

द्वितीय पत्र : खाद्य विज्ञान सम्बन्धी

Section A - 30 Marks

1. **Post Harvest and Food Processing Technology** **30 %**
- 1.1 The broad-based approach to post- harvest and agro-industry development in Nepal.
 - 1.2 Development, growth, maturation, ripening of fruits and vegetables.
 - 1.3 Development of post- harvest technology for citrus, apple, mangoes, tomatoes, cabbages, cauliflowers etc. Controlled atmosphere storage (CAS), modified atmosphere storage (MAS), cellar storage, cold storage, zero energy chamber storage
 - 1.4 Post harvest handling of grains: Grading, storage and transportation of cereal grains
 - 1.5 Qualitative and quantitative assessment of post harvest losses and management system for loss reduction in rice, maize, wheat and other perishable food commodities such as fruits and vegetable.
 - 1.6 GoN's current policy and plan for increase in agriculture production and strategy for development of food and nutrition security
 - 1.7 General principles and methods of food preservation
 - 1.8 Indigenous food processing practices
 - 1.9 Processing and preservation of milk and milk products
 - 1.10 Processing and preservation of meat, fish and poultry
 - 1.11 Technology of cereal, legume and oil seeds.
 - 1.12 Confectionery technology
 - 1.13 Processing and preservation of tea, coffee, spice and condiments
 - 1.14 Processing and preservation of fruits and vegetable
 - 1.15 Uses of enzymes in food processing industries
 - 1.16 Use of various packaging materials in food processing
 - 1.17 Recent advancements in food processing technology

Section B - 20 Marks

2. **Human Nutrition** **20 %**
- 2.1 Food habits and food taboos
 - 2.2 Food security and nutrition
 - 2.3 Role of Food technology in assuring food security in Nepal
 - 2.4 Functional foods and its importance, therapeutic nutrition and diet
 - 2.5 Supplementation, fortification and enrichment of foods
 - 2.6 Effect of processing on nutrients
 - 2.7 Underline causes and consequences of malnutrition and improvements of nutritional status of infants, pregnant and lactating mother. **Double burden of malnutrition.**
 - 2.8 Lifestyle diseases: diabetes mellitus, obesity, cardiovascular diseases, hypertension
 - 2.9 Food and nutrition surveys to assess the nutritional problems and develop practical measures to mitigate identified nutritional deficiency by food based approach.
 - 2.10 Natural occurrence of antinutritional factors in food, food toxicity and allergenicity. **Methods of their removal.**

- 2.11. Different Nutritional surveys (Dietary, Anthropometric and other) conducted so far in Nepal
- 2.12. Organizational set ups and policy documents to carryout nutritional activities in Nepal
- 2.13. International agencies in nutritional activities.

Section C - 20 Marks

3. Industrial Microbiology 20%

- 3.1 Industrial application of micro organisms
- 3.2 Isolation and preservation of industrially important micro organisms
- 3.3 Identification and physiological characteristics of industrially important microorganisms (Lactic acid bacteria, yeast and mold)
- 3.4 Fermented foods and beverages
- 3.5 Biochemical reaction and fermentation
- 3.6 Industrial fermentation of organic acids (vinegar, citric acid, lactic acid), amino acid (L-glutamic acid, L- lysine and L-tryptophan), and vitamins (vitamin B-12, riboflavin, β - carotene)
- 3.7 Industrial production and purification of enzymes (amylase, glucoamylase, dextrin sucrose)
- 3.8 Microbiological assay of vitamins and amino acids
- 3.9 Principle and application of bioreactor, Solid Substrate Fermentation (SSF): Principle and application, Submerged Fermentation. Merits and demerits of Solid Substrate Fermentation and Submerged Fermentation
- 3.10 Recent trends and developments in biotechnology
- 3.11 Single cell protein, antibiotics and chemistry of microbial leaching.

Section D - 30 Marks

4. Food Control Management 30 %

- 4.1 Concept of Quality control and Quality assurance
- 4.2 Food Act, 2033 and Food Regulation, 2027 ; Feed Act, 2033 and Regulation, 2041
- 4.3 Food Sampling and Inspection techniques
- 4.4 Food adulteration and its control mechanism. Food safety and monitoring of contaminants in foods.
- 4.5 Quality attributes of food and sensory evaluation
- 4.6 Food standards and Codex Alimentarius Commission
- 4.7 General concept of Sanitary and Phyto Sanitary (SPS) and Technical Barrier to Trade (TBT) in context of WTO
- 4.8 Food plant sanitation and management
- 4.9 General principle and application of Hazard Analysis and Critical Control Point (HACCP), Good Manufacturing Practice (GMP), International Standard Organization (ISO 9000-2000), Total Quality Management (TQM) and Good Agricultural Practice (GAP)
- 4.10 Good Laboratory Practices (GLP), Laboratory Accreditations
- 4.11 Principle and application: Enzyme Linked Immuno Sorbent Assay (ELISA), Gas Chromatography(GC), High Performance Liquid

लोक सेवा आयोग
नेपाल कृषि सेवा, फूड न्यूट्रिशन एण्ड क्वालिटी कन्ट्रोल समूह, राजपत्राङ्कित तृतीय श्रेणीका पदहरूको खुला र
आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

- Chromatography (HPLC), Atomic Absorption Spectroscopy (AAS),
Mass Spectrometry (MS), Infra Red and Ultra Violet Spectroscopy
- 4.12 General concept of statistical quality control , sampling techniques, measures of location and dispersion, probability, test of significance (Chi-square test, T and Z tests, F-value)
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द्वितीयपत्रका पाठ्यक्रमका एकाईहरूबाट सोधिने प्रश्नहरूको संख्या निम्नानुसार हुनेछ :

| द्वितीय पत्रका खण्ड | A | B | C | D |
|---------------------|---|---|---|---|
| द्वितीय पत्रका एकाई | 1 | 2 | 3 | 4 |
| प्रश्न संख्या | 3 | 2 | 2 | 3 |

बिषयगत नमूना प्रश्नहरू (Sample Questions)

1. What are the most prevalent nutrition deficiency diseases in Nepal? Discuss the remedial measures for most critical nutritional deficiency syndrome.
2. What are the potential health hazards posed by current practices of food adulteration? Explain the control measures that are imperative to curb such adulteration practices and misbranding.
3. How can proper post harvest handling reduce the losses of fruit and vegetables? Give a feasible solution to reduce the current losses in Nepal.
4. Discuss the basis of technology selection for the preservation of perishable temperate fruits and vegetables in Nepal. Suggest appropriate methods of post harvest handling operations of vegetables in the rural farming condition.
5. Explain the industrial method of citric acid production. What are the applications of citric acid in food industry?
6. Write short notes on
 - a) Hazard Analysis and Critical Control Point (HACCP)
 - b) Controlled atmosphere storage (CAS)