# CUET PG 2024 Food Engineering and Technology Question Paper with Solution

| Time Allowed :1 Hour 45 Mins | Maximum Marks :300 | Total Questions :75 |
|---|---|---|

## General Instructions

**Read the following instructions very carefully and strictly follow them:**

1. The examination duration is 105 minutes. Manage your time effectively to attempt all questions within this period.
2. The total marks for this examination are 300. Aim to maximize your score by strategically answering each question.
3. There are 75 mandatory questions to be attempted in the Agro forestry paper. Ensure that all questions are answered.
4. Questions may appear in a shuffled order. Do not assume a fixed sequence and focus on each question as you proceed.
5. The marking of answers will be displayed as you answer. Use this feature to monitor your performance and adjust your strategy as needed.
6. You may mark questions for review and edit your answers later. Make sure to allocate time for reviewing marked questions before final submission.
7. Be aware of the detailed section and sub-section guidelines provided in the exam. Understanding these will aid in effectively navigating the exam.

**1. Identify the antinutritional toxic constituent responsible for infestation of groundnut with Aspergillus flavus.**

1. Saponins
2. Gossypol
3. Aflatoxins
4. Haemagglutinins

**Correct Answer: 3. Aflatoxins**

**Solution:**

- Aspergillus flavus is a fungus known to produce aflatoxins, which are potent mycotoxins.
- These mycotoxins are harmful to both humans and animals, causing various health issues including liver damage and cancer.
- Aflatoxins are commonly found in improperly stored grains, nuts, and seeds, including groundnuts.

- Saponins, Gossypol, and Haemagglutinins are also antinutritional factors found in plants, but they are not associated with Aspergillus flavus infestation.

> Quick Tip
>
> Remember that Aspergillus flavus is a fungal source of aflatoxins, a harmful mycotoxin found in groundnuts and other improperly stored crops. Focus on the specific association between the fungus and its toxins.

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**2. Which type of protein structure involves the non-covalent association of protein chains, like in case of actomyosin system of muscles and the casein micelles of milk?**

1. Primary structure
2. Secondary structure
3. Tertiary structure
4. Quaternary structure

**Correct Answer: 4. Quaternary structure**

**Solution:**

- Primary structure refers to the linear sequence of amino acids in a polypeptide chain.
- Secondary structure refers to local folding of the polypeptide chain into $\alpha$-helices and $\beta$-sheets, stabilized by hydrogen bonds.
- Tertiary structure is the overall three-dimensional folding of a single polypeptide chain.
- Quaternary structure involves the association of two or more polypeptide chains (subunits), held together by non-covalent interactions like hydrogen bonds, ionic bonds, and hydrophobic interactions, which is seen in both the actomyosin system of muscles and the casein micelles of milk.

> Quick Tip
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> Think of protein structure levels: Primary is the sequence, secondary is local folding, tertiary is 3D folding of a single chain, and quaternary is the arrangement of multiple chains. Quaternary always has multiple polypeptide chains interacting non-covalently.

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**3. In the context of dextrinisation, which of the following statements are correct?**

(A). If a starch product is subjected to dry heat, carbohydrate compounds called dextrins are formed

(B). When dextrins are dissolved in water, they impart a bitter taste
(C). Non-enzymatic browning occurs and a burnt toasted flavour develops
(D). Dry dextrins known as pyrodextrins are formed in the crust of baked flour mixtures

**Choose the correct answer from the options given below:**
1. (A), (C) and (D) only.
2. (A), (B) and (C) only.
3. (A), (B), (C) and (D).
4. (B), (C) and (D) only.

**Correct Answer: 1. (A), (C) and (D) only.**

**Solution:**

- Dextrinization is the process where starch is broken down into smaller polysaccharides called dextrins upon heating. This occurs when a starch product is subjected to dry heat. Hence, statement (A) is correct.
- Dextrins have a sweet taste, not a bitter taste. So, statement (B) is incorrect.
- The heating process also causes non-enzymatic browning which contributes to a characteristic burnt, toasted flavor as mentioned in (C)
- Dry dextrins formed on the crust of baked flour mixtures are called pyrodextrins, thus (D) is correct.

Quick Tip

Dextrinization involves the breakdown of starch by dry heat, resulting in sweet dextrins and burnt/toasted flavor due to non-enzymatic browning; pyrodextrins are formed in crusts. Remember that dextrins are sweet not bitter.

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**4. Match List I with List II:**

| **List I** | **List II** |
|---|---|
| (Enzyme for tenderising meat) | (Source of enzyme) |
| A. Bromelain | I. Pineapple |
| B. Papain | II. Papaya leaves |
| C. Ficin | III. Pancreas and fungal enzymes |
| D. Trypsin | IV. Figs |

**Choose the correct answer from the options given below:**

1. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
2. (A) - (I), (B) - (III), (C) - (II), (D) - (IV)
3. (A) - (I), (B) - (II), (C) - (IV), (D) - (III)
4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

**Correct Answer: 3. (A) - (I), (B) - (II), (C) - (IV), (D) - (III)**

**Solution:**

- Bromelain is an enzyme extracted from pineapple and is known for its meat tenderizing properties.
- Papain is extracted from papaya leaves, which are also used for tenderizing meat.
- Ficin is extracted from Figs and used for tenderization
- Trypsin is primarily produced by the pancreas, and some fungal sources can also produce it, used as a meat tenderizer.

Quick Tip

Associate each enzyme with its source: Bromelain from pineapple, Papain from papaya, Ficin from Figs, and Trypsin from pancreas or fungal. These are known meat tenderizers found in nature.

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**5. Which of the following statements are correct in context of polymerization reaction of lipids?**

(A). Unsaturated fatty acids in lipids undergo polymerization owing to heat, oxidation, and the presence of free radicals or polar catalysts
(B). Heating of fats and oils, as in frying operations, can produce changes in molecular weight, colour, viscosity or refractive index due to polymerization
(C). Polymers increase the heat transfer efficiency of an oil and also improve the quality of products fried in oil.
(D). Under extreme conditions, polymerization can also enhance the nutritional quality of oils and their wholesomeness

**Choose the correct answer from the options given below:**
1. (A) and (B) only.
2. (A), (B) and (C) only.
3. (A), (B), (C) and (D).
4. (B), (C) and (D) only.

**Correct Answer: 1. (A) and (B) only.**

**Solution:**

- (A) is correct: Unsaturated fatty acids are susceptible to polymerization when exposed to heat, oxygen, free radicals, or polar catalysts, all of which trigger reactions that result in linking fatty acid molecules together.
- (B) is correct: During frying, lipids undergo polymerization due to heat, resulting in changes in physical properties such as molecular weight, color, viscosity, and refractive index.

- (C) is incorrect: While polymerization can increase heat transfer to some extent, it doesn't necessarily improve the overall quality of fried foods and it may impact the sensory properties and make oil less safe.
- (D) is incorrect: Polymerization under extreme conditions does not enhance nutritional quality or wholesomeness; actually, it may lead to the formation of potentially harmful compounds, decrease the nutritional value of the oil, and make it less digestible.

Quick Tip

Lipid polymerization happens with heat, oxygen, and free radicals and changes oil properties. It's good for heat transfer but never enhances the nutritional value, and can reduce fried product quality.

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**6. Identify the polar amino acid among the following options.**

1. Isoleucine
2. Asparagine
3. Methionine
4. Tryptophan

**Correct Answer: 2. Asparagine**

**Solution:**

- Polar amino acids are hydrophilic, containing functional groups that can form hydrogen bonds with water.
- Isoleucine, Methionine, and Tryptophan are non-polar or hydrophobic amino acids. They tend to cluster together in the interior of proteins, away from water.
- Asparagine, with its amide group in the side chain, is polar. This makes it highly soluble in water and allows it to interact with other polar molecules within a protein.

Quick Tip

Polar amino acids are hydrophilic because of functional groups that form hydrogen bonds with water. Remember, Asparagine contains an amide group which makes it polar, while Isoleucine, Methionine and Tryptophan are hydrophobic.

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**7. Match List I with List II**

| List I (Food) | List II (Pigment) |
|---|---|
| A. Tomatoes | I. Chlorophyll |
| B. Cherries, blueberries, red grapes | II. Myoglobin |
| C. Green leafy vegetables, capsicum, beans | III. Lycopene |
| D. Meat | IV. Anthocyanins |

**Choose the correct answer from the options given below:**

1. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
2. (A) - (I), (B) - (III), (C) - (II), (D) - (IV)
3. (A) - (I), (B) - (II), (C) - (IV), (D) - (III)
4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

**Correct Answer: 4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)**

**Solution:**

- Tomatoes get their red color from lycopene.
- Cherries, blueberries, and red grapes contain anthocyanins which are responsible for their red, purple, and blue hues.
- Green leafy vegetables, capsicum, and beans owe their green color to chlorophyll.
- Meat gets its red color due to myoglobin, an iron-containing protein.

Quick Tip

Connect the colors with the pigments: Lycopene for tomatoes (red), Anthocyanins for berries/grapes (red/blue), Chlorophyll for green vegetables, and Myoglobin for meat (red).

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**8. Identify the aldehydic compound which is a major contributor to the flavour of chocolate.**

1. Geranial
2. Benzaldehyde
3. 5-methyl-2-phenyl-2-hexenal
4. Acetaldehyde

**Correct Answer: 3. 5-methyl-2-phenyl-2-hexenal**

**Solution:**

- Geranial is found in lemon and lemongrass.
- Benzaldehyde is found in almonds.

- 5-methyl-2-phenyl-2-hexenal is a key component that imparts the characteristic aroma and flavor of chocolate.
- Acetaldehyde is found in fruits and alcoholic beverages and gives them specific flavors and aromas.

Quick Tip

The distinct flavor of chocolate comes from 5-methyl-2-phenyl-2-hexenal. Remember this specific compound is uniquely linked to the flavor of chocolate.

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**9. If xerosis of conjunctiva is left untreated, it can lead to _____, which is characterized by ulceration, cloudiness and bacterial infection.**

1. Bitot spot
2. Keratomalacia
3. Tetany
4. Cretinism

**Correct Answer: 2. Keratomalacia**

**Solution:**

- Xerosis of conjunctiva is dryness of the conjunctiva, which is the membrane lining the eyelids and covering the white part of the eye.
- If left untreated, this dryness can progress to keratomalacia, which is a degenerative eye disorder characterized by corneal ulceration, cloudiness, and bacterial infection.
- Bitot spot is a symptom of vitamin A deficiency but does not directly result from untreated xerosis of conjunctiva.
- Tetany is a condition characterized by muscle spasms due to low blood calcium.
- Cretinism is a condition caused by iodine deficiency which results in improper growth and development

Quick Tip

Untreated xerosis (dryness) of conjunctiva leads to keratomalacia, an eye disorder characterized by corneal damage, cloudiness, and infection.

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**10. Heat penetration in processing can be hastened by which of the following option?**

1. Using glass containers
2. Rotation and agitation
3. Layering of foods
4. Using larger cans

**Correct Answer: 2. Rotation and agitation**

**Solution:**

- Using glass containers, layering of foods, and using larger cans can hinder heat penetration.
- Rotation and agitation are used to promote heat transfer throughout the food product by creating convection currents. This helps to distribute heat more uniformly and quickly, thus reducing processing time.

Quick Tip

Rotation and agitation speed up heat penetration by creating convection currents, helping distribute heat evenly in food processing. Larger containers and layering tend to hinder heat transfer.

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**11. Pseudomonas grows well in food containing**

1. Nitrates
2. Vitamins
3. Antibiotics
4. Organic acid

**Correct Answer: 1. Nitrates**

**Solution:**

- Pseudomonas are known to utilize nitrates as a nitrogen source for growth and can therefore thrive in foods that contain nitrates.
- While Pseudomonas can use vitamins as well, it is not the primary growth factor.
- They are generally inhibited by antibiotics
- Organic acids may hinder the growth

Quick Tip

Pseudomonas thrives in Nitrate rich environment, utilizing nitrates as a nitrogen source for growth.

**12. These soil molds are similar to Mucor except that the zygospore suspensors are markedly unequal in size**

1. Rhizopus
2. Thamnidium
3. Absidia
4. Zygorrhynchus

**Correct Answer: 4. Zygorrhynchus**

**Solution:**

- Zygorrhynchus are characterized by having zygospore suspensors that are markedly unequal in size.
- Rhizopus, Thamnidium, and Absidia, although similar to Mucor, don't share this specific feature regarding zygospore suspensors.

Quick Tip

Zygorrhynchus is distinguished from similar molds like Mucor, Rhizopus, Thamnidium, and Absidia by markedly unequal suspensors for its zygospores.

**13. A predominant soil organism, it is inert in most foods. Some species can grow at 5°C and would be considered psychrotrophs**

1. Genus Bacillus
2. Genus Acetobacter
3. Genus Arthrobacter
4. Genus Clostridium

**Correct Answer: 3. Genus Arthrobacter**

**Solution:**

- Arthrobacter is a genus of soil-dwelling bacteria that are psychrotrophic and are inert in most foods.
- Bacillus and Clostridium species can grow at various temperatures and are not particularly psychrotrophs.
- Acetobacter is mostly associated with the production of acetic acid.

Quick Tip

Arthrobacter is known as a psychrotrophic soil organism that is mostly inert in food products. Psychrotrophs grow at low temperatures.

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**14. Cole crops include which of the following vegetable?**

1. Kale
2. Eggplant
3. Radish
4. Tomato

**Correct Answer: 1. Kale**

**Solution:**

- Cole crops are a group of vegetables belonging to the Brassica oleracea species. This includes vegetables such as cabbage, broccoli, cauliflower, kale, etc.
- Eggplant, Radish, and Tomato belong to a different plant family and are not considered Cole crops.

Quick Tip

Cole crops are vegetables from the Brassica oleracea species, which includes Kale, not eggplant, radish, or tomato.

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**15. Anti-carcinogenic effect of cauliflower is due to the high content of which substance**

1. Phosphates
2. Glucosilonates
3. Inosine
4. Fibrin

**Correct Answer: 2. Glucosilonates**

**Solution:**

- Glucosinolates, found in cauliflower and other cruciferous vegetables, have been associated with anti-carcinogenic effects by inducing enzymes that detoxify carcinogenic substances.
- Phosphates, Inosine and Fibrin are not the main substances responsible for the anti-carcinogenic effects found in cauliflower.

Quick Tip

Cauliflower's anti-carcinogenic effects are attributed to Glucosinolates. These compounds play a key role in detoxifying harmful substances.

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**16. Grains of some cereals are covered in caryopsis and in addition have fused palea and lemma which constitute the husk outside the fruit coat. The example of such cereal is**

1. Wheat
2. Rye
3. Maize
4. Barley

**Correct Answer: 4. Barley**

**Solution:**

- Barley is a cereal grain in which the palea and lemma are fused together and to the caryopsis (fruit coat).
- This structure forms a husk that is very tightly connected to the grain.
- Wheat, Rye, and Maize do not have the same kind of fused lemma and palea.

Quick Tip

Barley grains have a fused palea and lemma, forming a tight husk outside the fruit coat, which is not typical in wheat, rye, or maize.

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**17. The preparation of ice cream is done in following order**

(A). The mix are passed through freezer and temperature of the mix comes down to -5.5°C
(B). Mix is pasteurized at 71°C for 30 min. or HTST pasteurized at 82°C for 25 sec
(C). Liquid constituents are heated to 43°C, sugar and dry ingredients are added to the warm liquid
(D). The mix is homogenized and aged for 4 to 24 hours
**Choose the correct answer from the options given below:**
1. (A), (B), (D), (C).
2. (A), (B), (C), (D).
3. (B), (A), (D), (C).
4. (C), (B), (D), (A).

**Correct Answer: 4. (C), (B), (D), (A).**

**Solution:**

- First, (C) the liquid ingredients are heated, and dry ingredients are added to form a liquid mix.
- Next (B) the mix is pasteurized to destroy pathogens.
- Then (D) the pasteurized mix is homogenized and aged to develop flavor and texture.
- Finally (A), the mix is passed through a freezer to freeze it.

Quick Tip

Ice cream making starts with mixing, then pasteurizing for safety, homogenizing and aging for flavor, and finally, freezing to set the product. The correct sequence is C, B, D, A

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

Assertion (A): Stabilizers are used to prevent the formation of ice crystals during freezing.
Reason (R): Stabilizers form gels with the water in the formula and thereby improve the body and texture of the ice cream.
In light of the above statements, choose the correct answer from the options given below.
1. Both (A) and (R) are true and (R) is the correct explanation of (A).
2. Both (A) and (R) are true but (R) is NOT the correct explanation of (A).
3. (A) is true but (R) is false.
4. (A) is false but (R) is true.

**Correct Answer: 1. Both (A) and (R) are true and (R) is the correct explanation of (A).**

**Solution:**

- Assertion (A) is correct as stabilizers help prevent ice crystal formation which makes ice cream smoother.
- Reason (R) is also correct as stabilizers function by binding water molecules and forming gels which improves the overall texture, and preventing large ice crystal formation
- Since the mechanism mentioned in reason is responsible for assertion, it is the correct explanation of (A)

Quick Tip

Stabilizers in ice cream work by binding water and forming gels, this prevents ice crystal formation and improves the texture and body of the ice cream.

**19. Ghee is the clarified butter fat obtained from cow or buffalo milk, produced by heat desiccation of makkhan (butter) at temperature of**

1. 90-95°C
2. 105-110°C
3. 120-125°C
4. 130-135°C

**Correct Answer: 2. 105-110°C**

**Solution:**

- Ghee production is a process where butter is heated to remove water and milk solids, leaving behind clarified butterfat.
- The temperature for this desiccation process typically ranges between 105 to 110°C.

Quick Tip

Ghee is produced by heating butter to 105-110°C to remove water and milk solids. Remember this specific temperature range for the clarified butterfat.

**20. The starter composition for Blue-vein cheese is**

1. Lactococcus lactis, S.cremoris
2. Pencillium roqueforti and P.glaucum
3. S.lactis, Pencillium camemberti
4. Geotrichum candidum

**Correct Answer: 2. Pencillium roqueforti and P.glaucum**

**Solution:**

- Penicillium roqueforti and Penicillium glaucum are the key molds used in making blue-veined cheeses such as Roquefort and Gorgonzola.
- Lactococcus lactis and S.cremoris are primarily used in the production of cheddar and other cheeses, not in the formation of blue veins.
- Penicillium camemberti is used in the production of soft cheeses like camembert, not blue cheese.
- Geotrichum candidum is used in surface-ripened cheeses and does not produce blue veins

Quick Tip

The blue veins in cheeses are formed by Penicillium roqueforti and Penicillium glaucum.

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**21. Select the sequence for butter preparation**
(A). Cream is pasteurized at 62.8°C for 30 min.
(B). Churning
(C). Ripening of cream at 21.1°C for several hours
(D). Draining off buttermilk
**Choose the correct answer from the options given below:**
1. (A), (B), (C), (D).
2. (A), (C), (B), (D).
3. (B), (A), (D), (C).
4. (C), (B), (D), (A).

**Correct Answer: 2. (A), (C), (B), (D).**

**Solution:**

- First, (A) Cream is pasteurized to kill harmful bacteria and inactivate enzymes that may lead to spoilage.
- Then (C) the cream is ripened by allowing lactic acid bacteria to ferment and develop the desired flavor and acidity. This step involves holding the cream at a suitable temperature for several hours.
- Next, (B) the cream is churned, which is a mechanical agitation process that leads to separation of fat globules from the liquid.
- Finally, (D) buttermilk is drained off, which is the liquid portion remaining after the butter fat has been separated.

Quick Tip

The butter-making process starts with pasteurization, followed by ripening to develop flavor, then churning to separate butter from buttermilk, and finally draining the buttermilk away. The correct sequence is A, C, B, D.

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**22. Completion of pasteurization of milk is ascertained by testing for the alkaline phosphatase activity in milk. The enzyme liberates phenol from phenyl phosphate. The liberated phenol gives what colour in milk**

1. Yellow
2. Green

3. Red
4. Blue

**Correct Answer: 4. Blue**

**Solution:**

- The alkaline phosphatase test is used to check the effectiveness of pasteurization in milk.
- The enzyme alkaline phosphatase is inactivated by proper pasteurization, if enzyme is still active it liberates phenol from phenyl phosphate substrate.
- The presence of phenol is detected using a reagent that produces a blue color in alkaline conditions when it reacts with the liberated phenol.
- A red color is not associated with the alkaline phosphatase test in milk pasteurization.

Quick Tip

The presence of alkaline phosphatase activity is confirmed through a blue color. This indicates incomplete pasteurization of milk.

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**23. Sandiness in ice-cream is due to**

1. Whey
2. Casein
3. Lactose
4. Lipids

**Correct Answer: 3. Lactose**

**Solution:**

- Sandiness in ice cream is caused by the crystallization of lactose, which is a milk sugar.
- When lactose concentration is too high or during improper storage, lactose crystals grow and impart a gritty, sandy texture to the ice cream.
- Whey, casein, and lipids also affect the properties of ice cream, but they are not the primary cause of sandiness.

Quick Tip

Lactose crystallization causes the sandiness in ice cream. If not controlled it will give the gritty texture.

**24. Cans can also be made from TFS, also known as**

1. Electrolytically chlorine-lead coated steel
2. Electrolytically chromium-coated steel
3. Electrolytically chlorine-coated steel
4. Electrolytically chlorine-zinc coated steel

**Correct Answer: 2. Electrolytically chromium-coated steel**

**Solution:**

- TFS stands for Tin-Free Steel which is also known as Electrolytically chromium-coated steel.
- It is used in can manufacturing due to its good corrosion resistance, cost-effectiveness, and ability to provide a suitable surface for coatings.
- Electrolytically chlorine-lead coated, chlorine-coated steel, and chlorine-zinc coated steel are not standard terms for TFS material in canning.

Quick Tip

TFS is Tin-Free Steel, and is known as electrolytically chromium-coated steel. It is used due to good corrosion resistance.

**25. Paper is generally termed board when its gram-mage exceeds**

1. 154 gsm
2. 184 gsm
3. 204 gsm
4. 224 gsm

**Correct Answer: 4. 224 gsm**

**Solution:**

- The term "board" is used for paper products that are thicker and heavier than normal paper.
- Generally, when the gram-mage (weight per unit area) of the paper exceeds 224 gsm, it is classified as board.

Quick Tip

Paper is categorized as board when its gram-mage is above 224 gsm. This weight indicates that the paper is thicker and heavier.

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**26. During MAP of fatty fish, gas composition should be**

1. 40% $N_2$, 60% $CO_2$
2. 60% $N_2$, 40% $CO_2$
3. 30% $N_2$, 40% $CO_2$, 30% $O_2$
4. 40% $CO_2$, 60% $0_2$

**Correct Answer: 1. 40% $N_2$, 60% $CO_2$**

**Solution:**

- Modified Atmosphere Packaging (MAP) for fatty fish typically uses a specific gas mix to inhibit spoilage and preserve quality.
- A common gas composition is 40% Nitrogen ($N_2$) and 60% Carbon Dioxide ($CO_2$).
- $N_2$ acts as a filler gas, while $CO_2$ inhibits microbial growth and slows down enzymatic reactions.
- Using higher percentages of oxygen are avoided for fatty fish to prevent oxidative rancidity

Quick Tip

A typical gas mix for MAP of fatty fish is 40

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**27. Among the following which is NOT an inhibitor of polyphenol oxidase**

1. Pineapple juice
2. Sulphites
3. Ascorbic acid
4. Pectinic acid

**Correct Answer: 4. Pectinic acid**

**Solution:**

- Polyphenol oxidase (PPO) is an enzyme that causes browning in fruits and vegetables. Inhibiting PPO is essential to prevent this reaction.
- Pineapple juice contains bromelain, which inhibits PPO activity by proteolysis

- Sulphites are chemical inhibitors that interfere with PPO activity
- Ascorbic acid is an antioxidant which reduces the quinones back to phenols inhibiting the browning reaction
- Pectinic acid does not inhibit PPO, rather it acts as a gelling agent in plant cell walls

Quick Tip

Pectinic acid does not inhibit polyphenol oxidase but it is a gelling agent in plant cell walls whereas, pineapple juice, sulphites, and ascorbic acid do inhibit PPO.

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**28. Match List I with List II**

| **List I**<br>Radiant Energy | **List II**<br>Wavelength (nm) |
|---|---|
| A. Infrared | I. less than 100 |
| B. UV | II. 13.6-400 |
| C. X-rays | III. 800 |
| D. Gamma rays | IV. 100-150 |

**Choose the correct answer from the options given below:**

1. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
2. (A) - (I), (B) - (III), (C) - (II), (D) - (IV)
3. (A) - (III), (B) - (II), (C) - (IV), (D) - (I)
4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

**Correct Answer: 3. (A) - (III), (B) - (II), (C) - (IV), (D) - (I)**

**Solution:**

- Infrared radiation has a wavelength greater than 700 nm, which in this list most closely matches 800 nm.
- UV (ultraviolet) radiation has a wavelength of 10 nm to 400 nm, so matching with 13.6 to 400 nm.
- X-rays have very short wavelengths ranging from 0.01 nm to 10 nm, which in the range is closest to 100-150 nm on this list.
- Gamma rays have the shortest wavelengths (less than 0.01 nm) and is matched with less than 100 nm.

Quick Tip

Connect the type of radiation with its wavelength range, infrared (800 nm), UV (13.6-400 nm), X-rays (100-150 nm), and gamma rays (¡100 nm) .

**29. Which of the following is NOT a unit of radiation**

1. Gray
2. Roentgen
3. Electron volt
4. Electron amstrong

**Correct Answer: 4. Electron amstrong**

**Solution:**

- Gray is the SI unit of absorbed dose of ionizing radiation
- Roentgen is the traditional unit of radiation exposure
- Electron volt (eV) is a unit of energy used in atomic and nuclear physics to denote the amount of kinetic energy gained by a single electron accelerating from rest through an electric potential difference of one volt.
- Electron amstrong is a measurement of length, not a unit of radiation and does not have any direct application in measuring any aspect of radiation

Quick Tip

Gray, Roentgen, and Electron volt are units used in measuring radiation. However, Electron amstrong is a unit of length, not a unit of radiation.

**30. The choice of irradiation dosage of food is determined by taking into account various factors. The factors are**

(A). Resistance of food enzymes
(B). Resistance of microorganisms
(C). Resistance of food to deterioration of organoleptic quality
(D). Resistance of food to moisture absorption

**Choose the correct answer from the options given below:**
1. (A), (B) and (D) only.
2. (A), (B) and (C) only.
3. (A), (B), (C) and (D).
4. (B), (C) and (D) only.

**Correct Answer: 3. (A), (B), (C) and (D).**

**Solution:**

- The resistance of food enzymes, resistance of microorganisms, the resistance of food to deterioration of organoleptic quality (such as changes in flavor, color, texture, etc) and the resistance of food to moisture absorption are all important factors when determining the appropriate irradiation dose for foods.

Quick Tip

Irradiation dosage for foods is determined by considering all factors such as food enzyme resistance, microbial resistance, food's organoleptic quality and food's moisture absorption.

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

Assertion (A): Steak can be crusted on outside but still be rare on inside.
Reason (R): In conventional heating, direct contact with hot plate produces temperature gradient which can burn outside of food piece.

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

1. Both (A) and (R) are true and (R) is the correct explanation of (A).
2. Both (A) and (R) are true but (R) is NOT the correct explanation of (A).
3. (A) is true but (R) is false.
4. (A) is false but (R) is true.

**Correct Answer: 1. Both (A) and (R) are true and (R) is the correct explanation of (A).**

**Solution:**

- Assertion (A) is correct; when cooking steak, the exterior can develop a crust while the interior remains relatively rare.
- Reason (R) explains this phenomenon as the heat is directly transferred through the hot surface, creating a strong temperature gradient that burns the outside before heat reaches inside.
- The reason (R) is indeed the explanation of assertion (A).

Quick Tip

The crust formation on steak while keeping inside rare occurs due to the heat gradient created by direct contact with a hot surface; the reason statement is the actual explanation for the observation given in the assertion.

---

**32. Match List I with List II**

| List I | List II |
|---|---|
| Composition of Cereal Grain | % |
| A. Moisture | I. 8-13 |
| B. Carbohydrate | II. 2-5 |
| C. Protein | III. 58-72 |
| D. Fat | IV. 10-14 |

**Choose the correct answer from the options given below:**

1. (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
2. (A) - (IV), (B) - (III), (C) - (II), (D) - (I)
3. (A) - (IV), (B) - (III), (C) - (I), (D) - (II)
4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

**Correct Answer: 4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)**

**Solution:**

- Moisture content in cereal grains generally ranges between 8 to 13
- Carbohydrate makes up the largest proportion of most cereals and typically ranges from 58 to 72
- Protein content in cereals is usually between 8 to 13
- Fat content ranges from 2 to 5

Quick Tip

Know that cereal grains mostly contain carbohydrates (58-72

---

**33. The structural feature of cereal rich in oil are**

(A). Hull
(B). Bran
(C). Endosperm
(D). Hairs of brush

**Choose the correct answer from the options given below:**

1. (A) and (B) only.
2. (B) and (C) only.
3. (C) and (D) only.
4. (A) and (D) only.

**Correct Answer: 2. (B) and (C) only.**

**Solution:**

- The bran and endosperm are the structural features where lipids are primarily located in the cereal grains

- Bran contains high amounts of oils, especially in grains like rice and wheat.
- Endosperm in grains like corn also contains good amounts of oils
- The hull is the outermost covering of the seed and is not known for oil content.
- Hairs of brush are also a minor part of the plant structure.

Quick Tip

The oil-rich parts of cereals are located in the bran and endosperm. Hull and Hairs of brush are minor parts and are not rich in oils.

---

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

Assertion (A): Hard wheat yields softer flour.
Reason (R): Soft wheat is used for cake making.
In light of the above statements, choose the correct answer from the options given below.
1. Both (A) and (R) are true and (R) is the correct explanation of (A).
2. Both (A) and (R) are true but (R) is NOT the correct explanation of (A).
3. (A) is true but (R) is false.
4. (A) is false but (R) is true.

**Correct Answer: 4. (A) is false but (R) is true.**

**Solution:**

- Assertion (A) is incorrect; actually, hard wheat yields a coarser and stronger flour.
- Reason (R) is correct; soft wheat is usually used to make cakes because it gives a soft and tender texture.
- Therefore, reason (R) is true, and assertion (A) is false.

Quick Tip

Remember the relation: Hard wheat yields stronger flour, while soft wheat produces tender and finer flour which is suitable for cake making.

---

**35. The process of grinding flour from conventional milling in high speed turbo grinders is**

1. Grinding
2. Turbomilling

3. Shelling
4. Dehusking

**Correct Answer: 2. Turbomilling**

**Solution:**

- Turbomilling refers to the process of using high-speed turbo grinders to achieve a more refined milling action. This method is used to produce very fine particles of flour.
- While, grinding is a general term for reducing particle size, it doesn't specify the type of equipment used.
- Shelling and dehusking are terms that are used to remove the outer coverings, not for milling flour.

Quick Tip

Use Turbomilling when discussing high-speed turbo grinders in flour milling. This process gives the fine particle size.

---

**36. The process of paste formation when moistened starch is heated is called**

1. Dextrinization
2. Retrogradation
3. Gelatinisation
4. Caramelisation

**Correct Answer: 3. Gelatinisation**

**Solution:**

- Gelatinization is the process where starch granules swell and absorb water when heated in a moist environment. This causes them to lose their crystalline structure, leading to paste formation.
- Dextrinization is the breakdown of starch molecules by dry heat, not the formation of paste.
- Retrogradation is the reorganization of starch molecules that results in the formation of a gel
- Caramelization is the browning of sugars when heated.

Quick Tip

Moist starch forms a paste due to gelatinization. The process involves the swelling of granules and the formation of a gel structure.

---

**37. The following is a type of Contact heat exchanger**

1. Scraped surface
2. Tubular
3. Plate
4. Steam infusion

**Correct Answer: 4. Steam infusion**

**Solution:**

- Steam infusion involves direct contact between steam and the material, making it a direct contact heat exchanger.
- Scraped surface heat exchangers, while having contact between the surface and the material, are indirect contact devices since heat is transferred through the surface.
- Tubular and plate heat exchangers, are indirect contact devices.

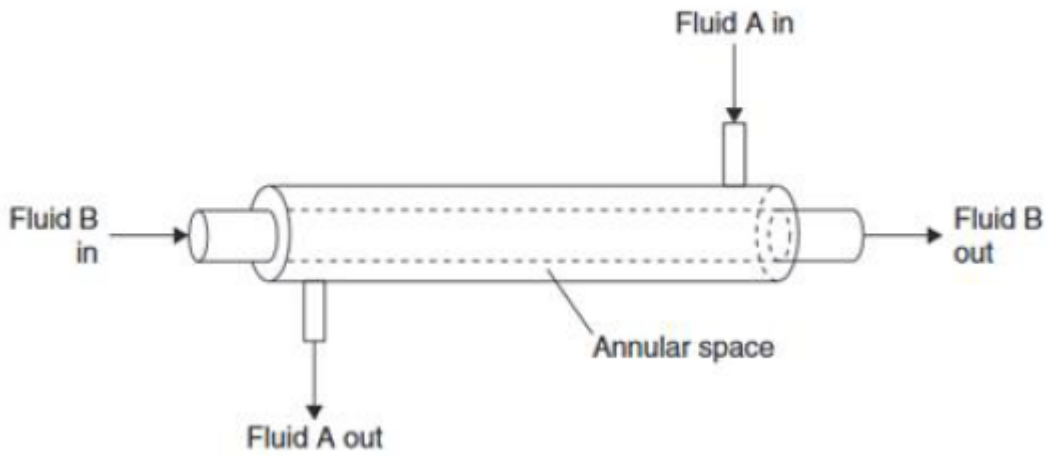
Quick Tip

Steam infusion is a direct contact heat exchanger type. Scraped surface, tubular and plate are indirect contact type.

---

**38. Identify the equipment shown in figure**

Identify the equipment shown in figure




1. Shell and tube heat exchanger
2. Steam infusion heat exchanger
3. Tubular heat exchanger
4. Plate heat exchanger

**Correct Answer: 3. Tubular heat exchanger**

**Solution:**

- The diagram describes a tubular heat exchanger, where one fluid flows through a tube and another fluid flows in an annular space or multiple tubes within a larger tube.
- A shell and tube heat exchanger is a specific type of tubular heat exchanger where fluid flows through many tubes within a shell.
- A steam infusion heat exchanger directly introduces steam into the material and thus would not have separate inlets and outlets for two fluids.
- A plate heat exchanger uses flat plates instead of tubes.

Quick Tip

A tubular heat exchanger has one fluid flowing inside a tube while another fluid flows around it in an annular space or multiple tubes in a larger tube.

---

**39. The law governing heat transfer by conduction is**

1. Newton's law
2. Fourier's law

3. Fick's law
4. Stefan Boltzmann law

**Correct Answer: 2. Fourier's law**

**Solution:**

- Fourier's Law describes the heat transfer through conduction, quantifying the rate of heat transfer through a medium proportional to the temperature gradient.
- Newton's law describes convection heat transfer.
- Fick's law relates to mass transfer (diffusion), not heat transfer.
- The Stefan-Boltzmann law defines the amount of energy radiated by a black body and describes radiative heat transfer.

Quick Tip

Fourier's Law is for heat transfer by conduction, while Newton's law is for convection. Fick's law is for diffusion, and Stefan-Boltzmann Law is for radiative heat transfer.

---

**40. Enthalapy of dry air is given by the expression**

1. Ha=1.005(Ta-To)
2. Ha=0.005(Ta-To)
3. Ha=1.88(Ta-To)
4. Ha=2501.4+1.88(Ta-To)

**Correct Answer: 1. Ha=1.005(Ta-To)**

**Solution:**

- The enthalpy of dry air (Ha) is calculated as 1.005 multiplied by the temperature difference (Ta - To), where Ta is temperature of dry air and To is temperature at reference point.
- Other formulas given are either enthalpy of steam or wet air

Quick Tip

The Enthalpy of dry air, Ha is calculated using the formula Ha = 1.005(Ta - To).

---

**41. The water vapor in the air will be saturated when air is at a temperature equal to**

1. Saturation pressure corresponding to the partial pressure exerted by the water vapor
2. Saturation temperature corresponding to the partial pressure exerted by the dry air
3. Saturation temperature corresponding to the partial pressure exerted by the water vapor
4. Saturation pressure corresponding to the partial pressure exerted by the dry air

**Correct Answer: 3. Saturation temperature corresponding to the partial pressure exerted by the water vapor**

**Solution:**

- Air becomes saturated with water vapor when the air's temperature reaches the point where the air can no longer hold more water vapor.
- This point is known as the saturation temperature which corresponds to the partial pressure exerted by the water vapor itself in air.
- Once saturation temperature is reached, water vapor will condense to liquid.

Quick Tip

Air is saturated with water vapor when the temperature matches the saturation temperature related to the water vapor partial pressure.

---

**42. The psychrometric wet bulb temperature is obtained**

1. When the bulb of a mercury thermometer is unmodified
2. When the bulb of a mercury thermometer is dipped in 0.1N NaCl
3. When the bulb of a mercury thermometer is dipped in 0.01 N NaCl
4. When the bulb of a mercury thermometer is covered with a wet wick

**Correct Answer: 4. When the bulb of a mercury thermometer is covered with a wet wick**

**Solution:**

- The wet-bulb temperature is measured by covering the bulb of a mercury thermometer with a wet wick and then exposing it to air.
- As the water from wick evaporates, it causes a cooling effect, and the thermometer will show a lower temperature than the dry-bulb temperature.
- Dipping the thermometer in saline solutions is not the process to measure wet-bulb temperature.

Quick Tip

Wet-bulb temperature is measured by a mercury thermometer covered by a wet wick. This setup allows for evaporative cooling.

---

**43. The chart that is used to determine the boiling point of the solutions of given concentrations is known as:**

1. Duhring chart
2. Psychometric chart
3. Refrigerant 12 chart
4. Steam chart

**Correct Answer: 1. Duhring chart**

**Solution:**

- A Duhring chart is specifically designed to determine the boiling point of solutions of known concentrations at different pressures. It plots the boiling points of two different solutions against each other.
- A psychometric chart is used to determine the properties of air such as humidity.
- A refrigerant 12 chart is related to the thermodynamic properties of refrigerants.
- A steam chart provides information about steam properties such as enthalpy, entropy, and temperature.

Quick Tip

Use a Duhring chart to find boiling points of solutions at different concentrations, it is a specific chart for boiling point determination.

---

**44. The removal of moisture from a typical food product will follow a series of drying rates. Identify the various stages**

(A). Initial Adjustment
(B). Constant Rate
(C). Falling rate
(D). Logarithmic Rate

**Choose the correct answer from the options given below:**
1. (A), (B) and (D) only.
2. (A), (B) and (C) only.

3. (A), (B), (C) and (D).
4. (B), (C) and (D) only.

**Correct Answer: 2. (A), (B) and (C) only.**

**Solution:**

- The typical drying process consists of: Initial Adjustment stage where the food is equilibrating with the environment, constant rate period where water evaporates at a consistent rate, and falling rate period where drying slows down as moisture gets less available.
- Logarithmic rate is not a standard phase of the drying process. The falling rate can be in logrithmic fashion but it's not a specific stage.

Quick Tip

Drying involves three stages: Initial adjustment, constant rate, and falling rate. The falling rate can be in a logrithmic manner but it's not considered a separate stage.

---

**45. The Drying process that results in moisture removal by Sublimation is**

1. Vacuum Drying
2. Freeze Drying
3. Foam mat drying
4. Spray Drying

**Correct Answer: 2. Freeze Drying**

**Solution:**

- Freeze Drying, also known as lyophilization, is a dehydration process where moisture is removed by sublimation.
- In freeze-drying, the food product is first frozen and then the ice is sublimed at low temperatures under vacuum.
- Vacuum drying removes water through evaporation, not sublimation.
- Foam-mat drying uses air to remove moisture after the product is foamed.
- Spray drying uses hot air to evaporate liquid and moisture.

Quick Tip

Freeze drying utilizes sublimation, where water goes directly from solid to gas to remove moisture. Other drying methods employ evaporation.

**46. The constant-rate drying period occurs with the product at the**

1. Equilibrium Relative Humidity
2. Dry bulb temperature of the air
3. wet bulb temperature of the air
4. Dew point temperature

**Correct Answer: 3. wet bulb temperature of the air**

**Solution:**

- The constant-rate drying period occurs when water evaporates from the surface of the food at a steady rate.
- During this phase, the food product is at a temperature that is close to the wet-bulb temperature of the air.
- At this point, the energy used to evaporate moisture is balanced by energy transferred to the surface of the material by the air.

Quick Tip

During constant-rate drying, the product's temperature remains near the wet-bulb temperature of the air, which is the temperature that is measured when water is evaporating steadily from the surface.

---

**47. Concentration Gradient is the key driving force in which of the following Membrane processes**

1. Reverse Osmosis
2. Ultrafiltration
3. Dialysis
4. Nanofiltration

**Correct Answer: 3. Dialysis**

**Solution:**

- Dialysis uses a concentration gradient as the key driving force that moves molecules from higher to lower concentrations across a membrane.
- Reverse osmosis involves applying pressure to overcome osmotic pressure and force water molecules across the membrane.
- Ultrafiltration and nanofiltration use pressure as the primary driving force.

Quick Tip

Dialysis depends on the concentration gradient as its main driving force to separate substances by size, whereas other filtration methods (RO, Ultrafiltration, Nanofiltration) use pressure as their main driving force.

---

**48. The major types of membrane devices used for reverse-osmosis and ultrafiltration systems are:**

(A) Plate-and-frame
(B). Tubular
(C). Spiral-wound
(D). Hollow-fiber.
**Choose the correct answer from the options given below:**
1. (A), (B) and (D) only.
2. (A), (B) and (C) only.
3. (A), (B), (C) and (D).
4. (B), (C) and (D) only.

**Correct Answer: 3. (A), (B), (C) and (D).**

**Solution:**

- All of the listed membrane devices are used in both RO and Ultrafiltration systems.
- Plate-and-frame devices are made of flat sheets separated by spacers.
- Tubular devices use a cylindrical configuration.
- Spiral-wound devices consist of membrane sheets rolled around a central tube.
- Hollow-fiber devices use a bundle of fine tubes.

Quick Tip

Common membrane devices for both reverse-osmosis and ultrafiltration include plate-and-frame, tubular, spiral-wound, and hollow-fiber configurations.

---

**49. In a multi-effect evaporator, steam is supplied externally as a source of heat**

1. Only in the first effect.
2. Only in the first and last effect.
3. In all the effects
4. In No effect

**Correct Answer: 1. Only in the first effect.**

**Solution:**

- In a multi-effect evaporator, the external steam is supplied only to the first effect.
- The vapor generated in the first effect is then used as a heating source for the second effect, and so on.

Quick Tip

In a multi-effect evaporator, external steam is only supplied to the first effect. The vapor from the first effect is then utilized to heat the subsequent effects

---

**50. One of the simplest and perhaps oldest types of evaporators used in the food industry is**

1. Rising film evaporator
2. Falling film evaporator
3. Batch-type pan evaporator,
4. Rotary Vacuum evaporator

**Correct Answer: 3. Batch-type pan evaporator**

**Solution:**

- The batch-type pan evaporator is one of the simplest and oldest types of evaporators. It consists of a large open pan that is heated to evaporate the liquid.
- Rising-film and falling-film evaporators are more sophisticated types.
- Rotary vacuum evaporators operate at reduced pressures, a different approach to evaporation.

Quick Tip

The batch-type pan evaporator is one of the oldest and simplest types of evaporators because of its very simple design, that has been used for centuries in different applications.

---

**51. Streptococcus lactis causes**

1. no spoilage of milk
2. production of antibiotics
3. color change in milk

4. no color change in milk

**Correct Answer: 4. no color change in milk**

**Solution:**

- Streptococcus lactis is a lactic acid bacteria.
- They are beneficial for dairy products as they do not spoil milk. They produce lactic acid during fermentation that helps in food preservation.
- They are not known for producing antibiotics or causing significant color change in milk.

Quick Tip

Streptococcus lactis doesn't cause spoilage or color change in milk. They produce lactic acid by fermentation which helps in preservation.

---

**52. A dry food like bread is most likely to be spoilt by**

1. Molds
2. Yeasts
3. Thermophilic bacteria
4. Mesophilic bacteria

**Correct Answer: 1. Molds**

**Solution:**

- Molds are known to grow in dry and less moist environment and can survive on low water activity and can grow well on dry foods like bread.
- Yeasts typically need more moisture and a higher water activity for growth.
- Thermophilic bacteria grow at higher temperature.
- Mesophilic bacteria thrive at moderate temperatures with moist conditions.

Quick Tip

Molds are more likely to spoil dry foods like bread due to their ability to grow in low-moisture conditions.

---

**53. The rapid and constant rate of multiplication of an organism occurs during the**

1. Lag Phase
2. Exponential Phase
3. Stationary Phase
4. Decline Phase

**Correct Answer: 2. Exponential Phase**

**Solution:**

- In the exponential phase (or log phase), microorganisms multiply rapidly and at a constant rate, as they have all the resources that they need to multiply.
- The lag phase is when the organism is adjusting to its new environment.
- The stationary phase is where the growth slows down because the resources are depleting and the waste products are accumulating.
- The decline phase is when the death rate surpasses the growth rate.

Quick Tip

The exponential phase is the stage where an organism exhibits rapid, constant, and exponential growth.

---

**54. Match List I with List II**

| **List I**<br>(Initial concentration of spores, number/ml) | **List II**<br>(Thermal death time, or time required to kill all spores, min at 120 °C) |
|---|---|
| A. 50,000<br>B. 5,000<br>C. 500<br>D. 50 | I. 9<br>II. 14<br>III. 8<br>IV. 10 |

**Choose the correct answer from the options given below:**

1. (A) - (II), (B) - (IV), (C) - (I), (D) - (III)
2. (A) - (I), (B) - (III), (C) - (II), (D) - (IV)
3. (A) - (I), (B) - (II), (C) - (IV), (D) - (III)
4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

**Correct Answer: 1. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)**

**Solution:**

- A higher spore concentration requires less time for thermal treatment to be effective, as they are clustered together.
- 50,000 spores would have the lowest thermal death time, which is 8 min
- 5,000 spores would have 10 min
- 500 spores will have 9 min
- 50 spores will take 14 mins

> Quick Tip
>
> Remember that higher the initial spore concentration lower the thermal death time at specific temperature and the correct match is A(8 min), B(10 min), C(9 min), D (14 min).

---

**55. Berries and Sauerkraut are classified as**

1. Low-acid foods
2. Medium-acid foods
3. High-Acid foods
4. Acid foods

**Correct Answer: 3. High-Acid foods**

**Solution:**

- High-acid foods have a pH less than 4.6. Both berries and sauerkraut fit into this category because they contain high levels of organic acids.
- Low-acid foods have a pH above 4.6, and medium-acid foods have a pH between 3.7 and 4.6.

> Quick Tip
>
> Berries and sauerkraut are high-acid foods because of their low pH, which is typically below 4.6.

---

**56. Malt foods are prepared by blending**

(A). 40 per cent cereal malt
(B). 40 per cent groundnut flour
(C).10 per cent Bengal gram flour
(D).10 per cent skim milk powder

**Choose the correct answer from the options given below:**
1. (A), (B) and (D) only.
2. (A), (B) and (C) only.
3. (A), (B), (C) and (D).
4. (B), (C) and (D) only.

**Correct Answer: 3. (A), (B), (C) and (D).**

**Solution:**

- Malt foods typically consist of a blend of cereal malt, groundnut flour, Bengal gram flour, and skim milk powder to provide a balance of nutrients and functional properties.
- These ingredients help to make the mixture nutrient rich.

Quick Tip

Malt foods typically include a blend of cereal malt, groundnut flour, Bengal gram flour, and skim milk powder.

---

**57. Match List I with List II**

| **List I** (Nutrient) | **List II** % (Daily value) |
|---|---|
| A. Omega-3 fatty acids | I. 21.6 |
| B. Dietary Fibre | II. 17.5 |
| C. Vitamin B-6 | III. 140.4 |
| D. Magnesium | IV. 9.0 |

**Choose the correct answer from the options given below:**

1. (A) - (III), (B) - (I), (C) - (IV), (D) - (II)
2. (A) - (I), (B) - (III), (C) - (II), (D) - (IV)
3. (A) - (I), (B) - (II), (C) - (IV), (D) - (III)
4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

**Correct Answer: 1. (A) - (III), (B) - (I), (C) - (IV), (D) - (II)**

**Solution:**

- Omega-3 fatty acids are needed in high quantity to show benefit, and their daily value is 140.4.
- Dietary Fiber is needed in 21.6% daily value.
- Vitamin B-6 is needed 9% daily value.

- Magnesium is needed 17.5% daily value.

Quick Tip

Omega-3 fatty acids are needed in high daily value (140.4), dietary fiber in 21.6, Vitamin B-6 and magnesium has 9 and 17.5 respectively.

---

**58. The steps involved in the processing of oil and fats from animal tissues are given below**

(A). Solvent Extraction
(B). Refining
(C). Rendering
(D). Pressing
**Choose the correct sequence of steps from the options given below:**
1. (C), (A), (B), (D).
2. (C), (B), (A), (D).
3. (B), (A), (D), (C).
4. (C), (D), (A), (B).

**Correct Answer: 4. (C), (D), (A), (B).**

**Solution:**

- First, (C) rendering, a process of melting and separating fat tissues,
- Then (D) the melted fat is separated using pressing.
- After that, (A) Solvent extraction, which uses solvents like hexane to remove the oil from remaining solids
- Finally (B) Refining, the extracted oil is processed to improve its quality and characteristics.

Quick Tip

The sequence of oil and fats processing from animal tissues is rendering to melt the fat, pressing to separate solid from liquid, solvent extraction to remove the remaining oil, and refining for purification.

---

**59. The various processing steps in the manufacture of black tea are**

(A). Fermentation
(B). Drying

(C). Rolling
(D). Withering
**Arrange the steps in the correct sequence from the options given below:**
1. (C), (A), (B), (D).
2. (D), (C), (A), (B).
3. (D), (A), (C), (B).
4. (C), (B), (D), (A).

**Correct Answer: 2. (D), (C), (A), (B).**

**Solution:**

- The first step of the black tea manufacturing is (D) Withering which is process where freshly picked leaves are spread to reduce the moisture content.
- The leaves are then (C) rolled to breakdown and release enzymes
- The rolled leaves are then subjected to (A) Fermentation where polyphenols are converted to desired compounds.
- After fermentation, the leaves are subjected to (B) Drying to reduce moisture content to an appropriate level.

Quick Tip

Black tea processing begins with withering, followed by rolling of leaves, then fermentation, and finally drying.

---

**60. Steps in processing of cocoa are:**

(A). Drying of beans
(B). Fermentation
(C). Roasting of beans
(D). Scooping out of beans and mucilage
**Select the correct sequence**
1. (A), (C), (B), (D).
2. (D), (A), (C), (B).
3. (D), (B), (C), (A).
4. (C), (B), (D), (A).

**Correct Answer: 3. (D), (B), (C), (A).**

**Solution:**

- The first step of the cocoa bean processing is (D) Scooping out of beans and mucilage from the cocoa pods.
- Then, beans with mucilage are subjected to (B) Fermentation.

- The beans are then subjected to (C) Roasting, which develops their aroma and flavor.
- Finally, (A) Drying removes the remaining moisture from roasted beans.

Quick Tip

Cocoa bean processing involves: scooping beans from pods, fermenting them with mucilage, roasting for flavor and aroma development, and finally drying.

---

**61. Arrange the sequence of pastry preparation**

(A). Addition of water and working in the dough
(B). Flour and salt are mixed and the fat is cut into the flour
(C). Baking in oven
(D). Shaping of dough
**Choose the correct answer from the options given below:**
1. (A), (D), (C), (B).
2. (B), (A), (D), (C).
3. (B), (A), (C), (D).
4. (C), (B), (D), (A).

**Correct Answer: 2. (B), (A), (D), (C).**

**Solution:**

- First, (B) Flour and salt are mixed and the fat is cut into the flour.
- Next, (A) water is added and the mixture is worked into a dough.
- Then, (D) the dough is shaped as required for the pastry.
- Finally, (C) the shaped pastry is baked in the oven.

Quick Tip

Pastry preparation steps: combine dry ingredients and fat, add water, shape the dough and finally bake it. The sequence is: B, A, D, C.

---

**62. The type of cookies made from refrigerated stiff dough is**

1. Drop cookies
2. Rolled cookies
3. Bar cookies
4. Sponge cookies

**Correct Answer: 2. Rolled cookies**

**Solution:**

- Rolled cookies use a stiff dough that needs to be chilled and then rolled out before cutting into desired shapes.
- Drop cookies are made from soft dough that is dropped directly from a spoon.
- Bar cookies are baked in a pan and cut into bars after baking.
- Sponge cookies are light, airy cookies typically made with whipped eggs.

Quick Tip

Rolled cookies are made with a refrigerated stiff dough that is rolled out and cut before baking. Other cookies use softer dough and different methods.

---

**63. In the preparation of pastry, the proportion of flour, fat and water is**

1. 5:2:1
2. 5:4:1
3. 6:4:1
4. 6:2:1

**Correct Answer: 4. 6:2:1**

**Solution:**

- A common proportion of flour, fat, and water used in pastry making is 6:2:1.
- This proportion gives a good balance of flakiness and structure to the pastry. 6:4:1 is more common for short crust pastry

Quick Tip

The common proportion of flour, fat, and water in pastry is 6:2:1. Remember this balance for flaky pastry.

---

**64. A good chapati is sweetish and palatable and it requires a minimum sugar percent to give the desired characteristic. The minimum sugar percent should be**

1. 0.5%
2. 1.0%

3. 1.5%
4. 2.5%

**Correct Answer: 4. 2.5%**

**Solution:**

- For a chapati to be sweetish and palatable, the minimum sugar content should be around 2.5%.
- This sugar is usually produced by the action of endogenous enzymes during the dough fermentation process

Quick Tip

A minimum of 2.5% sugar content is required in a chapati for a sweetish and palatable taste.

---

**65. Match List I with List II**

| **List I** | **List II** |
|---|---|
| (Type of Fluid) | (Examples.) |
| A. Herschel-Bulkley | I. Some types of honey, 40% raw corn starch solution |
| B. Newtonian | II. Minced fish paste, Raisin paste |
| C. Shear-thinning (pseudoplastic) | III. Honey, milk |
| D. Shear-thickening | IV. Banana purée, orange juice concentrate |

**Choose the correct answer from the options given below:**

1. (A) - (I), (B) - (III), (C) - (II), (D) - (IV)
2. (A) - (I), (B) - (IV), (C) - (II), (D) - (III)
3. (A) - (II), (B) - (III), (C) - (IV), (D) - (I)
4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

**Correct Answer: 3. (A) - (II), (B) - (III), (C) - (IV), (D) - (I)**

**Solution:**

- Herschel-Bulkley fluids exhibit a yield stress, where they need a threshold shear stress to initiate flow, fluids like minced fish paste and raisin paste.
- Newtonian fluids have a linear relationship between stress and shear rate, fluids like honey and milk are good examples

- Shear-thinning (pseudoplastic) fluids become less viscous under shear stress, such as banana puree and orange juice concentrate.
- Shear-thickening fluids become more viscous under shear stress, examples are some types of honey and raw corn starch solutions.

Quick Tip

Connect fluid types with examples: Herschel-Bulkley (minced fish/raisin paste), Newtonian (honey, milk), Shear-thinning (banana purée, juice concentrate), and Shear-thickening (honey, corn starch solutions).

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**66. Phenomenon in which a substance occurs in different crystalline forms ?**

1. Rancidity
2. Polymorphism
3. Polymerization
4. Denaturation

**Correct Answer: 2. Polymorphism**

**Solution:**

- Polymorphism refers to the ability of a solid material to exist in multiple crystalline forms.
- Rancidity refers to the spoilage of oils or fats,
- Polymerization is the combination of monomers to form large polymers
- Denaturation is the change in the structure of a protein

Quick Tip

Polymorphism is the property of a substance to have multiple crystalline forms.

---

**67. Processes that take place during caramelization reaction are**

(A). Isomerization
(B). Inversion of sucrose
(C). Putrefaction
(D). Condensation reactions
**Choose the correct answer from the options given below:**
1. (A), (B) and (D) only.
2. (A), (B) and (C) only.

3. (A), (B), (C) and (D).
4. (B), (C) and (D) only.

**Correct Answer: 1. (A), (B) and (D) only.**

**Solution:**

- Caramelization is a complex process which involves sugars being heated to high temperatures, where several reactions take place.
- Isomerization converts one form of sugar into another.
- Inversion of sucrose into glucose and fructose is a step before the degradation reactions.
- Condensation reactions results in the formation of larger molecules with a loss of water.
- Putrefaction is the decomposition of proteins by bacterial activity and has no part in caramelization.

Quick Tip

Caramelization involves isomerization, inversion of sucrose, and condensation reactions, while putrefaction is not involved in this process.

---

**68. Heat is the most important physical agent. For every 10°C rise in temperature the increase in denaturation rate of protein is**

1. 300 fold
2. 600 fold
3. 900 fold
4. 1200 fold

**Correct Answer: 2. 600 fold**

**Solution:**

- For every 10°C increase in temperature, the rate of protein denaturation increases by approximately 600 fold.
- This shows the exponential effect that heat can have on protein structure.

Quick Tip

A 10°C increase in temperature increases the rate of protein denaturation by approximately 600 fold, emphasizing the large effect of temperature.

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**69. Match List I with List II**

| **List I** (Material) | **List II** (Thermal Conductivity W/m°C) |
|---|---|
| A. Air (at 20°C) | I. 0.597 |
| B. Water (at 20°C) | II. 10-120 |
| C. Alloys | III. 0.035-0.173 |
| D. Insulating Materials | IV. 0.0251 |

**Choose the correct answer from the options given below:**

1. (A) - (III), (B) - (II), (C) - (I), (D) - (IV)
2. (A) - (I), (B) - (III), (C) - (II), (D) - (IV)
3. (A) - (I), (B) - (II), (C) - (IV), (D) - (III)
4. (A) - (IV), (B) - (I), (C) - (II), (D) - (III)

**Correct Answer: 4. (A) - (IV), (B) - (I), (C) - (II), (D) - (III)**

**Solution:**

- Air is a good thermal insulator which means it has a very low thermal conductivity of 0.0251.
- Water has thermal conductivity around 0.597.
- Alloys generally have a high thermal conductivity which is intermediate between insulators and conductors around 10-120.
- Insulating materials have low thermal conductivity (0.035-0.173).

Quick Tip

Remember these thermal conductivity values for different materials: air (0.0251 W/m°C), water (0.597 W/m°C), alloys (10-120 W/m°C), and insulators (0.035-0.173 W/m°C).

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**70. For the best acceptability, texture and quality of idli, the proportion of rice to black-gram dhal is 2:1. This mucilaginous material is a complex carbohydrate containing**

1. Amylose and Amylopectin
2. Galactose and Amylose
3. Galactose and Arabinose
4. Maltose and Galactose

**Correct Answer: 3. Galactose and Arabinose**

**Solution:**

- The mucilaginous material present in black gram dal, used in idli batter, is a complex carbohydrate that mainly consists of galactose and arabinose.
- This combination of polysaccharides makes the batter viscous.

> Quick Tip
>
> The mucilaginous material in black gram dal used for idli is made of galactose and arabinose, which gives it its characteristic viscous property.

---

**71. Percent of alcohol present in fortified wines is about**

1. 5 percent
2. 10 percent
3. 15 percent
4. 20 percent

**Correct Answer: 4. 20 percent**

**Solution:**

- Fortified wines have a higher alcohol content than regular wines, which is typically around 20 percent.
- Fortification involves adding distilled spirits, like brandy, to increase the alcohol concentration.

> Quick Tip
>
> Fortified wines have a higher alcohol content than regular wines. This is achieved by the addition of spirits that results in around 20% alcohol content.

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**72. Match List I with List II**

| **List I** | **List II** |
|---|---|
| (Process) | (Product) |
| A. Filtration | I. Cream |
| B. Centrifugation | II. Foam |
| C. Mixing | III. Cordial |
| D. Settling | IV. Waste treatment |

**Choose the correct answer from the options given below:**

1. (A) - (IV), (B) - (I), (C) - (II), (D) - (III)
2. (A) - (IV), (B) - (III), (C) - (II), (D) - (I)
3. (A) - (III), (B) - (II), (C) - (I), (D) - (IV)
4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

**Correct Answer: 1. (A) - (IV), (B) - (I), (C) - (II), (D) - (III)**

**Solution:**

- Filtration is generally used for removing solid particles from a liquid stream, such as in waste water treatment.
- Centrifugation is used to separate components based on density like cream from milk.
- Mixing process is used to combine various liquid components of a beverage like cordial.
- Settling is the simplest method for solid-liquid separation.

Quick Tip

Associate process with its product: Filtration for waste treatment, Centrifugation for cream, Mixing for cordial, and Settling for solid-liquid separation.

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**73. The sequence of steps during spray drying of liquid foods**

(A). Cyclone separation
(B). Atomization
(C). Hot air drying
(D). Pumping of liquid

**Choose the correct answer from the options given below:**
1. (B), (A), (C), (D).
2. (C), (B), (A), (D).
3. (B), (A), (D), (C).
4. (D), (B), (C), (A).

**Correct Answer: 4. (D), (B), (C), (A).**

**Solution:**

- First, (D) the liquid food is pumped into the spray dryer.
- Then, (B) liquid food is atomized into droplets.
- The droplets are then dried by (C) hot air drying

- Finally the dried powder is recovered using (A) cyclone separation.

Quick Tip

Spray drying involves pumping of the liquid, followed by atomization, then hot air drying, and finally, cyclone separation.

---

**74. Which of the following are the correct steps of a HACCP plan**

(A). Monitoring
(B). Identification
(C). Stimulation
(D). Documentation
**Choose the correct answer from the options given below:**
1. (A), (B) and (D) only.
2. (A), (B) and (C) only.
3. (B), (C) and (D).
4. (A), (C) and (D) only.

**Correct Answer: 1. (A), (B) and (D) only.**

**Solution:**

- The HACCP (Hazard Analysis and Critical Control Points) system focuses on preventing food safety hazards.
- Key steps include (B) Identification of hazards, (A) Monitoring critical control points, and (D) Documentation of procedures.
- Stimulation is not part of a HACCP plan.

Quick Tip

HACCP involves hazard identification, monitoring critical points, and proper documentation. There is no step known as "stimulation" in HACCP.

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**75. Match List I with List II**

| **List I (Process)** | **List II (Particle Size in Micrometers)** |
|---|---|
| A. Nano Filtration | IV. 0.001-0.01 |
| B. Micro Filtration | I. 0.1-1.0 |
| C. Ultrafiltration | II. 0.01-1.0 |
| D. Reverse Osmosis | III. <0.001 |

**Choose the correct answer from the options given below:**

1. (A) - (I), (B) - (III), (C) - (II), (D) - (IV)
2. (A) - (IV), (B) - (III), (C) - (II), (D) - (I)
3. (A) - (IV), (B) - (I), (C) - (II), (D) - (III)
4. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

**Correct Answer: 3. (A) - (IV), (B) - (I), (C) - (II), (D) - (III)**

**Solution:**

- **Nano Filtration (NF):** Typically separates molecules that are about 0.001-0.01 $\mu$m in size.
- **Micro Filtration (MF):** Removes particles ranging from 0.1 to 1.0 $\mu$m.
- **Ultrafiltration (UF):** Removes particles sized from 0.01 to 1.0 $\mu$m.
- **Reverse Osmosis (RO):** Removes very small particles with the size below 0.001 $\mu$m.

Quick Tip

Associate the processes with particle size: Nano Filtration (0.001-0.01 $\mu$m), Micro Filtration (0.1-1.0 $\mu$m), Ultrafiltration (0.01-1.0 $\mu$m), and Reverse Osmosis (below 0.001 $\mu$m).