



৪৫ তম বিসিএস লিখিত পরীক্ষার প্রশ্ন

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বিষয়- ফুড ইঞ্জিনিরিং এন্ড টেকনোলজি

বিষয় কোড- ৪৭৮

সময়- ৪ ঘন্টা

[ডান দিকের সংখ্যা সংশ্লিষ্ট প্রশ্নের পূর্ণমান জ্ঞাপক]

পূর্ণমান-২০০

Part I

Food Engineering and Technology

(Answer any two questions)

Marks—20×2=40

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|---|------------|
| 1. (a) Describe the principles and methods of food preservation. | 10 |
| (b) Explain thermophysical properties of foods with examples. A wet food product contain 70% water. After drying, it is found that 80% of original water is removed. Determine (i) mass of water removed per kg of wet food and (ii) composition of dried food. | 5+5
=10 |
| 2. (a) Define and discuss the rheological properties of common food products like sauces, dough and emulsions in context of food engineering. How do these properties affect to choose processing methods? | 10 |
| (b) Describe the working principle with mechanism of a vapour compression refrigeration cycle with a flow diagram. It is wished to freeze 15 tonnes of fish per day from an initial temperature of 10°C using a stream of cold air. Estimate the maximum capacity of the refrigeration plant required, if it is assumed that the maximum rate of heat extraction from the product is twice of the average rate. If the heat transfer co-efficient from the air to the evaporator coils is $22 \text{ Jm}^{-2}\text{S}^{-1}\text{°C}^{-1}$, calculate the surface area of the evaporator coil required if the LMTD drop across the coil is 12°C and specific heats of fish are 3.18 and 1.67 $\text{KJkg}^{-1}\text{°C}^{-1}$ above and below freezing, respectively. | 5+5
=10 |
| 3. (a) Explain the principles and factors of drying process. "Drying involves both heat and mass transfer processes simultaneously"—Justify the statement. | 4+6
=10 |
| (b) What are the general principles of food packaging? Discuss the different types of packaging materials commonly used in food industry and their specific properties and applications. | 3+7
=10 |

Food Microbiology and Hygiene

(Answer any two questions)

Marks—15×2=30

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| 1. (a) Illustrate the growth phase of microbes in relation to available nutrient and/ metabolites formation with neat sketch. | 8 |
| (b) Define starter culture with it's functions. Explain symbiosis in yoghurt. | 4+3=7 |
| 2. (a) Discuss the sources and symptoms of common food borne pathogens in reference with <i>salmonella. sp.</i> <i>E. coli</i> and <i>Listeria. sp.</i> . How can these pathogens be controlled in food the food supply chain? | 5+5
=10 |
| (b) Briefly describe the different types of spoilage occurred in canned foods. | 5 |
| 3. (a) Distinguish between food borne infection and intoxication. Describe the biological causes of food borne illness. | 2+8
=10 |
| (b) Explain 12D concept. Calculate the D-value of an organism that shows 50 survivors from initial inoculums of 2×10^6 spores after 10 minutes at 250°F. | 2+3
=5 |

Food Chemistry and Analysis

(Answer any two questions)

Marks—15×2=30

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|----|---|-----------|
| 1. | (a) Explain the importance of determining the proximate composition of food products. What are the key components measured in proximate analysis? | 4+3
=7 |
| | (b) Discuss the functional classification of foods with examples. One cup of chicken Thai soup contain 19g carbohydrates, 33g proteins and 9g fats. Calculate the number of calories and the percentage of total energy intake. | 5+3
=8 |
| 2. | (a) Describe the chemical reactions involved in enzymatic and non-enzymatic browning in foods. | 8 |
| | (b) Illustrate and explain the textural profile of a bakery product like bread or biscuit in reference with hardness, cohesiveness, gumminess and chewiness. | 7 |
| 3. | (a) Discuss the reasons behind the off flavour production in fats and oils. How it could be minimized? | 4+4
=8 |
| | (b) Discuss the principles and applications of Gas Chromatography (GC) in food analysis with neat sketch. | 7 |

Part II

Food Engineering and Technology

(Answer any two questions)

Marks—20×2=40

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|----|---|------------|
| 1. | (a) Describe the production procedures of condensed milk, ghee and milk powder. | 10 |
| | (b) Illustrate the common processes used in fish processing. How does the processing method affect the shelf life and quality of fish products. | 6+4=
10 |
| 2. | (a) Discuss the manufacturing process of raw sugar from sugarcane with a flow diagram. | 10 |
| | (b) Describe the carbonation process of carbonated beverage. Differentiate between carbonated and non-carbonated beverage with example. | 6+4
=10 |
| 3. | (a) Prepare a plant layout for a dairy food plant. | 10 |
| | (b) Illustrate the working principle of a multiple effect evaporator with mass, enthalpy and heat balance. | 10 |

Food Quality and Food Safety Management

(Answer any two questions)

Marks—15×2=30

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|----|--|------------|
| 1. | (a) Describe the importance of Good Manufacturing Practices (GMP) in food production. How do GMPs contribute to the food safety and quality? | 6+4
=10 |
| | (b) Explain Japanese 5S theory of GMP. | 5 |
| 2. | (a) Describe the quick tests for detection of common adulteration in milk, salt, sugar, tea and spices powder. | 10 |
| | (b) State the principles of risk assessment in context of food safety with key components. | 5 |
| 3. | Prepare a HACCP plan for a milk processing plant including Hazard analysis worksheet and CCP decision tree. | 15 |

Post-harvest Management

(Answer any two questions)

Marks—15×2=30

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|----|---|------------|
| 1. | (a) Give an overview of post-harvest treatments used for fresh fruits and vegetables. | 10 |
| | (b) "Exposing food to irradiation does not make the food itself radioactive"—Explain. | 5 |
| 2. | (a) Illustrate the physiological and biochemical changes occur in fruits and vegetables after harvest. How do these changes affect the post-harvest quality and shelf life? | 6+4
=10 |
| | (b) Differentiate between Controlled Atmosphere (CA) and Modified Atmosphere (MA) storage. | 5 |
| 3. | (a) State the principles of rice drying and milling. How do these processes impact the quality and storage stability of rice? | 6+4
=10 |
| | (b) Calculate the amount of ingredients required for preparation of 100g of mango squash with following specification : pulp 25%, TSS 40%, acidity 1.25% and SO ₂ (500 ppm) in the form of potassium metabisulfite (KMS). Assume any missing data. | 5 |