# JAMMU AND KASHMIR PUBLIC SERVICE COMMISSION

RESHAM GHAR COLONY, BAKSHI NAGAR, JAMMU - 180016

Website: http://jkpsc.nic.in

**Subject: Written Examination for the posts of Assistant Professor (Food Science/Food Science & Quality Control and Food Technology & Food Processing) in Higher Education Department - Provisional Answer Key(s) thereof.**

**Notification No. PSC/Exam/S/2026/37**
**Dated: 04.04.2026**

In pursuance of Rule 10(c) of the Jammu & Kashmir Public Service Commission (Conduct of Examination) Rules, 2022, as amended upto date, the Provisional Answer Keys of Question Papers pertaining to the written examinations for the posts of **Assistant Professor (Food Science/Food Science & Quality Control and Food Technology & Food Processing) in Higher Education Department,** held on **04.04.2026,** are hereby notified for seeking the objections from candidates.

## Provisional Answer Key

### Assistant Professor (Food Science/Food Science & Quality Control)

| Test Booklet Question No. (Series A) | |
|---|---|
| Q1. | B |
| Q2. | B |
| Q3. | C |
| Q4. | A |
| Q5. | C |
| Q6. | A |
| Q7. | B |
| Q8. | D |
| Q9. | B |
| Q10. | C |
| Q11. | B |
| Q12. | C |
| Q13. | C |

| Test Booklet Question No. (Series A) | |
|---|---|
| Q14. | A |
| Q15. | B |
| Q16. | C |
| Q17. | B |
| Q18. | A |
| Q19. | A |
| Q20. | A |
| Q21. | B |
| Q22. | B |
| Q23. | A |
| Q24. | D |
| Q25. | D |
| Q26. | C |

| Test Booklet Question No. (Series A) | |
|---|---|
| Q27. | A |
| Q28. | C |
| Q29. | B |
| Q30. | B |
| Q31. | A |
| Q32. | B |
| Q33. | C |
| Q34. | C |
| Q35. | C |
| Q36. | C |
| Q37. | C |
| Q38. | B |
| Q39. | C |

| Test Booklet Question No. (Series A) | |
|---|---|
| Q40. | B |
| Q41. | A |
| Q42. | D |
| Q43. | B |
| Q44. | C |
| Q45. | A |
| Q46. | B |
| Q47. | D |
| Q48. | C |
| Q49. | B |
| Q50. | C |
| Q51. | D |
| Q52. | A |
| Q53. | C |
| Q54. | B |
| Q55. | A |
| Q56. | B |
| Q57. | A |
| Q58. | B |
| Q59. | D |
| Q60. | C |
| Q61. | B |
| Q62. | D |
| Q63. | A |
| Q64. | A |
| Q65. | C |
| Q66. | C |

| Test Booklet Question No. (Series A) | |
|---|---|
| Q67. | C |
| Q68. | D |
| Q69. | C |
| Q70. | B |
| Q71. | D |
| Q72. | B |
| Q73. | A |
| Q74. | B |
| Q75. | C |
| Q76. | A |
| Q77. | D |
| Q78. | B |
| Q79. | C |
| Q80. | B |
| Q81. | D |
| Q82. | A |
| Q83. | B |
| Q84. | B |
| Q85. | D |
| Q86. | A |
| Q87. | C |
| Q88. | B |
| Q89. | C |
| Q90. | B |
| Q91. | D |
| Q92. | C |
| Q93. | A |

| Test Booklet Question No. (Series A) | |
|---|---|
| Q94. | C |
| Q95. | B |
| Q96. | C |
| Q97. | D |
| Q98. | B |
| Q99. | C |
| Q100. | A |
| Q101. | B |
| Q102. | C |
| Q103. | B |
| Q104. | A |
| Q105. | D |
| Q106. | A |
| Q107. | B |
| Q108. | A |
| Q109. | C |
| Q110. | A |
| Q111. | A |
| Q112. | B |
| Q113. | C |
| Q114. | D |
| Q115. | C |
| Q116. | B |
| Q117. | C |
| Q118. | D |
| Q119. | A |
| Q120. | B |

## Provisional Answer Key

## Assistant Professor (Food Technology & Food Processing)

| Test Booklet Question No. (Series A) | |
|---|---|
| Q1. | B |
| Q2. | A |
| Q3. | A |
| Q4. | D |
| Q5. | D |
| Q6. | A |
| Q7. | B |
| Q8. | C |
| Q9. | B |
| Q10. | A |
| Q11. | B |
| Q12. | D |
| Q13. | D |
| Q14. | B |
| Q15. | C |
| Q16. | B |
| Q17. | D |
| Q18. | A |
| Q19. | C |
| Q20. | B |

| Test Booklet Question No. (Series A) | |
|---|---|
| Q21. | A |
| Q22. | A |
| Q23. | B |
| Q24. | C |
| Q25. | D |
| Q26. | B |
| Q27. | C |
| Q28. | A |
| Q29. | C |
| Q30. | B |
| Q31. | A |
| Q32. | B |
| Q33. | A |
| Q34. | C |
| Q35. | A |
| Q36. | C |
| Q37. | C |
| Q38. | B |
| Q39. | B |
| Q40. | C |

| Test Booklet Question No. (Series A) | |
|---|---|
| Q41. | C |
| Q42. | B |
| Q43. | C |
| Q44. | C |
| Q45. | B |
| Q46. | D |
| Q47. | B |
| Q48. | A |
| Q49. | A |
| Q50. | C |
| Q51. | B |
| Q52. | A |
| Q53. | C |
| Q54. | B |
| Q55. | C |
| Q56. | D |
| Q57. | C |
| Q58. | A |
| Q59. | B |
| Q60. | B |

| Test Booklet Question No. (Series A) | |
|---|---|
| Q61. | D |
| Q62. | B |
| Q63. | A |
| Q64. | B |
| Q65. | C |
| Q66. | B |
| Q67. | A |
| Q68. | B |
| Q69. | D |
| Q70. | D |
| Q71. | B |
| Q72. | C |
| Q73. | A |
| Q74. | C |
| Q75. | B |
| Q76. | A |
| Q77. | D |
| Q78. | C |
| Q79. | B |
| Q80. | C |

| Test Booklet Question No. (Series A) | |
|---|---|
| Q81. | A |
| Q82. | D |
| Q83. | B |
| Q84. | A |
| Q85. | C |
| Q86. | B |
| Q87. | B |
| Q88. | C |
| Q89. | D |
| Q90. | D |
| Q91. | C |
| Q92. | B |
| Q93. | D |
| Q94. | B |
| Q95. | A |
| Q96. | C |
| Q97. | A |
| Q98. | D |
| Q99. | A |
| Q100. | C |

| Test Booklet Question No. (Series A) | |
|---|---|
| Q101. | B |
| Q102. | A |
| Q103. | D |
| Q104. | B |
| Q105. | D |
| Q106. | C |
| Q107. | A |
| Q108. | B |
| Q109. | C |
| Q110. | D |
| Q111. | A |
| Q112. | C |
| Q113. | C |
| Q114. | B |
| Q115. | D |
| Q116. | A |
| Q117. | C |
| Q118. | B |
| Q119. | A |
| Q120. | A |

The candidates are advised to refer to **Question Booklet (Series A)** to match the corresponding question(s) in their respective Question Booklet Series and if any candidate feels that the key to any of the question(s) is/are wrong, he/she may represent on prescribed format/proforma annexed as **Annexure-A** along with the documentary proof/evidence **(hard copies only)** and fee of Rs.500/- per question in the form of Demand Draft drawn in favour of **COE, J&K PSC** (refundable in case of genuine/correct representation) to the Controller of Examinations, Jammu & Kashmir Public Service Commission, from Monday i.e. 06.04.2026 to 08.04.2026. **The candidates are further advised to clearly mention the question(s) objected to with reference to its serial number as it appears in the Question Booklet of Series A of the provisional answer key(s).**

Any objection/application not accompanied by the requisite Demand Draft of Rs.500/- as prescribed, shall not be considered/entertained under any circumstances. Candidates are, in their own interest, advised to adhere to these instructions and not submit any objection unaccompanied by the Demand Draft as required under extant rules. The Commission shall not entertain any such representation(s) after the expiry of the stipulated period i.e. after 08.04.2026 (Wednesday), 05.00 pm.

Further, objection(s) submitted in any other mode will not be entertained.

The provisional answer key(s) are also available on the website of the Commission http://www.jkpsc.nic.in.

04/04/26

**(Sachin Jamwal) JKAS**
Controller of Examinations
J&K Public Service Commission

No. PSC/Ex-Secy/2026/20 Dated: 04.04.2026

Copy to the: -

1. Director, Information and Public Relations, J&K for publication of the notice in all leading newspapers published from Jammu/Srinagar.
2. P.S. to Hon'ble Chairman, J&K Public Service Commission for information of the Hon'ble Chairman.
3. P.S. to Hon'ble Member, Shri _____ for information of the Hon'ble Member.
4. P. A. to Secretary, J&K Public Service Commission for information of the Secretary.
5. Main file/Stock file/Notice Board.

## Annexure-A

**Representation regarding objection(s) to any Question/Answer pertaining to the Written Examination conducted for the posts of Assistant Professor (Food Science/Food Science & Quality Control and Food Technology & Food Processing) in Higher Education Department held on 05.04.2026**

**(NOTE: USE SEPARATE FORMS FOR SEPARATE QUESTIONS)**

**Discipline:** _____

**Name of the Applicant:** _____

**Roll No. :** _____

**Correspondence Address :** _____

**Contact/Mobile No. :** _____

**Date of Application:** _____.04.2026

**Demand Draft Details:** No._____Date_____ Amount_____

**Candidates Account No.(16 digit) & IFSC Code :**_____

_____

| Question No. in Series A | Details of the Objection | Resource Material (copy to be enclosed) | Details of the Website (if any) |
|---|---|---|---|
| | | | |
| **Correct Answer/Option as per candidate :** | | | |

**Signature of the Candidate**

**Note : Application for each question/answer shall be made on separate page in the given format, otherwise the first question entered in the format shall only be considered.**

*DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO*

**Booklet Serial No.** 338033 **Test Booklet Series**

# TEST BOOKLET
# ASSISTANT PROFESSOR FOOD SCIENCE/ FOOD SCIENCE AND QUALITY CONTROL

**A**

## Written Test - 2026
## (34)

*Time Allowed: Three Hours* *Maximum Marks: 120*

## INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET ***DOES NOT*** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. **Please note that it is the candidate's responsibility to encode and fill in the Roll Number and Test Booklet Series Code A, B, C or D carefully and without any omission or discrepancy at the appropriate places in the OMR Answer /Response Sheet. Any omission/discrepancy will render the Response Sheet liable for rejection.**
3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside. ***DO NOT*** **write** ***anything else*** on the Test Booklet.
4. This Test booklet contains **120** items (questions). Each item comprises of four responses (answers). You will select the response which you want to mark on the Answer Sheet/Response Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose ***ONLY ONE*** response for each item.
5. You have to mark all your responses ***ONLY*** on the separate Answer /Response Sheet provided. *See directions in the Response Sheet.*
6. ***All*** items carry equal marks.
7. Before you proceed to mark in the Answer /Response Sheet, the response to various items in the Test Booklet, you have to fill in some particulars in the Answer /Response Sheet as per instructions sent to you with your Admission Certificate.
8. After you have completed filling in all your responses on the Response Sheet and the examination has concluded, you should hand over to the Invigilator ***only the Answer /Response Sheet***. You are permitted to take away with you the Test Booklet and ***Candidate's Copy of the Response Sheet .***
9. Sheets for rough work are appended in the Test Booklet at the end.
10. While writing Centre, Subject and Roll No. on the top of the Answer Sheet/Response Sheet in appropriate boxes use **"ONLY BALL POINT PEN".**
11. **Penalty for wrong answers:**

    **THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY THE CANDIDATE IN THE WRITTEN TEST (OBJECTIVE TYPE QUESTION PAPER).**

    (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **(0.25)** of the marks assigned to that question will be deducted as penalty.

    (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above for that question.

    (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be **no penalty** for that question.

*DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO*

1. Oligosaccharides in foods are most appropriately defined as carbohydrates that on hydrolysis yield:
   A) One molecule of monosaccharide
   B) Three to ten molecules of monosaccharides
   C) More than ten molecules of monosaccharides
   D) Only pentose sugars

2. Amylose in native starch is best described as:
   A) A highly branched polymer of glucose with $\alpha$ -1,6 linkages at every second residue
   B) A predominantly linear polymer of $\alpha$ -1,4 - linked D - glucose units
   C) A linear $\beta$ - 1,4 - glucan
   D) A polymer of galacturonic acid units

3. Gelatinization of starch during cooking is primarily associated with:
   A) Conversion of $\beta$ - linkages to $\alpha$ - linkages
   B) Enzymatic hydrolysis of amylopectin to dextrins
   C) Leaching of amylose from granules and disruption of granular structure on heating in water
   D) Formation of glycosidic bonds between starch and proteins

4. Which feature distinguishes starch from cellulose, although both are composed solely of D - glucose units?
   A) Type of glycosidic linkage between glucose units
   B) Presence of amino sugars
   C) Degree of polymerization
   D) Presence of branching in both polymers

5. Compared with their cis isomers, trans fatty acids typically show which physical property?
   A) Lower melting point and more pronounced kink in the chain
   B) Similar melting point but greater susceptibility to oxidation
   C) Higher melting point and a more linear chain conformation, resembling saturated fatty acids
   D) Lower melting point and greater solubility in water

6. Which of the following correctly pairs an essential fatty acid with its omega family?
   A) Linoleic acid - omega - 6; $\alpha$ - linolenic acid - omega - 3
   B) Linoleic acid - omega - 3; $\alpha$ - linolenic acid - omega - 6
   C) Oleic acid - omega - 3; arachidonic acid - omega - 6
   D) Stearic acid - omega - 3; linoleic acid - omega - 9

7. From a nutritional standpoint, industrial trans fatty acids are considered undesirable primarily because they:
   A) Significantly increase HDL cholesterol and decrease LDL cholesterol
   B) Increase LDL cholesterol and decrease HDL cholesterol.
   C) Increase protein oxidation
   D) Are rapidly oxidized to essential fatty acids

8. The primary driving force for folding of many globular proteins into a compact native structure in aqueous solution is:
   A) Formation of peptide bonds between amino acids
   B) Hydrogen bonding with molecular oxygen
   C) Creation of disulfide bridges between all amino acid residues
   D) Hydrophobic interactions among nonpolar side chains

9. Disulfide bonds that contribute to protein stability are formed by covalent linkage between the side chains of:
   A) Two serine residues
   B) Two cysteine residues
   C) Lysine and arginine
   D) Aspartic acid and glutamic acid

10. The degree of supercooling ( $\Delta$ T) in a lipid system generally affects nucleation by:
   A) Having no measurable effect on nucleation rate
   B) Decreasing nucleation rate as $\Delta$ T increases
   C) Increasing the driving force for crystallization and usually increasing nucleation rate as $\Delta$ T increases
   D) Eliminating the need for any activation energy for nucleation

11. Oiling - out or fat bloom occurring on the surface of fat - rich products is most closely associated with:
   A) Decrease in saturation of triacylglycerols
   B) Post - crystallization redistribution of lipids and growth of larger, more stable crystals at the expense of smaller ones
   C) Formation of micelles in the aqueous phase
   D) Complete prevention of polymorphic transitions

12. The off -flavor compounds associated with advanced oxidative rancidity (e.g., rancid odor in old oils) are mainly:
   A) Intact lipid hydroperoxides
   B) Intact triacylglycerols
   C) Short - chain aldehydes, ketones, and related secondary oxidation products
   D) Only free fatty acids with long chains

13. Lag phase duration depends primarily on:
    A) Final population size
    B) Death rate
    C) Previous history and adaptation to new environment
    D) Stationary phase metabolites

14. The F- value (sterilizing value) represents:
    A) Equivalent time at reference temperature
    B) Microbial growth rate
    C) Minimum water activity for growth
    D) pH for maximum heat resistance

15. *Shigella sonnei* is notable for its low infectious dose. Its primary virulence mechanism involves:
    A) Producing a heat-stable enterotoxin that causes watery diarrhea
    B) Invading and replicating within the colonic epithelium, causing cell death and inflammatory dysentery
    C) Producing a toxin that is transported systemically to inhibit protein synthesis
    D) Surviving within macrophages and causing disseminated infection

16. The characteristic spongy texture and leavening of *idli*, a traditional South Indian steamed food, primarily results from:
    A) Lactic acid production by *Lactobacillus* species alone.
    B) Alcoholic fermentation by *Saccharomyces cerevisiae.*
    C) Synergistic lactic acid and carbon dioxide production by lactic acid bacteria and yeasts in a cereal-legume batter.
    D) Proteolytic activity of molds breaking down gluten networks.

17. During the initial stage of cheese manufacturing, the primary function of adding chymosin (rennet) to acidified milk is to:
    A) Initiate lactic acid fermentation by starter cultures.
    B) Hydrolyze milk proteins, specifically cleaving κ-casein to cause coagulation.
    C) Promote the growth of surface-ripening molds like *Penicillium camemberti.*
    D) Ferment lactose into lactic acid, lowering the pH.

18. Which pairing of a mycotoxin with its primary producing fungal genus is correct?
    A) Fumonisin - *Fusarium*
    B) Aflatoxin - *Penicillium*
    C) Patulin - *Aspergillus flavus*
    D) Ochratoxin A - *Fusarium graminearum*

19. Benzoic acid and its sodium salt are most effective as antimicrobials in foods with a pH below 4.5. This pH-dependence is primarily because:
   A) The undissociated acid molecule is the active antimicrobial species, which predominates in acidic conditions
   B) The sodium salt form is more soluble at alkaline pH.
   C) High pH enhances its interaction with bacterial cell wall proteins.
   D) Microbial metabolic activity is universally highest in acidic environments.

20. Potassium sorbate is a preferred preservative for cheese, wine, and high-moisture cakes due to its effectiveness against a wide range of spoilage organisms. Its primary advantages over other weak-acid preservatives include:
   A) It is tasteless and odorless at effective use levels and is active against yeasts and molds.
   B) It is the most effective preservative against spore-forming bacteria like *Clostridium botulinum.*
   C) It retains full antimicrobial activity in neutral pH (7.0) food products.
   D) It functions primarily as a potent antioxidant, with secondary antimicrobial effects.

21. Sulfur dioxide and sulfite salts are widely used in winemaking and for dried fruit. Their broad antimicrobial and anti-browning action is attributed to:
   A) Lowering water activity to a level incompatible with microbial growth.
   B) Chelating essential metal ions and forming addition compounds with key microbial enzymes and food carbonyls.
   C) Creating an anaerobic environment by displacing oxygen in the food matrix.
   D) Hydrolyzing microbial cell wall polysaccharides like peptidoglycan.

22. A major technological and safety challenge in processing Single-Cell Protein (SCP) from microbial biomass for human consumption is:
   A) The complete lack of essential amino acids in microbial cells.
   B) The need to reduce high nucleic acid (RNA) content to prevent health risks like hyperuricemia.
   C) The inherent production of potent mycotoxins by all candidate microorganisms.
   D) Its natural inability to be digested by the human gastrointestinal system.

23. In controlled industrial fermentations, such as yogurt or sauerkraut production, the primary technological function of a defined starter culture is to:
   A) Rapidly and predictably lower the pH through targeted acid production, ensuring safety and consistent quality.
   B) Introduce a diverse, wild microbiome to enhance flavor complexity.
   C) Serve as a source of digestive enzymes for the consumer.
   D) Physically block oxygen penetration into the food matrix.

24. A non-leaking, commercially processed can of green beans shows bulging ends and, upon opening, produces a foul, putrid odor. This type of spoilage is most indicative of:

A) Thermophilic acid flat sour spoilage by *Geobacillus stearothermophilus*

B) Surface mold growth due to under-processing

C) Hydrogen swell caused by interaction of acids with the metal can

D) Mesophilic spoilage by *Clostridium sporogenes,* a putrefactive anaerobic sporeformer

25. In an aseptic processing system (e.g., for UHT milk or soup), the term "aseptic" specifically guarantees that:

A) The product is heated to a higher temperature than in traditional canning.

B) The processing equipment is cleaned more frequently than in conventional systems.

C) The final product is guaranteed to be free of all bacterial spores.

D) The product is sterilized before packaging, and the packaging material is sterilized separately, with assembly occurring in a sterile environment.

26. Unlike commercial sterilization, the thermal process of pasteurization for a product like milk or fruit juice is designed to:

A) Achieve a 12-D reduction of all bacterial endospores.

B) Render the product indefinitely shelf-stable at room temperature.

C) Destroy all pathogens of public health significance and inactivate spoilage enzymes, with product stability dependent on subsequent refrigeration or other hurdles.

D) Target only thermophilic flat-sour spoilage organisms.

27. When plotted on a log-log graph of viscosity versus shear rate, a true Newtonian fluid is characterized by:

A) A straight horizontal line.

B) A straight line with a positive slope.

C) A straight line with a negative slope.

D) A curve that decreases and then levels off.

28. The steady-state, one-dimensional rate of conductive heat transfer (q) through a plane wall is mathematically described by Fourier's Law as:

A) $q = h A \Delta T$

B) $q = \varepsilon \sigma A (T\_s^4 - T\_surr^4)$

C) $q = -k A (dT/dx)$

D) $q = \dot{m} C\_p \Delta T$

29. Thermal radiation is distinguished from conduction and convection by its ability to transfer energy:
    A) Only through direct physical contact between materials.
    B) At the speed of light as electromagnetic waves, requiring no intervening medium.
    C) Only in conductive solids like metals.
    D) Through the bulk motion of ionized particles.

30. In the context of particle fracture, the yield point is best defined as the:
    A) Point where the particle completely shatters into fine dust.
    B) Stress level at which the material transitions from elastic to plastic deformation.
    C) Maximum force the milling equipment can apply.
    D) Particle size at which further reduction becomes impossible.

31. Kick's Law for size reduction energy is based on the fundamental hypothesis that the energy required for fracture is proportional to:
    A) The volume of the particle being reduced.
    B) The increase in new surface area created.
    C) The square root of the particle diameter.
    D) The reduction in particle volume.

32. Rittinger's Law is considered most accurate for processes involving:
    A) Primary crushing of run-of-mine ore.
    B) Grinding in the fine and ultrafine range where surface area increase is significant.
    C) Elastic deformation of polymers.
    D) The cutting of ductile metals.

33. Bond's Law is often described as a compromise between Kick's and Rittinger's laws because it proposes that the energy required for size reduction is proportional to:
    A) The particle volume.
    B) The new surface area created.
    C) The crack length (or the square root of the new surface area).
    D) The log mean diameter of the feed and product.

34. If a grinding mill is producing an unexpectedly high proportion of ultra-fines, a likely operational cause is:
    A) The feed particles are too large.
    B) The grinding media is too large and insufficient in number.
    C) The mill residence time is too long.
    D) The mill speed is below the critical speed.

35. The majority of the physical and chemical effects of power ultrasound in liquids, such as cell disruption and emulsification, are primarily driven by:
A) Simple heating from sound absorption.
B) Acoustic streaming and induced fluid flow.
C) The phenomenon of cavitation-the formation, growth, and violent collapse of microbubbles.
D) Direct resonant vibration of individual molecules.

36. The rate of heat generation during ohmic heating is most directly and critically dependent on the food's:
A) Dielectric constant and loss factor.
B) Thermal conductivity and specific heat.
C) Electrical conductivity and the applied electric field strength.
D) Density and viscosity.

37. The most common mode of HPLC, Reverse-Phase Chromatography, separates analytes primarily based on differences in their:
A) Ionic charge in a mobile phase of specific pH.
B) Affinity for a chiral stationary phase.
C) Hydrophobicity, through partitioning between a polar mobile phase and a non-polar stationary phase.
D) Molecular size via pores in a gel filtration column.

38. A fundamental prerequisite for an analyte to be suitable for analysis by standard Gas Chromatography is that it must be:
A) Ionic in nature.
B) Thermally stable and volatile at the operating temperature of the column.
C) Capable of absorbing ultraviolet light.
D) Soluble in aqueous buffers.

39. NMR spectroscopy is based on the absorption of electromagnetic radiation that causes:
A) Electronic transitions between molecular orbitals.
B) Vibrational energy level changes in chemical bonds.
C) The excitation of nuclei with non-zero spin states from a lower to a higher nuclear spin energy level in a magnetic field.
D) The ionization of molecules to form radicals.

40. For the quantitative analysis of thermally labile, non-volatile pharmaceutical compounds in a tablet formulation, the most appropriate primary analytical technique would be:
A) Gas Chromatography with Flame Ionization Detection
B) High-Performance Liquid Chromatography with UV Detection
C) Nuclear Magnetic Resonance Spectroscopy
D) Gas Chromatography-Mass Spectrometry

41. In Atomic Absorption Spectroscopy, a Hollow Cathode Lamp is used as the radiation source because it provides:

A) Intense, stable, and narrow emission lines specific to the analyte element.

B) A broad continuum of wavelengths for multi-element analysis.

C) A heated environment to vaporize the liquid sample.

D) A magnetic field to split atomic energy levels.

42. The principal advantage of ICP-MS over atomic spectroscopy techniques like AAS is its ability to provide:

A) Much faster analysis of single elements.

B) Direct analysis of solid food samples with no sample preparation.

C) Better precision for major nutrient elements like potassium and calcium.

D) Simultaneous multi-element detection at extremely low concentrations and isotopic information.

43. In food analysis, X-Ray Diffraction is most effectively used to study:

A) The concentration of vitamins in a fruit juice.

B) The polymorphic forms of crystalline food components like fats, starches, and sugars.

C) The microbial load in a meat sample.

D) The pH of a fermented product.

44. The step of thoroughly washing the microplate wells between each reagent addition in an ELISA procedure is essential to:

A) Speed up the enzymatic reaction.

B) Prevent the photobleaching of the fluorescent signal.

C) Remove unbound reagents and minimize non-specific background signal.

D) Activate the immobilized capture antibodies.

45. In a standard Polymerase Chain Reaction (PCR), the thermostable *Taq* DNA polymerase is essential because it:

A) Catalyzes the synthesis of a new DNA strand complementary to the template at ~72°C, surviving the repeated high-temperature denaturation steps.

B) Denatures the double-stranded DNA template at 95°C.

C) Anneals the specific primers to the template DNA at 55°C.

D) Cuts the amplified DNA fragments at specific restriction sites.

46. The Food Safety and Standards Act, 2006, of India was enacted primarily to:
   A) Promote international trade of Indian food products exclusively.
   B) Establish a single statutory body for science-based standards and regulate the manufacture, storage, and sale of food.
   C) Decentralize food regulation to individual state governments without central oversight.
   D) Focus solely on punitive measures for street food vendors.

47. Chronic dietary exposure to arsenic, particularly the inorganic form in rice, is primarily a chemical hazard resulting from:
   A) Intentional fortification for nutritional benefit.
   B) Formation during high-temperature grilling.
   C) Migration from metal can packaging.
   D) Bioaccumulation from contaminated soil and irrigation water.

48. The lactometer, a hydrometer-based test for milk, detects adulteration by water based on the measurement of:
   A) Protein content via the Biuret reaction.
   B) Lactose concentration through polarimetry.
   C) Specific gravity / relative density, which decreases with water addition.
   D) Fat content via Gerber method.

49. The Halphen test is a specific historic colorimetric assay used to detect the adulteration of expensive natural oils (e.g., sesame, olive) with:
   A) Mineral oil.
   B) Cottonseed oil.
   C) Palm oil.
   D) Argemone oil.

50. Microscopic examination of a ground spice like turmeric or black pepper is particularly useful for detecting adulteration with:
   A) Synthetic dyes that are water-soluble.
   B) Added salts or sugars.
   C) Foreign starch from cheaper sources or spent powder.
   D) Pesticide residues.

51. The aleurone layer, which forms the outer part of the endosperm in cereals, is biologically significant during germination because it:
   A) Stores the majority of the seed's starch.
   B) Forms the root cap of the emerging radicle.
   C) Is the primary site of photosynthesis in the young seedling.
   D) Synthesizes and secretes hydrolytic enzymes to mobilize endosperm reserves.

52. The addition of a reducing agent (e.g., L-cysteine) to bread dough weakens it dramatically by:

A) Cleaving the inter-polypeptide disulfide bonds in glutenin, depolymerizing the network.

B) Hydrolyzing starch granules.

C) Increasing the water absorption of gliadins.

D) Chelating essential minerals.

53. Celiac disease is triggered by specific peptide sequences in wheat proteins that are resistant to complete gastrointestinal digestion and provoke an immune response. The proteins most implicated are:

A) Water-soluble albumins

B) Enzymes like $\alpha$-amylase/trypsin inhibitors

C) Glutenins and, especially, gliadins

D) Structural cell wall proteins

54. High-quality dried pasta is characterized by firmness upon cooking (al dente texture) and minimal starch loss. This is best achieved by using flour from:

A) Soft wheat with low protein.

B) Durum wheat, which has high protein content and yellow carotenoid pigments.

C) Rye flour.

D) Chemically modified starch.

55. Enzyme-active soy flour is sometimes used in breadmaking for its high lipoxygenase content, which acts as a natural:

A) Bleaching agent and dough improver.

B) Sweetener.

C) Preservative.

D) Reducing agent.

56. Emulsifiers like DATEM (diacetyl tartaric acid esters of monoglycerides) and SSL (Sodium Stearoyl Lactylate) retard bread staling primarily by:

A) Killing mold spores.

B) Complexing with gelatinizing starch to slow starch retrogradation.

C) Oxidizing gluten proteins.

D) Adding moisture directly to the crumb.

57. For high-oil-content seeds like rapeseed or sunflower, the most efficient industrial process is typically:
    A) Pre-pressing followed by solvent extraction of the press cake.
    B) Solely cold pressing to preserve quality.
    C) Aqueous extraction using enzymes.
    D) Supercritical $CO_2$ extraction alone.

58. Before tempering and degermination in modern corn dry milling, kernels undergo a critical cleaning and conditioning step that involves:
    A) Soaking in dilute sulfurous acid for 24-48 hours.
    B) Adding a small amount of water to toughen the bran and mellow the endosperm.
    C) High-pressure steam injection to fully gelatinize the starch.
    D) Fermentation with lactic acid bacteria.

59. Before storage and shipping, blended High Fructose Corn Syrup undergoes final refining steps that include:
    A) Immobilized enzyme treatment with cellulase.
    B) Pasteurization at ultra-high temperatures.
    C) Fortification with vitamins and minerals.
    D) Activated carbon treatment and ion exchange followed by evaporation to specified solids concentration.

60. The nutrient-rich byproduct collected during the whitening/polishing stages, which is a primary source of edible oil and contains antioxidants like oryzanol, is:
    A) Rice hull ash.
    B) Broken rice.
    C) Rice bran.
    D) Rice germ.

61. Compared to raw (white) milled rice, properly parboiled rice is characterized by:
    A) A softer, stickier texture when cooked.
    B) Greater resistance to breakage during milling, higher nutrient retention, and reduced cooking loss.
    C) A significantly sweeter taste due to sugar formation.
    D) A shorter cooking time and higher water absorption.

62. Pearl millet (*Pennisetum glaucum*) is a critical food security crop in arid regions partly because it is a rich dietary source of:
    A) Vitamin A (as beta-carotene).
    B) Sodium and potassium.
    C) Vitamin B12.
    D) Iron and zinc, with genetic potential for further biofortification.

63. For a non-climacteric fruit like pineapple, the most important maturity index for minimal processing is likely:

A) Soluble solids content and acidity at harvest.

B) Skin color change after ethylene treatment.

C) The timing of its climacteric respiration peak.

D) Its firmness after 3 days of storage.

64. The 'Yang Cycle' in ethylene biosynthesis is essential because it:

A) Recycles the sulfur from MTA back into methionine, allowing sustained ethylene production despite low cellular methionine

B) Generates ATP needed for the conversion of SAM to ACC

C) Produces the immediate precursor for lignin synthesis

D) Breaks down ethylene after it has performed its action

65. In the final step of ethylene biosynthesis, 1-Aminocyclopropane carboxylic acid oxidase requires which co-factor?

A) ATP and Magnesium

B) NADPH and Flavin

C) Ferrous iron ($Fe^{2+}$) and Ascorbate

D) Copper and Zinc

66. Ethylene receptors (ETR1, ERS1, etc.) in plants are located on the:

A) Nuclear membrane

B) Chloroplast envelope

C) Endoplasmic reticulum membrane

D) Plasma membrane

67. Which pigment group is MOST likely to retain its color in an acidified, thermally processed product like canned fruit?

A) Chlorophyll (greens)

B) Anthocyanins (reds/blues)

C) Carotenoids (oranges/yellows)

D) Betalains (beets)

68. The primary degradation pathway for carotenoids during processing and storage is:

A) Enzymatic hydrolysis

B) Leaching into water

C) Conversion to anthocyanins

D) Oxidation

69. The manufacturing of tomato "sauce" or "ketchup" differs from paste/puree primarily by the:
    A) Use of a cold break
    B) Higher required concentration of tomato solids
    C) Addition of significant quantities of vinegar, sugar, salt, and spices, and often starch as a thickener
    D) Lack of any thermal processing

70. Elevated $CO_2$ levels (typically 1-10%) in controlled atmosphere storage primarily help to:
    A) Increase sugar content.
    B) Suppress fungal growth and reduce sensitivity to ethylene.
    C) Enhance chlorophyll synthesis.
    D) Promote protein breakdown.

71. Hydrobaric storage (also called hyperbaric storage) is a preservation technique based on:
    A) Submerging produce in chilled water.
    B) Storing in vacuum conditions.
    C) Using High-Pressure Processing (HPP) for short-term treatment.
    D) Applying elevated atmospheric pressure (above 1 atm) with or without refrigeration.

72. The Zero Energy Cool Chamber operates on the principle of:
    A) Mechanical vapor compression.
    B) Evaporative cooling using water and a porous wall structure.
    C) Absorption refrigeration with ammonia.
    D) Radiative cooling to the night sky.

73. Lipoxygenase is an enzyme often targeted for inactivation by blanching vegetables because it causes:
    A) Off-flavors and color loss through co-oxidation of pigments and lipids.
    B) Excessive softening.
    C) Increased vitamin C content.
    D) Desirable tenderization.

74. The firm texture of canned tomatoes or carrots is partly attributed to:
    A) Gelation of free pectin.
    B) Calcium salts added to the brine that cross-link with pectic acid, strengthening the middle lamella.
    C) Inactivation of all pectinases.
    D) High sugar content in the brine.

**75.** The major protein in milk, casein, exists primarily as colloidal particles called:

A) Monomers
B) Globular proteins
C) Micelles
D) Enzymes

**76.** Which vitamin in milk is significantly degraded by exposure to light?

A) Vitamin $B_2$ (Riboflavin)
B) Vitamin A
C) Vitamin C (Ascorbic acid)
D) Vitamin D

**77.** Lactoferrin, an important minor protein in milk, functions primarily as:

A) The main clotting enzyme
B) A fat-digesting enzyme
C) The primary protein in cheese curd
D) An iron-binding protein with antimicrobial and immunomodulatory properties

**78.** Phosphatase testing is used post-pasteurization to verify:

A) Fat content standardization
B) Adequate heat treatment
C) Complete homogenization
D) Vitamin content

**79.** "Age-gelation" is a common shelf-life limiting defect in UHT milk, primarily caused by:

A) Fat separation
B) Lactose crystallization
C) Residual proteolytic enzyme activity or bacterial heat-stable enzymes
D) Protein aggregation due to high calcium

**80.** The primary purpose of homogenization is to:

A) Kill bacteria
B) Reduce fat globule size to prevent creaming and improve mouthfeel
C) Increase milk viscosity
D) Standardize protein content

**81.** As per FSSAI, Double-toned milk has a legal minimum fat content of:

A) 6.0%
B) 4.5%
C) 3.0%
D) 1.3%

82. "Cheesy" flavor defect in butter is primarily caused by:

A) Growth of lipolytic bacteria or natural milk lipase activity producing free fatty acids

B) Excessive salt

C) Oxidation of unsaturated fats

D) High moisture content

83. A bitter flavor in aged cheese is typically the result of:

A) Fat oxidation

B) Excessive accumulation of small, hydrophobic peptides from casein breakdown

C) High salt content

D) Low acidity

84. The "freezing point" of an ice cream mix is depressed below that of milk primarily due to:

A) Fat content

B) High concentration of dissolved sugars and salts

C) Air incorporation

D) Protein content

85. FSSAI 2011 - Biogenic Amines Limits histamine content in cheese to prevent:

A) Texture problems

B) Excessive ripening

C) Color defects

D) Food poisoning from biogenic amines

86. "Processed Cheese" as per FSSAI Regulations 2011 is defined as a product made by:

A) Grinding, mixing, and heating cheese with emulsifying salts

B) Freezing and thawing natural cheese

C) Fermenting milk with special molds

D) Concentrating cheese whey

87. A key principle of proper preslaughter handling to minimize stress and improve meat quality is:

A) Mixing unfamiliar animal groups just before slaughter.

B) Using electric prods as the primary driving tool.

C) Providing a lairage period with access to water for rest and recovery from transport.

D) Slaughtering animals immediately upon arrival without rest.

88. Pithing after stunning involves:
   A) Severing the carotid arteries and jugular veins.
   B) Inserting a rod into the cranial cavity to destroy the brain stem and spinal cord, preventing reflex kicking.
   C) Removing the hide or feathers.
   D) Eviscerating the carcass.

89. The immediate source of energy for muscle contraction and the initial substrate for post-mortem glycolysis is:
   A) Adenosine triphosphate (ATP)
   B) Creatine phosphate
   C) Muscle glycogen
   D) Fatty acids

90. The phenomenon where a carcass feels stiff and "sets" in the position it was chilled is a direct physical manifestation of:
   A) Cold shortening.
   B) Rigor mortis.
   C) Autolysis.
   D) Exsanguination.

91. The biochemical event that directly initiates the development of rigor mortis is:
   A) The complete breakdown of glycogen.
   B) The release of calcium from the sarcoplasmic reticulum.
   C) The drop in pH to 5.6.
   D) The depletion of adenosine triphosphate below a critical threshold.

92. Warmed-over flavor, a rancid taste in reheated cooked meat, is primarily caused by the oxidation of:
   A) Proteins
   B) Carbohydrates
   C) Phospholipids in cell membranes
   D) Collagen

93. The innermost proteinaceous layer surrounding the yolk, separating it from the albumen, is the:
   A) Vitelline membrane
   B) Cuticle
   C) Shell membrane
   D) Chalaziferous layer

**94.** The protein in egg white that binds iron and exhibits antimicrobial properties by depriving bacteria of this essential nutrient is:

A) Ovalbumin

B) Ovomucoid

C) Ovotransferrin

D) Avidin

**95.** The primary cause of "watery whites" (thin albumen) in a freshly laid egg is:

A) Excessive washing

B) Increased hen age

C) Refrigeration

D) High humidity storage

**96.** The Haugh unit is a standard measure that primarily evaluates:

A) Shell color

B) Yolk color intensity

C) Albumen quality (thickness and height)

D) Air cell size

**97.** In the food industry, the functionality of egg white proteins for forming stable foams is most dependent on their:

A) Color

B) Iron-binding capacity

C) Antimicrobial activity

D) Ability to denature at interfaces and form a viscoelastic film that traps air

**98.** The primary reason for rotating eggs during long-term cold storage is to:

A) Distribute the yolk color evenly

B) Prevent the yolk from settling and adhering to the shell membrane

C) Slow down air cell growth

D) Strengthen the chalazae

**99.** Why is Kraft paper particularly strong and suitable for grocery bags and multi-wall sacks?

A) It is heavily bleached

B) It is coated with a plastic layer

C) It is made from long, unbleached sulphate pulp, which yields high-strength fibers

D) It is laminated with aluminum foil

**100.** Which plastic identification code and resin is most commonly used for making transparent beverage bottles due to its clarity, strength, and gas barrier?

A) #1 - PETE (Polyethylene Terephthalate)

B) #2 - HDPE (High Density Polyethylene)

C) #4 - LDPE (Low Density Polyethylene)

D) #6 - PS (Polystyrene)

**101.** The primary function of 'plasticizers' added to polymers like PVC is to:

A) Increase the polymer's strength

B) Increase the flexibility and workability of the polymer

C) Act as a UV stabilizer

D) Function as an antioxidant

**102.** The primary function of the paperboard layer in a Tetra Pak structure is to:

A) Provide a barrier against oxygen

B) Create a seal with the plastic layer

C) Provide mechanical rigidity and stacking strength to the package

D) Act as the direct food contact surface

**103.** A Time-Temperature Indicator (TTI) on a vaccine package changes color irreversibly. This is an example of:

A) Active packaging

B) Intelligent packaging

C) Modified atmosphere packaging

D) Biodegradable packaging

**104.** Which natural antimicrobial agent is commonly incorporated into edible films for fresh produce?

A) Nisin

B) Sodium benzoate

C) BHA (Butylated hydroxyanisole)

D) Potassium sorbate

**105.** PLA (Polylactic Acid) is a popular bioplastic derived from:

A) Seaweed extracts

B) Petroleum

C) Natural rubber

D) Fermentation of corn starch or sugarcane

**106.** INS numbers (International Numbering System) for food additives are maintained by:

A) Codex Alimentarius Commission

B) World Health Organization only

C) Food and Drug Administration (USA)

D) Bureau of Indian Standards

**107.** Which natural colorant, derived from turmeric, is widely used in Indian foods and has FSSAI approval?

A) Carmine (INS 120)

B) Curcumin (INS 100)

C) Tartrazine (INS 102)

D) Annatto (INS 160b)

**108.** Which sweetener is approximately 200 times sweeter than sucrose but is not heat-stable, limiting its use in baked goods?

A) Aspartame (INS 951)

B) Sucralose (INS 955)

C) Saccharin (INS 954)

D) Acesulfame-K (INS 950)

**109.** According to FSSAI, what is the maximum permissible level of trans fats in all fats/oils and foods in India as of 2022?

A) 10%

B) 5%

C) 2%

D) 0.5%

**110.** Which natural sweetener, also used as a prebiotic, is derived from chicory root?

A) Inulin

B) Maltitol

C) Tagatose

D) Erythritol

**111.** Which natural colorant, derived from saffron, is one of the most expensive food ingredients in the world?

A) Crocin

B) Carmine

C) Chlorophyll

D) Caramel

**112.** Which active packaging system is particularly effective for ethylene-sensitive fresh produce like broccoli and bananas?

A) Oxygen absorbers

B) Potassium permanganate

C) $CO_2$ emitters

D) Moisture controllers

**113.** In the context of encapsulated nutrients, "enteric release" means the capsule:

A) Dissolves immediately in the mouth

B) Never releases the core

C) Resists stomach acid and releases the core in the intestines

D) Releases upon application of ultrasound

**114.** The "coacervation" process is unique because it can produce:

A) The largest capsules (>5 mm)

B) Capsules that are always transparent

C) Only oil-soluble cores

D) Capsules with a true, continuous polymer shell rather than a porous matrix

**115.** The "freeze-drying" of encapsulated products often requires the use of "cryoprotectants" like trehalose to:

A) Increase the freezing point

B) Make the product colorful

C) Protect the core and wall matrix from ice crystal damage and dehydration stress

D) Reduce drying time

**116.** "Pickering emulsions" stabilized by food-grade nanoparticles (e.g., starch nanocrystals) offer enhanced stability because:

A) They use expensive synthetic surfactants

B) Solid particles adsorb irreversibly at the oil-water interface, forming a rigid barrier

C) They are always thermodynamically unstable

D) The nanoparticles dissolve in the oil

**117.** "Molecular encapsulation" using cyclodextrins is particularly suitable for:

A) Encapsulating large probiotic cells

B) Creating large, impermeable walls

C) Forming inclusion complexes with small, hydrophobic molecules

D) Aqueous core materials

**118.** The "GRAS" (Generally Recognized as Safe) status of a nano-encapsulated food ingredient:

A) Is automatically inherited from its bulk counterpart
B) Is only for synthetic materials
C) Is never granted
D) Must be re-evaluated specifically for the nano-form due to potential altered properties

**119.** Dynamic Light Scattering is a standard technique used to characterize nano encapsulates, primarily for determining:

A) Particle size distribution and z-average diameter in suspension
B) Chemical structure
C) Exact molecular weight
D) Crystalline polymorphism

**120.** To encapsulate a water-insoluble flavor oil, which combination of wall materials would be most effective in spray drying?

A) Maltodextrin alone
B) A blend of maltodextrin and a surface-active protein
C) Pure starch
D) Crystalline sucrose

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# ROUGH WORK

*DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO*

Booklet Serial No. 338301

**Test Booklet Series**

# TEST BOOKLET
# ASSISTANT PROFESSOR FOOD TECHNOLOGY & FOOD PROCESSING

**A**

## Written Test - 2026
## (35)

*Time Allowed: Three Hours* | *Maximum Marks: 120*

## INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET ***DOES NOT*** HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. **Please note that it is the candidate's responsibility to encode and fill in the Roll Number and Test Booklet Series Code A, B, C or D carefully and without any omission or discrepancy at the appropriate places in the OMR Answer /Response Sheet. Any omission/discrepancy will render the Response Sheet liable for rejection.**
3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside. ***DO NOT*** **write** ***anything else*** on the Test Booklet.
4. This Test booklet contains **120** items (questions). Each item comprises of four responses (answers). You will select the response which you want to mark on the Answer Sheet/Response Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose ***ONLY ONE*** response for each item.
5. You have to mark all your responses ***ONLY*** on the separate Answer /Response Sheet provided. *See directions in the Response Sheet.*
6. ***All*** items carry equal marks.
7. Before you proceed to mark in the Answer /Response Sheet, the response to various items in the Test Booklet, you have to fill in some particulars in the Answer /Response Sheet as per instructions sent to you with your Admission Certificate.
8. After you have completed filling in all your responses on the Response Sheet and the examination has concluded, you should hand over to the Invigilator ***only the Answer /Response Sheet.*** You are permitted to take away with you the Test Booklet and ***Candidate's Copy of the Response Sheet .***
9. Sheets for rough work are appended in the Test Booklet at the end.
10. While writing Centre, Subject and Roll No. on the top of the Answer Sheet/Response Sheet in appropriate boxes use **"ONLY BALL POINT PEN".**
11. **Penalty for wrong answers:**

    **THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY THE CANDIDATE IN THE WRITTEN TEST (OBJECTIVE TYPE QUESTION PAPER).**

    (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **(0.25)** of the marks assigned to that question will be deducted as penalty.

    (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above for that question.

    (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be **no penalty** for that question.

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1. The α-helix and β-pleated sheet conformations of the secondary structure are stabilized mainly by:
   A) Covalent disulfide bonds between side chains
   B) Hydrogen bonds between backbone carbonyl oxygens and amide hydrogens
   C) Ionic bonds between side chains of charged residues
   D) Hydrophobic interactions in the protein core

2. Which component of starch undergoes *retrogradation* most rapidly upon cooling after gelatinization?
   A) Amylose
   B) Amylopectin
   C) Lipids
   D) Proteins

3. Conjugated proteins are distinguished from simple proteins by:
   A) Having a non-protein component covalently bound to the polypeptide
   B) Containing only essential amino acids
   C) Being fibrous rather than globular
   D) Having quaternary structure only

4. The *Maillard reaction* is a non-enzymatic browning reaction between:
   A) Proteins and non-reducing sugars
   B) Starch and water
   C) Fats and oxygen only
   D) Amino acids (or proteins) and reducing sugars

5. Ascorbic acid browning contributes to non-enzymatic browning primarily in:
   A) Roasted meats
   B) Chocolate confections
   C) Fried doughnuts
   D) Dehydrated fruits and vegetables

6. *Locust bean gum* is extracted from the endosperm of:
   A) Ceretonia siliqua (carob) seeds
   B) Acacia Senegal seeds
   C) Irish moss seaweed
   D) Konjac plant

7. *Carrageenan* is extracted from:
   A) Brown seaweed (Laminaria)
   B) Red seaweed (Chondrus crispus, Eucheuma, Gigartina)
   C) Green algae
   D) Carob seeds

8. Which fatty acid is classified as an *essential fatty acid* required in the human diet?
   A) Stearic acid
   B) Oleic acid
   C) Linoleic acid
   D) Palmitic acid

9. Phospholipids function in foods primarily as:
   A) Bulk energy sources
   B) Emulsifiers due to amphiphilic nature in emulsions
   C) Strong gelling agents
   D) Flavor enhancers

10. In chocolate manufacture, maintaining the *β′ or Form V polymorph* of cocoa butter is critical for:
   A) Snap, gloss, and resistance to fat bloom
   B) Maximum bloom formation
   C) Soft melting texture
   D) Grainy mouthfeel

11. Which assay detects malondialdehyde as a lipid peroxidation biomarker?
   A) DPPH radical scavenging
   B) Thiobarbituric acid reactive substances
   C) Folin-Ciocalteu
   D) Oxygen Radical Absorbance Capacity

12. Water activity in foods is defined as:
   A) Total moisture content (% water)
   B) Osmotic pressure of food solution
   C) Bound water unavailable for reactions
   D) Ratio of vapor pressure of water in food to vapor pressure of pure water at same temperature

13. The D-value (decimal reduction time) represents:
   A) Temperature increase for 90% kill
   B) Survivor concentration
   C) Time for complete sterilization
   D) Time required at given temperature to reduce microbial population by 90%

14. Infant botulism, often associated with the ingestion of honey, is primarily caused by which of the following pathophysiological mechanisms?
   A) Infection and invasion of colonic mucosa by a toxigenic bacterium
   B) In vivo production of a neurotoxin that blocks neurotransmitter release at the neuromuscular junction
   C) Consumption of food containing preformed cytotoxic enterotoxins
   D) Systemic infection leading to meningoencephalitis

15. *Listeria monocytogenes* is a particular concern in processed, ready-to-eat foods like deli meats and soft cheeses because of its unique ability to:

A) Produce preformed heat-stable toxins in food.

B) Form highly resistant spores that survive pasteurization.

C) Grow at standard refrigeration temperatures (4°C) and cross the placental and blood-brain barriers.

D) Cause a profuse, dehydrating watery diarrhea in healthy adults.

16. A food product containing galactooligosaccharides is labeled to support digestive health. Based on its composition, this product is best categorized as a:

A) Probiotic, because it introduces beneficial bacteria.

B) Prebiotic, because it provides a fermentable substrate for resident gut bacteria.

C) Synbiotic, because it contains both live cultures and their substrate.

D) Postbiotic, because it contains inactivated microbial cells.

17. Chronic dietary exposure to aflatoxin $B_1$, a potent mycotoxin produced primarily by *Aspergillus flavus* and *A. parasiticus*, is most clinically significant due to its strong association with:

A) Acute renal failure (Balkan endemic nephropathy)

B) Neural tube defects in developing fetuses

C) Esophageal strictures and gastric ulcers

D) Hepatocellular carcinoma and liver cirrhosis

18. Ochratoxin A, produced by *Aspergillus ochraceus* and *Penicillium verrucosum*, is a nephrotoxic mycotoxin commonly found in stored grains. Its long-term health impact is most notably linked to:

A) A degenerative kidney disease in humans and animals (porcine nephropathy)

B) Pulmonary fibrosis and "farmer's lung"

C) Acute hemorrhagic syndrome in poultry

D) Immunosuppression leading to opportunistic viral infections

19. Immobilized glucose oxidase is sometimes used in packaged foods, such as bottled beverages, not as a primary preservative but to:

A) Directly inhibit the growth of *Listeria monocytogenes*

B) Hydrolyze pectin to increase juice clarity

C) Catalyze the removal of residual oxygen, thereby delaying oxidative spoilage and inhibiting aerobes

D) Convert glucose to fructose to enhance sweetness

**20.** The main industrial advantage of immobilizing an enzyme on a solid support matrix, as used in processes like high-fructose corn syrup production, is:

A) It universally increases the enzyme's catalytic turnover number.

B) It allows for the continuous use and easy separation of the enzyme from the product stream.

C) It significantly broadens the enzyme's substrate specificity.

D) It completely eliminates the need for cofactors or specific reaction conditions.

**21.** Most common pathogenic bacteria, such as *Salmonella* spp. and *Escherichia coli*, are inhibited in acidic foods (pH < 4.6) primarily because:

A) The high proton concentration disrupts transmembrane proton gradients and denatures essential enzymes.

B) The low pH directly hydrolyzes their peptidoglycan cell walls.

C) All bacteria are obligate neutrophiles and cannot tolerate any acidity.

D) Acidic conditions promote the growth of faster-fermenting yeasts that outcompete them.

**22.** Modified Atmosphere Packaging that replaces air with high concentrations of carbon dioxide extends the shelf-life of chilled meat by:

A) Creating a bacteriostatic environment through $CO_2$ dissolution, intracellular acidification, and enzyme inhibition.

B) Providing a rich carbon source for fermentative bacteria.

C) Generating toxic levels of carbonic acid on the food surface.

D) Completely sterilizing the product through anoxia.

**23.** In the production of wine, the most critical technological parameter for ensuring a complete and controlled alcoholic fermentation by *Saccharomyces cerevisiae*, while suppressing wild microbes, is:

A) Maintaining a high dissolved oxygen concentration.

B) The initial adjustment and monitoring of pH and the addition of sulfur dioxide.

C) Using a nutrient-deficient must to limit microbial growth.

D) Fermenting at temperatures exceeding 40°C.

**24.** In conventional breadmaking, the leavening action that creates the spongy crumb structure is primarily a result of:

A) Proteolytic enzyme activity strengthening the gluten network.

B) Thermophilic bacterial production of lactic acid.

C) Alcoholic fermentation by yeast producing carbon dioxide trapped within the gluten matrix.

D) The release of steam during the baking process alone.

25. A food product like tomato ketchup or fruit puree often exhibits decreased resistance to pouring under high shear (e.g., when shaken or squeezed). This behavior is best described as:

A) Newtonian
B) Dilatant (shear- hickening)
C) Thixotropic
D) Pseudoplastic (shear-thinning)

26. A glass capillary viscometer (e.g., Ostwald type) measures viscosity based on the principle of:

A) Measuring the torque required to rotate a spindle at a given speed.
B) Timing the laminar flow of a fixed fluid volume under the influence of gravity through a calibrated tube.
C) Measuring the damping of an oscillating surface in contact with the fluid.
D) Observing the deformation of a fluid droplet under extensional flow.

27. A primary challenge when using a rotational viscometer to measure the viscosity of a suspension or paste is ensuring the measurement is not invalidated by:

A) The Coriolis effect
B) Dielectric breakdown of the fluid
C) Wall slip, where a thin, low-viscosity layer forms at the sensor surface, leading to erroneously low readings
D) The fluid becoming radioactive

28. The total emissive power of a perfect blackbody radiator is given by the Stefan-Boltzmann Law as proportional to:

A) The absolute temperature to the fourth power ($T^4$).
B) The absolute temperature to the second power ($T^2$).
C) The absolute temperature to the first power (T).
D) The logarithm of the absolute temperature (ln T).

29. The high effectiveness of porous or fibrous materials (like fiberglass or polystyrene foam) as thermal insulators is primarily due to their ability to:

A) Emit very little thermal radiation.
B) Create a high-conductivity path for heat.
C) Entrap air (or other gas) within small, stagnant pockets, drastically reducing conductive and convective heat transfer.
D) Reflect all incident thermal radiation.

**30.** In fluid flow analysis, the Reynolds number represents the ratio of:

A) Heat transfer rate to mass transfer rate.

B) Inertial forces to viscous forces.

C) Convective heat transfer to conductive heat transfer.

D) Momentum diffusivity to thermal diffusivity.

**31.** The Nusselt number provides a dimensionless measure of:

A) The enhancement of convective heat transfer relative to conduction across a stagnant fluid layer.

B) The friction at a fluid-solid boundary.

C) The ratio of momentum to thermal boundary layer thicknesses.

D) The pressure drop in a flowing system.

**32.** In forced convection heat transfer correlations, the Prandtl number appears because it:

A) Defines the flow velocity.

B) Scales the thickness of the thermal boundary layer relative to the velocity boundary layer.

C) Determines the pipe diameter.

D) Is a direct measure of the heat transfer rate.

**33.** The effectiveness ($\varepsilon$) of a heat exchanger is defined as the ratio of:

A) The actual heat transfer rate to the heat transfer rate in an ideal, infinite-area exchanger.

B) The Log Mean Temperature Difference to the maximum temperature difference.

C) The cold fluid flow rate to the hot fluid flow rate.

D) The tube length to the shell diameter.

**34.** The most significant quality advantage of cryogenic freezing over conventional air-blast freezing for delicate foods (e.g., berries, seafood) is the minimization of:

A) Package size.

B) Energy consumption per kilogram.

C) Drip loss and texture damage by promoting the formation of numerous, small intracellular ice crystals.

D) Microbial load through sterilization.

**35.** A spray dryer converts a liquid feed (e.g., milk, coffee extract) into a dry powder primarily by:

A) Atomizing the feed into a hot air chamber to create a vast surface area for rapid evaporation.

B) Freezing and then sublimating the water under vacuum.

C) Spreading a thin film over a heated drum.

D) Using microwave energy to boil off water.

36. The dominant size reduction mechanism in a tumbling ball mill operating at optimal speed is:

A) Cutting and shearing by sharp blades.

B) High-velocity impact against stationary surfaces.

C) A combination of impact from falling grinding media and attrition between cascading media and particles.

D) Compression between two rigid metal plates.

37. A short, inexpensive column placed between the injector and the analytical column in an HPLC system serves primarily to:

A) Enhance the detection sensitivity for trace analytes.

B) Generate higher backpressure to ensure mobile phase mixing.

C) Protect the analytical column by trapping particulate matter and chemically irreversible contaminants.

D) Act as a pre-column for derivatization reactions.

38. The most critical technological challenge in coupling Liquid Chromatography to Mass Spectrometry is solved by the interface, which must:

A) Dramatically increase the flow rate from the LC to match MS requirements.

B) Efficiently remove the liquid mobile phase and volatilize/ionize the analyte for introduction into the high-vacuum MS.

C) Act as a pre-column to filter out salts before they reach the MS.

D) Cool the LC eluent before it enters the mass spectrometer.

39. The fine splitting (multiplicity) of signals in a $^{1}H$ NMR spectrum, such as a doublet or triplet, is caused by:

A) Magnetic field inhomogeneity across the sample.

B) Scalar (through-bond) coupling between the magnetic moments of neighbouring, non-equivalent nuclei.

C) The presence of paramagnetic impurities in the sample.

D) Rapid chemical exchange with the deuterated solvent.

40. Two isomeric compounds, one a straight-chain alkane and the other a branched alkane with the same molecular formula, would be most unequivocally distinguished using:

A) Gas Chromatography, as they would have identical retention times.

B) Low-resolution Mass Spectrometry, as they would produce identical mass spectra.

C) $^{1}H$ and $^{13}C$ Nuclear Magnetic Resonance spectroscopy, which would show distinct chemical shift and coupling patterns.

D) Ultraviolet-Visible spectroscopy, as alkanes have characteristic chromophores.

41. ICP-MS is uniquely powerful in food traceability and authenticity studies because it can accurately measure:

A) The total fat content of a sample.

B) The specific activity of enzymes.

C) Multi-element fingerprints and stable isotope ratios that are characteristic of geographic origin.

D) The molecular weight of protein contaminants.

42. X-Ray Diffraction is used to characterize the crystalline structure of materials, such as food additives or contaminants, based on:

A) The absorption of X-rays by heavy metal atoms.

B) The constructive interference of X-rays scattered by ordered atomic planes.

C) The emission of fluorescent X-rays from excited atoms.

D) The diffraction of X-rays by amorphous, glassy matrices.

43. The endothermic peak observed in a DSC thermogram of a starch-water suspension during heating is primarily attributed to:

A) The evaporation of free water.

B) The melting of amylose-lipid complexes.

C) The gelatinization process: the disruption of molecular order and swelling of starch granules.

D) The thermal decomposition of starch polymers.

44. The temperature-induced unfolding (denaturation) of a purified food protein, such as whey or egg white protein, is best studied using:

A) ICP-MS to track release of bound metals.

B) XRD to observe loss of long-range order.

C) DSC to measure the endothermic heat flow associated with the disruption of the protein's tertiary structure.

D) PCR to detect changes in its genetic code.

45. Effective Prerequisite Programs, such as Good Manufacturing Practices, are essential to a Hazard Analysis and Critical Control Point (HACCP) system because they:

A) Replace the need for identifying Critical Control Points.

B) Provide the foundational hygiene and operational conditions necessary to reduce general hazards, allowing the HACCP plan to focus on controlling significant hazards at critical control points.

C) Are only required for exporting companies.

D) Are established after the HACCP plan is validated.

46. Within the framework of the World Trade Organization (WTO), Codex Alimentarius standards, guidelines, and recommendations are recognized as:
A) Legally binding directives that all member nations must adopt verbatim.
B) Superseding all existing national food safety laws.
C) Optional guidelines with no bearing on trade disputes.
D) The benchmark for evaluating national measures under the Agreement on the Application of Sanitary and Phytosanitary Measures, serving as a basis for facilitating trade and resolving disputes.

47. A foodborne illness characterized by a sudden onset of vomiting within 1-6 hours of consumption is most likely an:
A) Infection caused by ingesting viable *Salmonella* cells.
B) Intoxication caused by ingesting a preformed bacterial toxin.
C) Infection caused by invasive *Shigella*.
D) Toxico-infection caused by *Clostridium perfringens*.

48. The qualitative detection of starch as an adulterant in commodities like milk, grated cheese, or powdered spices utilizes iodine solution, which produces a characteristic:
A) Blue-black color due to the formation of an iodine-starch inclusion complex.
B) Yellow precipitate indicating protein contamination.
C) Red-violet color signifying the presence of dextrins.
D) Colorless endpoint in a titration.

49. The detection of poisonous argemone oil adulteration in edible mustard oil is based on a test that identifies:
A) The presence of toxic alkaloids like sanguinarine.
B) An altered fatty acid profile via Gas Chromatography.
C) The fluorescence of argemone oil under UV light.
D) A change in the saponification value.

50. Fourier-Transform Infrared (FTIR) spectroscopy is a rapid, non-destructive screening tool for detecting adulteration of edible oils because it can monitor changes in the:
A) Radioactive isotope ratios.
B) Heavy metal concentration.
C) Molecular vibration signatures (fingerprint region) of functional groups, altered by adulterant oils.
D) DNA sequence of the source plant.

51. Compared to major cereals like wheat and rice, millets (e.g., pearl millet, finger millet) as a group are generally characterized by being:
A) Higher in starch content and lower in protein.
B) More drought-resistant and often richer in minerals like iron and calcium.
C) The only cereals that contain gluten.
D) Lower in lipid content due to a smaller germ.

52. The extensive network of disulfide bonds (S-S) in glutenin polymers is crucial because they:
A) Provide covalent cross-links that stabilize the protein matrix.
B) Are broken during mixing to release flavor compounds.
C) Make the protein soluble in water.
D) Are the primary site for starch binding.

53. In breadmaking, salt (NaCl) is a critical ingredient that modulates gluten strength and fermentation. Its primary functions include all of the following EXCEPT:
A) Strengthening the gluten network by moderating water absorption and protein hydration.
B) Enhancing flavor and overall taste perception.
C) Serving as the primary nutrient for yeast growth.
D) Exerting a retarding effect on yeast activity, providing fermentation control.

54. In biscuits and shortcrust pastry, a high proportion of solid fat (shortening) is incorporated to create a tender, crumbly texture by:
A) Forming a gluten network parallel to the starch.
B) Coating flour particles and physically separating gluten strands.
C) Providing a strong scaffold for air entrapment.
D) Hydrating the starch granules for rapid gelatinization.

55. Freshly milled wheat flour produces sticky, weak doughs. Natural aging over several weeks improves its baking quality primarily due to the:
A) Evaporation of volatile flavors.
B) Growth of beneficial microbes.
C) Slow, atmospheric oxidation of gluten-forming proteins and carotenoid pigments.
D) Hydrolysis of starch into sugar.

56. The primary objective of refining crude vegetable oil is to:
A) Change its fatty acid composition to make it healthier.
B) Completely hydrogenate it to increase oxidative stability.
C) Synthesize new flavor compounds.
D) Remove undesirable minor components (gums, free fatty acids, pigments, odors) while preserving triglycerides and natural antioxidants like tocopherols.

57. During alkali refining (neutralization), a caustic soda solution is added to crude oil primarily to:
A) Hydrate and remove phospholipids.
B) Saponify triglycerides into soap and glycerol.
C) React with free fatty acids to form soapstock, which is then separated.
D) Bleach color pigments by oxidation.

58. The separation of starch granules from gluten (protein) in the wet milling process relies on their difference in:

A) Particle size and density.

B) Electrical charge, using electrophoresis.

C) Solubility in alkali.

D) Magnetic properties.

59. The production of High Fructose Corn Syrup from wet-milled starch slurry begins with the enzyme $\alpha$ - amylase, which catalyzes the:

A) Isomerization of glucose to fructose.

B) Hydrolysis of starch to dextrins, randomly cleaving $\alpha$-1,4 glycosidic bonds to reduce viscosity.

C) Saccharification of dextrins to glucose via precise cleavage of $\alpha$-1,4 and $\alpha$-1,6 bonds.

D) Purification of the syrup via immobilized enzyme columns.

60. In modern rice mills, the predominant method for husk removal utilizes a rubber roll husker, which operates by:

A) Shearing the husk with abrasive carborundum stones.

B) Applying differential speed and pressure between two rotating rubber rolls to slide the husk off the grain.

C) Using high-velocity air aspiration to separate husk by density.

D) Impacting the paddy against a metal screen to crack the husk.

61. Parboiling is a hydro-thermal treatment of paddy where the fundamental physicochemical change is:

A) Complete pre-cooking of the starch for instant rice.

B) Chemical bleaching of the husk.

C) Fermentation of the bran layer to enhance flavor.

D) Gelatinization of starch within the intact grain, followed by controlled drying and milling.

62. Finger millet (*Eleusine coracana*) is exceptionally valued in nutrition, particularly for weaning foods, due to its remarkably high content of:

A) Vitamin C

B) Bioavailable calcium and resistant starch.

C) Omega-3 fatty acids.

D) Iodine.

63. The most definitive physiological characteristic that distinguishes a climacteric fruit from a non-climacteric fruit is:
    A) The presence of a pronounced, autocatalytic rise in respiration rate and concomitant ethylene production at the onset of ripening.
    B) Its ability to change color after harvest.
    C) Its sugar content at harvest.
    D) Its requirement for sunlight to ripen.

64. Which list correctly identifies a climacteric and a non-climacteric fruit, respectively?
    A) Tomato; Banana
    B) Mango; Orange
    C) Peach; Melon (Cantaloupe)
    D) Apple; Pear

65. In minimally processed produce, enzymatic browning is primarily controlled by:
    A) Adding preservatives like sodium benzoate.
    B) Sterilizing the product with high heat.
    C) Using chemical inhibitors (e.g., ascorbic acid) and/or lowering pH.
    D) Removing all oxygen from the plant cells.

66. The primary purpose of the "withering" stage in black tea manufacture is to:
    A) Initiate fermentation
    B) Reduce leaf moisture content to concentrate cell sap and soften the leaf for rolling
    C) Develop the characteristic black color
    D) Halt all enzymatic activity

67. The critical step that distinguishes Green Tea from Black Tea processing is:
    A) The application of heat to deactivate polyphenol oxidase immediately after plucking
    B) A longer fermentation time
    C) The use of older, mature leaves
    D) Sun-drying instead of oven drying

68. The fermentation step in wet coffee processing is essential for:
    A) Developing the brown bean color
    B) Breaking down the mucilage surrounding the parchment bean through microbial action
    C) Initiating the Maillard browning reactions
    D) Caffeine synthesis

69. "Hot break" processing of tomatoes involves heating crushed tomatoes to approximately 90°C (194°F) immediately to:
    A) Develop a redder color
    B) Enhance sugar caramelization
    C) Sterilize the product for ambient storage
    D) Inactivate pectic enzymes to preserve viscosity and prevent serum separation

70. "Bloater" formation in fermented pickles is a defect caused by:
A) Too little salt
B) Over-softening due to pectinase activity
C) Growth of mold on the surface
D) Excessive carbon dioxide production by yeast or heterofermentative LAB, causing hollow, gas-filled cucumbers

71. The conversion of bright green chlorophyll to dull olive-brown pheophytin during thermal processing (canning, blanching) is due to:
A) Oxidation
B) Replacement of the central magnesium ion with hydrogen ions in an acidic medium
C) Enzymatic action of chlorophyllase
D) Exposure to light

72. The enzyme *chlorophyllase*, which can cleave chlorophyll, is most active:
A) At high temperatures (>80°C)
B) In strong alkaline conditions
C) At moderate temperatures (60-75°C) and can be activated by blanching
D) Only in the presence of light

73. Compared to chlorophyll and anthocyanins, carotenoids (like beta-carotene, lycopene) are generally:
A) More heat-stable and often show improved extractability and bioavailability after moderate thermal processing
B) More water-soluble and easily leached out
C) Highly sensitive to acidic pH
D) Unchanged by any processing method

74. The Maillard reaction (non-enzymatic browning) is a dominant flavor/color-forming reaction in the processing of:
A) Green tea and sauerkraut
B) Tomato juice and fresh-pack pickles
C) Coffee and cocoa roasting
D) All fermented vegetables

75. Milk fat is unique because it contains a relatively high proportion of:
A) Polyunsaturated fatty acids
B) Short- and medium-chain fatty acids
C) Trans-fatty acids from industrial processing
D) Cholesterol

**76.** The enzyme *plasmin* in milk is significant because it:
A) Hydrolyzes caseins, affecting cheese yield and storage stability of UHT milk
B) Catalyzes lactose fermentation
C) Is the primary cause of milk souring
D) Homogenizes milk fat

**77.** The freezing point of milk is slightly depressed below 0°C primarily because of:
A) High fat content
B) The presence of stabilizers
C) Protein coagulation
D) The osmotic effect of dissolved solutes.

**78.** The "buffering capacity" of milk, which resists pH change during acidification, is mainly due to:
A) Lactose
B) Milk fat
C) Proteins, phosphates, and citrate
D) Vitamins

**79.** The Pearson Square method is a calculation tool used for:
A) Determining pasteurization time
B) Standardizing milk solids content by blending two streams of different concentrations
C) Designing homogenization valves
D) Calculating refrigeration load

**80.** The "whey" proteins in milk (α-lactalbumin, β-lactoglobulin) are characterized by being:
A) Insoluble at all pH values
B) Part of the casein micelle
C) Precipitated at their isoelectric point (pH ~4.6) but soluble in native milk
D) The primary proteins in cheese curd

**81.** As per FSSAI (2023), Double-toned milk has a legal minimum Milk Solids- not-Fat content of:
A) 9.0%
B) 8.5%
C) 8.0%
D) 7.5%

**82.** During the curing/ripening of Cheddar, the breakdown of proteins (proteolysis) is primarily responsible for:
A) Color changes
B) Increase in pH
C) Fat separation
D) Development of flavor compounds and characteristic texture

83. The main nutritional contribution of cheese to the diet is as a rich source of:
A) Vitamin C and fiber
B) High-quality protein, calcium, phosphorus, and fat-soluble vitamins (A, D)
C) Simple carbohydrates
D) Iron

84. The maximum peroxide value allowed in butter by FSSAI indicates:
A) Extent of oxidative rancidity
B) Moisture content
C) Salt concentration
D) Microbial load

85. According to FSSAI 2011, "Early Blowing" in cheese is often caused by:
A) Protein over-digestion
B) Mold growth on surface
C) Coliform fermentation during initial stages
D) High salt content

86. FSSAI standards for "Cottage Cheese" specify maximum moisture content of:
A) 60%
B) 80%
C) 70%
D) 90%

87. The immediate objective of effective stunning in humane slaughter is to:
A) Exsanguinate the animal.
B) Induce instantaneous and painless unconsciousness and insensibility that lasts through the sticking process.
C) Initiate the tenderization process.
D) Relax the muscles completely.

88. The primary purpose of the "sticking" or exsanguination step is to:
A) Induce unconsciousness.
B) Initiate rigor mortis.
C) Rapidly bleed the animal, causing death through cerebral ischemia and improving meat quality/shelf-life.
D) Sterilize the carcass.

89. In modern poultry processing, the step of "scalding" is primarily performed to:
A) Sterilize the skin.
B) Remove the cuticle (epidermis).
C) Initiate protein denaturation for texture.
D) Loosen feathers by relaxing the muscles anchoring them in the follicle, facilitating efficient defeathering.

**90.** Pale, Soft, and Exudative condition is a significant quality defect in poultry meat, often triggered by:

A) Long aging times.
B) Freezing the carcass too slowly.
C) Incomplete bleeding.
D) Preslaughter stress in genetically susceptible birds, leading to rapid post-mortem glycolysis while body temperature is still high.

**91.** The primary enzymatic system responsible for the post-rigor tenderization (resolution) of meat during aging is:

A) Glycolytic enzymes (e.g., phosphorylase)
B) Lipases
C) Calcium-dependent proteases (calpains)
D) Lysosomal cathepsins

**92.** Electrical stimulation of carcasses shortly after slaughter is a technology used primarily to:

A) Improve bleeding efficiency.
B) Accelerate glycolysis and pH decline, preventing cold shortening and potentially enhancing tenderization.
C) Sterilize the carcass surface.
D) Initiate proteolytic enzyme activity immediately.

**93.** The tenderness of meat from an older animal is generally lower than from a younger animal of the same species primarily because of:

A) Lower fat content.
B) Faster post-mortem glycolysis.
C) Weaker myofibrillar proteins.
D) Increased cross-linking and thermal stability of the connective tissue (collagen).

**94.** The two twisted, rope-like structures that anchor the yolk at the center of the egg are called:

A) Air cell membranes
B) Chalazae
C) Vitelline membranes
D) Albumen layers

**95.** Candling of eggs is a non-destructive quality evaluation technique used primarily to assess:

A) Internal defects like blood spots, meat spots, and air cell size
B) Protein content
C) Microbial load
D) Yolk cholesterol level

96. Compared to uncoated eggs, oil-coated eggs stored at room temperature will typically show:

A) A more rapid increase in air cell size

B) A faster thinning of the thick albumen

C) A slower rate of pH increase in the albumen

D) More rapid yolk membrane weakening

97. Thermostabilization of eggs involves a brief heat treatment designed to:

A) Coagulate a thin layer of albumen just inside the shell, sealing the pores

B) Cook the egg completely

C) Kill all microorganisms inside the egg

D) Melt the cuticle for easier peeling

98. The functional property of egg yolk that makes it an excellent emulsifier in products like mayonnaise is primarily due to its content of:

A) Cholesterol

B) Carotenoid pigments

C) Iron

D) Lecithin and lipoproteins

99. The Cobb test is a standard method for measuring:

A) The water absorbency of paper and paperboard over a specified time

B) The bursting strength of paperboard

C) The tensile strength of paper

D) The thickness (caliper) of paper

100. The 'Lacquer' applied inside a food can primarily serves to:

A) Enhance the external appearance

B) Increase the mechanical strength of the can

C) Prevent chemical interaction between the metal and the food product

D) Aid in the soldering process

101. A biodegradable plastic derived from microbial fermentation of sugars, often used for compost bags and food service ware, is:

A) Polyethylene Terephthalate

B) Polyhydroxyalkanoates

C) Polyvinyl Chloride

D) Expanded Polystyrene

**102.** A potato chip package requires both oxygen and moisture barriers. Which material combination would be most effective?

A) Multi-layer laminate containing aluminium foil or metallized film
B) Single-layer LDPE film
C) Glassine paper
D) Untreated paperboard

**103.** What is the key difference between "active" and "intelligent" packaging systems?

A) Active packaging is always more expensive
B) Only active packaging is approved by FSSAI
C) Intelligent packaging always contains sensors
D) Active packaging interacts with the food/headspace to extend shelf-life, while intelligent packaging monitors and communicates information

**104.** According to FSSAI regulations, when is nutritional information mandatory on packaged food labels?

A) For all food products regardless of type
B) For all packaged foods except those sold loose, exempted by regulation
C) Only for imported foods
D) Only for foods making health claims

**105.** What does the term "RDA" stand for in nutritional labeling as per Indian regulations?

A) Required Dietary Allowance
B) Required Daily Average
C) Regular Daily Amount
D) Recommended Dietary Allowance

**106.** According to Codex Alimentarius and FSSAI, what is the primary purpose of a food additive?

A) To increase the bulk of food cheaply
B) To replace natural ingredients entirely
C) To perform specific technological functions during manufacturing, processing, or storage
D) To mask poor quality ingredients

**107.** Which synthetic color is notorious for causing hyperactivity in some sensitive children and has been banned in several countries?

A) Tartrazine (Yellow 5, INS 102)
B) Erythrosine (Red 3, INS 127)
C) Indigo Carmine (Blue 2, INS 132)
D) Sunset Yellow FCF (INS 110)

**108.** What is a key advantage of sugar alcohols like sorbitol and xylitol over intense sweeteners?

A) They are calorie-free

B) They provide bulk and texture similar to sugar, useful in sugar-free confections

C) They are sweeter than sugar

D) They have no laxative effect

**109.** In modified atmosphere packaging of fresh meat, which combination of gases is typically used to maintain red color and inhibit microbial growth?

A) 100% Nitrogen

B) 100% Carbon Dioxide

C) High Oxygen (70-80%) with Carbon Dioxide (20-30%)

D) Normal atmospheric air

**110.** Which FSSAI regulation specifically governs the use of food additives in infant foods?

A) Food Safety and Standards (Fortification of Foods) Regulations, 2018

B) Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011

C) Food Safety and Standards (Contaminants, Toxins and Residues) Regulations, 2011

D) Food Safety and Standards (Foods for Infant Nutrition) Regulations, 2020

**111.** Which synthetic blue color, also called Brilliant Blue FCF, is commonly used in ice creams and beverages?

A) INS 133

B) INS 131

C) INS 132

D) INS 142

**112.** The primary biological objective of blanching vegetables prior to freezing or canning is to:

A) Achieve commercial sterility

B) Eliminate all vegetative pathogens

C) Inactivate endogenous enzymes that cause quality deterioration

D) Increase nutritional value through heat treatment

**113.** Which blanching method typically results in the LEAST leaching of water-soluble nutrients?

A) Conventional boiling water blanching

B) Steam blanching

C) Microwave blanching

D) Hot water blanching

**114.** Which enzyme must be inactivated during UHT milk processing to prevent gelation during storage?

A) Lactase

B) Plasmin

C) Lipase

D) Peroxidase

**115.** In extrusion cooking, the sudden pressure drop at the die causes:

A) Immediate cooling of the product

B) Nutrient enrichment

C) Protein coagulation exclusively

D) Flash evaporation of water and starch gelatinization

**116.** Which microorganism's thermal resistance characteristics determine the minimum thermal process for low-acid canned foods?

A) Clostridium botulinum

B) Bacillus cereus

C) Escherichia coli

D) Salmonella enterica

**117.** The primary mechanism of heat transfer in retort processing of canned liquids is:

A) Conduction only

B) Radiation

C) Natural convection

D) Electrical induction

**118.** In dairy processing, microfiltration (0.1-1.4 μm) is commonly used for:

A) Complete milk sterilization

B) Reduction of microbial load and removal of somatic cells without affecting proteins

C) Lactose removal

D) Casein concentration

**119.** Reverse osmosis for fruit juice concentration offers this advantage over thermal evaporation:

A) Better retention of volatile aroma compounds and heat-sensitive nutrients

B) Lower capital costs

C) Higher final concentration achievable

D) No membrane fouling issues

**120.** The international symbol for irradiated foods, the "Radura," must appear on packaging when:

A) The food or any ingredient has been treated with ionizing radiation

B) Any processing has occurred

C) Only when gamma rays are used

D) Only X-rays are used

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# ROUGH WORK