes during manufacture and ripening in cheese. Accelerated ripening of cheese. quality defects, causes and prevention, packaging and storage.

**Questions:**

1. Define cheese. 3
2. Write name of vegetable rennet. 1
3. What is the origin of cheddar cheese? 1
4. Classify cheese. 3
5. Write true nutritive value of cheese. 3
6. Write flow diagram of manufacture of cheddar cheese. 5
7. Write mechanism of rennet action during cheese making. 3
8. What is the casein/fat ratio in cheese making? 1
9. What should be the addition of calcium chloride level in milk during cheese making? 1
10. What starter culture is used during cheese making? 1
11. What is the amount of starter addition during cheddar cheese making? 1
12. At what temperature starter is added during cheddar cheese making? 1
13. What should be the level of colour addition during cheese making? 1
14. What is rennet? 2
15. How rennet is prepared? 2
16. Who invented rennet? 1
17. One part of liquid rennet is used for about \_\_\_\_\_part of milk. 1
18. Rennet is sensitive at which environment? 1
19. Write factors effecting rennet action. 4
20. Write name of microbial rennet. 1
21. What is ideal temperature and time for rennet action? 1+1
22. Liquid rennet is added at the rate of\_\_\_\_\_ per 100 liters of milks. 1
23. How you will ensure that curd is ready for cutting during cheese making? 2
24. Describe curd knife during cheese making. 2
25. Write method of curd cutting during cheese making. 2
26. Write method of cheddaring. 3
27. How end of cheddaring operation indicates? 3
28. What is the object of milling during cheese making? 2
29. What is the object of salting during cheese making? 2
30. What is the object and procedure for paraffining? 2+3
31. How moisture can be controlled in cheddar cheese making? 3
32. Define curing/ripening of cheese. 2
33. Write difference between cold curing and warm curing. 2
34. Write changes during ripening of cheddar cheese. 3
35. How ripening can be measured? 3
36. Which factors affect the rate of cheese ripening? 3
37. Write role of lactic acid in cheese making and ripening. 2
38. What is the freezing point of cheddar cheese? 1
39. What is the fat percentage of cottage cheese? 1
40. Write flow diagram of cottage cheese manufacture, with mentioning all technical specification. 4
41. Differentiate process cheese, process food, process cheese spread. 2
42. What is the advantage of processed cheese? 3
43. How processed cheese is prepared? 5
44. What is the role of emulsifier during process cheese manufacture? 2
45. Why process cheese spread is popular in India? 2
46. Write method of manufacture for Swiss cheese and mozzarella cheese. 5+5
47. What is the mechanism for eyehole formation in Swiss cheese. 3
48. Write the mechanism for stretching of curd during mozzarella cheese making. 3
49. Write cause and prevention of following defects in cheddar cheese:
	1. Acid cut
	2. Mottled
	3. Seamy
	4. Wavy
	5. Lopside
	6. Cracked rind
	7. Rind rot
	8. Mouldy surface
	9. Huffed
	10. Corky
	11. Crumbly
	12. Rubbery
	13. Greasy
	14. Mealy
	15. Pasty
	16. Weak
	17. Fish eyes/Yeast holes
	18. Pin holes/Gassy
	19. Mechanical holes
	20. Swiss holes/Short holes
	21. Bitter
	22. Mouldy

**UNIT-5**

**Syllabus:**

Traditional Indian Dairy Products: Definitions, compositions, processing, packaging, storage, equipment and quality testing – Desiccated milk-based products-Khoa and Khoa based sweets, Heat-acid coagulated products-Channa and Channa based sweets, Paneer, Fermented products-Srikhand, dahi, Milk-based puddings/Dessert-Kheer

**Questions:**

1.What due mean by Indian dairy products? (1)

2. What is the name of corresponding western product of Rabri? (1)

3. What is the name of Indian icecream? (1)

4. What should be the fat percentage of Khoa? (1)

5. Classify Khoa with the mention in sweets prepared from them? (3)

6. Why iron content of Khoa is higher than milk? (2)

7. What is the yield of Khoa? (1)

8. What due you mean by Khoa test? (2)

9. Write the causes and prevention of flowing defects of Khoa - (Two each)

 i) Flavour - smoky, rancid.

 ii) Body and texture - Hard body, coarse texture, gritty texture.

 iii) Colour and appearance - Dry surface, presence of burnt particles, mouldy surface.

 10. Write method of manufacture of Kulfi making? (3)

11. Write name of culture used or sweet Dahi and Sour Dahi. (2+2)

 12. What are the acidity for Sweet and Sour Dahi? (2)

 13. Write flow diagram for preparation of Sweet and Sour Dahi. (3+3)

 14. Write method of preparation for Srikhand. (4)

 15.. What should be the weight and temperature of coagulation of milk for desirable body and texture in Chhana? (2)

17. What should be the strength of coagulating solution for Chhana making? (1)

18. Write the cause and prevention for following defects in Chhana-

 a. Flavor-Smoky, Sour, Rancid, Stale.

 b. Body and texture-hard body, coarse texture.

 c. Color and appearance- dry surface, visible dirt, mouldy surface. (Two each)

19. What do you mean by makkhan? (2)

20. Define saponification number, Iodine number, Reichert meissl number, polenske number (two each)

21. Write method of manufacture of ghee making by

 a. Creamery butter method

 b. Direct cream method

 c. Pre- stratification method (three each)

22. Compare different methods of ghee making. (5)

23. Write short note on cooling and crystallization of ghee? (3)

24. What should be the storage temperature of ghee? (1)

25. What should be the permitted BHA lavel in ghee? (1)

26. How adulteration of ghee can be detected? (2)

27. Write full from of AGMARK. (1)

28. Write AGMARK standard for ghee. (3)

29. Write method manufacture of lassi making. (3)

30. How recovery of ghee can be done from ghee residue? (2)

31. Write uses of ghee residue. (2)

32. What do you mean by makkhan? (2)

**UNIT-6**

**Syllabus:**

By-products-manufacturing and uses of Casein, sodium and calcium caseinates, casein hydrolysates, Cooprecipitates, Whey, Whey protein concentrates, Lactose, Butter milk, Ghee residue

**Questions:**

1. What do mean by dairy by-product? [2]
2. Write name of cheeses prepared from skim milk.[2]
3. Write name of four cheeses which are prepared from skim milk. [2]
4. Write name of four cheeses which are prepared from whey. [2]
5. Write short note on baker’s cheese, quarg cheese, gammelost cheese and sapsago cheese. [2+2+2+2]
6. Classify casein. [2]
7. How casein is prepared in industry? [4]
8. Write effect of temperature of precipitation on character of casein curd.[3]
9. Write yield of acid-casein. [1]
10. Write defects in casein, their causes and prevention. [3]
11. Write uses of casein.[3]
12. Write Indian standard specification for edible casein. [2]
13. Write short note on Butter milk. [3]
14. Write short note on whevit, yeast whey, plain condensed whey, sweetened condensed whey, whey protein concentrates and whey paste.[3+3+3+3+3+3]
15. What are the temperatures used to precipitate skim milk by lactic, sulfuric and hydrochloric acid? [2]
16. What is the maximum fat percentage in edible casein on dry basis? [1]
17. What is the lactose percentage in crude lactose? [1]
18. How lactose is prepared in industry? [4]
19. Write short note on ricotta cheese, mysost, Gjetost and Primost cheese. [3]
20. Write manufacturing process of Lassi. [4]
21. What is Ghee-residue? Write its uses. [2+5]
22. Write short note on casein hydrolysates, co-precipitate, sodium and calcium caseinates. [3+3+3+3]

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