MINISTRY OF EDUCATION

Food and Nutrition

for Senior High Schools

TEACHER MANUAL

YEAR TWO

NATIONAL COUNCIL FOR CURRICULUM & ASSESSMENT OF MINISTRY OF EDUCATION

MINISTRY OF EDUCATION

REPUBLIC OF GHANA

Food and Nutrition

for Senior High Schools

Teacher Manual

Year Two

NATIONAL COUNCIL FOR CURRICULUM & ASSESSMENT OF MINISTRY OF EDUCATION

FOOD AND NUTRITION TEACHER MANUAL

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CONTENTS

LIST OF TABLES AND FIGURES

List of Tables

List of Figures

INTRODUCTION

The National Council for Curriculum and Assessment (NaCCA) has developed a new Senior High School (SHS) curriculum which aims to ensure that all learners achieve their potential by equipping them with 21st Century skills, competencies, character qualities and shared Ghanaian values. This will prepare learners to live a responsible adult life, further their education and enter the world of work.

This is the first time that Ghana has developed an SHS Curriculum which focuses on national values, attempting to educate a generation of Ghanaian youth who are proud of our country and can contribute effectively to its development.

This Teacher Manual for Food and Nutrition is a single reference document which covers all aspects of the content, pedagogy, teaching and learning resources and assessment required to effectively teach Year Two of the new curriculum. It contains information for all 24 weeks of Year Two including the nine key assessments required for the Student Transcript Portal (STP).

Thank you for your continued efforts in teaching our children to become responsible citizens.

It is our belief that, if implemented effectively, this new curriculum will go a long way to transforming our Senior High Schools and developing Ghana so that we become a proud, prosperous and values-driven nation where our people are our greatest national asset.

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SCOPE AND SEQUENCE

Food and Nutrition Summary

S/N	STRAND	SUB-STRAND	YEAR 1			YEAR 2			YEAR 3		
			CS	LO	LI	CS	LO	LI	CS	LO	LI
1.	Nutrition and Health	Food For Healthy Living	3	2	8	4	4	11	2	2	6
		Food Security	2	2	5	2	2	5	2	2	4
2.	Food Pro-duction	Food Production Technology	2	2	5	2	2	4	2	2	4
		Food Processing Techniques	2	2	5	2	2	7	1	1	4
Total			**9**	**8**	**23**	**10**	**10**	**27**	**7**	**7**	**18**

Overall Totals (SHS 1 – 3)

Content Standards	**26**
Learning Outcomes	**25**
Learning Indicators	**68**

SECTION 1: NUTRITION

STRAND: NUTRITION AND HEALTH

Sub-Strand: Food for Healthy Living

Learning Outcomes

1. *Employ knowledge and understanding of the principles of nutrition and how different food groups contribute to healthy living in planning meals for special groups and other members of the family with special needs.*
2. *Explore and evaluate food and nutritional interventions available for households and individuals suffering from food related diseases.*
3. *Plan and prepare meals that promote the well-being of individuals, family members and special groups with diverse food nutritional needs using healthy cooking methods.*
4. *Demonstrate skills using appropriate methods of preparation, cooking and serving meals for individuals and special groups in the family.*

Content Standards

1. Analyse the relationship between food choices and the overall health of individuals, family members and special groups.
2. Demonstrate the ability to investigate food and nutritional interventions for managing food-related diseases at the household, community, national and global levels.
3. Demonstrate the ability to plan balanced meals that promote healthy living and meet nutritional needs.
4. Demonstrate appropriate skills in preparation, cooking and serving meals for individuals and special groups in the family.

Hint

*Assign **Portfolio Assessment** for the academic year by Week 2. Portfolio should be submitted by Week 22. See **Appendix A** at the end of this Section and Teacher Assessment Manual and Toolkit pages 22-25 for more information on how to organise a portfolio assessment.*

*Assign **Group Project** for the semester by Week 3. The project should be submitted by Week 6. See **Appendix B** at the end of this for more information on how to organise a group project.*

INTRODUCTION AND SECTION SUMMARY

This section provides learners with knowledge and practical skills in aspects of food and nutrition. It aims to enhance learners' understanding of nutritional principles, safety and interventions. The section covers key areas such as balanced diet, diet related diseases, excessive consumption of processed foods, basic nutritional intervention. The section specifically targets

dietary – related diseases, where learners learn balanced and nutritious meals that meet dietary requirements of individual, family and societal needs. Learners will develop knowledge and practical skills in cooking methods that help to retain nutrients and planning of meals. Learners will also plan special meals to support groups of individuals in the family suffering from dietary related diseases.

Finally, this section provides learners with a comprehensive understanding of meal preparation and meal service. A key area of focus in this course is on preparation, cooking and service of meals, application of proper serving techniques and table setting skills suitable for different individuals and special groups, ensuring meal presentation is hygienic and appealing. The weeks covered by this section are:

Week 1 The relationship between food choices and overall health

Week 2 Basic concepts in nutritional interventions

Week 3 Meal planning for individuals and families

Week 4 Meal planning for individuals and special groups

Week 5 Prepare and cook meals for individuals and special groups in the family

Week 6 Serving techniques and table setting

SUMMARY OF PEDAGOGICAL EXEMPLARS

This section employs a variety of Pedagogical Exemplars to make the lesson delivery learner focused. A few of the Pedagogical Exemplars used in this section include Problem-based Learning, Group work or Collaborative Learning, Experiential Learning, Structuring Talk for Learning, to mention but a few. The teacher is expected to explore and apply other Pedagogical Exemplars suitable for each focal area within the section and not to limit himself/herself to only the pedagogies mentioned in the section. The teacher is equally encouraged to incorporate cross-cutting issues such as GESI, SEN, SEL, the 21st Century skills, Core National Values and ICT in the lesson delivery, to make it more interactive, inclusive and learner centered.

ASSESSMENT SUMMARY

Once learners learn in different ways or forms, the teacher is advised to vary the assessment strategies to cater for different categories of learners. Various forms of assessments should be carried out to ascertain learners' performance on the concepts that will be taught under this section. Teachers are entreated to administer these assessments and record them for onward submission into the Student Transcript Portal (STP). The following assessment would be conducted and recorded for each learner:

Week 1: *Class Exercise* ***Week 4:*** *Case Study*

Week 2: *Research* ***Week 5:*** *Practical*

Week 3: *Poster* ***Week 6:*** *Mid – semester examination*

WEEK 1: THE RELATIONSHIP BETWEEN FOOD CHOICES AND THE OVERALL HEALTH OF INDIVIDUALS, FAMILY MEMBERS AND SPECIAL GROUPS

Learning Indicators

1. *Explain the importance of consuming a balanced diet for maintaining good health.*
2. *Identify dietary-related diseases and their causes among individuals, families and the community.*
3. *Analyse the effects of excessive consumption of processed foods and sugary drinks on health.*

FOCAL AREA: THE COMPONENTS OF A BALANCED DIET AND DIETARY RELATED DISEASES

Key Concepts

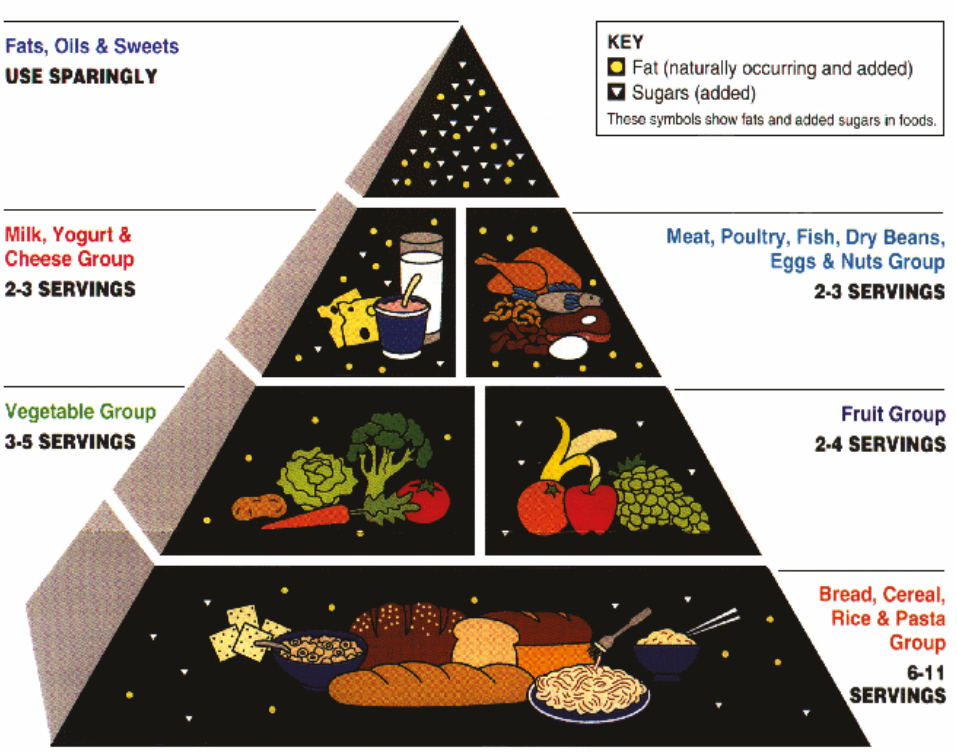


Fig. 1: *Food Pyramid with all the food components and serving sizes*

a. Components of a balanced diet

A balanced diet includes all these components in appropriate proportions to meet an individual's nutritional needs. A deficiency or excess of any component can lead to health complications, emphasise the importance of consuming a variety of foods for overall well-being.

i. Carbohydrates: The body breaks down carbohydrates into glucose, which fuel physical activities and brain functions.

ii. Proteins: Essential for muscle development, healing wounds, and maintaining overall body strength.

iii. Fats and Oils: Helps in insulation, hormone production, and maintaining healthy skin. However, excess consumption of unhealthy fats like saturated and trans fats can lead to heart diseases.

iv. Vitamins: Prevents diseases like scurvy (Vitamin C deficiency) and rickets (Vitamin D deficiency).

v. Minerals: Prevents conditions like anaemia (iron deficiency) and osteoporosis (calcium deficiency).

vi. Water: Prevents dehydration, supports metabolic activities, and maintains kidney function.

b. Dietary related diseases

These include Obesity**,** Diabetes**,** hypertension**,** Malnutrition. They are health conditions caused by a range of factors such as poor nutrition, unbalanced diets, unhealthy eating habits

These diseases affect individuals, families, and entire communities, leading to economic burdens on the family, reduced productivity and a poor quality of life.

c. Effects of excessive consumption of processed and sugary foods on health

i. Positive effects on individuals

- Convenience: Processed foods save time in preparation, making them useful for busy individuals.
- Extended shelf life: Canned and frozen foods help reduce food waste and provide year-round availability.
- Fortification: Some processed foods are enriched with essential nutrients such as iodized salt and fortified cereals.

ii. Negative Effects

- Increased risk of chronic diseases
- Nutritional Deficiencies
- Addiction and Overconsumption, etc.

iii. Positive effects on Families

- Easier meal preparation: Ready-to-eat and frozen meals help families save time cooking.
- Variety and accessibility: Processed foods provide a variety of meal options and ensure food availability in different seasons.

iv. Negative Effects

- Health complications in children
- Financial strain on healthcare
- Loss of traditional cooking practices, etc.

v. Positive effects on the Community

- Economic growth: The processed food industry creates jobs and contributes to national economies.
- Food Security: Fortified and long-lasting processed foods help address hunger and malnutrition in food-insecure regions.

vi. Negative Effects

- Rising public health issues
- Environmental pollution
- Food insecurity in low-income communities, etc.

vii. General Implications

- Processed foods offer convenience and food security.
- Overconsumption leads to serious health risks at individual, family and community levels.
- It is important to balance processed food intake with fresh, whole foods.
- Encourage nutritional education.
- Implement policies that regulate unhealthy food production.

Learning Tasks

1. Discuss the components and importance of a balanced diet.
2. Research dietary related diseases and the impact of eating unhealthy foods.
3. Analyse a case study on people affected by dietary related disease.
4. Discuss the advantages and disadvantages of processed food.

Pedagogical Exemplars

1. Collaborative Learning and Group Work

a. In groups discuss the components of a balanced diet and produce food pyramids and charts to illustrate these.

2. Talk for Learning/ group work

a. In groups, discuss the importance of a balanced diet and present a report to the class.

b. Reflection activity: Share your experience of how your family meals support the diverse nutritional needs of the individual members and special groups in your family.

c. In groups, organise a debate on processed foods using arguments for or against the advantages and disadvantages of processed foods.

d. Reflection activities: Assess how you and your family use processed food and the impact on you, the family and society.

3. Experiential Learning and Collaborative Learning

a. In pairs/small groups watch videos or visit a community nutrition unit at the nearest hospital/social centre to research dietary related diseases and their implications on individuals, family and the community.

b. In groups watch a video documentary on the impact of processed foods. Think-pair-share to discuss the impact of processed foods on healthy living among individuals, families and the community.

c. Write a report on the impact of processed foods for presentation.

4. Experiential Learning and Collaborative Learning

a. In pairs/small groups conduct a case study analysis of people affected by dietary related diseases.

Case Study Type 2 Diabetes

Mr. Mwini and Ms Kwakyewaa are 45 years and 32 years old respectively. They are both office workers and were diagnosed with Type 2 diabetes five years ago. Their jobs require them to sit for long hours and they frequently consume fast food, sugary drinks and snacks due to their busy schedule.

Analysis

a. Health issues faced
   - Rapid weight gain (obesity).
   - Frequent urination, excessive thirst and fatigue.
   - High blood sugar levels can lead to nerve damage and blurred vision.

b. Impact on family and community
   - Their families had to adjust their diet to accommodate their conditions.
   - Increased medical expenses for insulin and check-ups.
   - Reduced productivity at work due to frequent hospital visits, etc.,

c. Intervention and solution
   - Dietary changes: Reduced sugar intake, more fibre-rich foods and portion control.
   - Physical activity: Daily walks and exercise routines.

d. Adherence to regular medical check-ups and medication, etc.

Key Assessment

The teacher should focus on formative assessments, choosing from the following examples or creating their own formative assessment tasks.

DOK Level 2 Skills of Conceptual Understanding

a. Describe the components of a balanced diet.

b. Explain the importance of eating a balanced diet.

c. Identify dietary related diseases and their causes.

DOK Level 3 Strategic Reasoning

a. Explain the impacts on communities and wider society of dietary related diseases.

b. Describe the advantages and disadvantages of processed foods.

WEEK 2: BASIC CONCEPTS IN NUTRITIONAL INTERVENTIONS

Learning Indicators

1. *Explain basic concepts of nutritional interventions*
2. *Examine household and community-based food and nutritional interventions supporting individuals, families and societies.*
3. *Apply basic research skills to assess the impact and challenges of household-based and community-based food and nutritional interventions*

FOCAL AREA 1: BASIC CONCEPT OF NUTRITIONAL INTERVENTIONS

Key Concepts

Basic concepts in nutritional interventions: Strategies and actions designed to improve nutritional status and prevent or manage diet-related diseases at individual, family and community levels. These interventions aim to address:

1. Malnutrition
2. Nutrient deficiencies
3. Diet-related health conditions
4. Dietary improvements
5. Supplementation
6. Education
7. Policy implementation, etc.

Types of nutritional interventions

1. **Dietary-Based Interventions**

   Focus on promoting healthy eating habits and ensuring access to nutritious foods.

   a. Balanced Diet Promotion: Encouraging a diet rich in fruits, vegetables, whole grains, lean proteins and healthy fats.

   b. Dietary Diversification: Introducing a variety of foods to improve nutrient intake.

   c. School Feeding Programs: Providing nutritious meals to children to improve their health and academic performance.

   d. Nutrition Education: Teaching individuals and families about proper meal planning, food preparation and healthy eating habits, etc.

2. **Supplementation-Based Interventions**

   Providing specific nutrients to individuals at risk of deficiencies.

a. Vitamin A Supplementation: Helps prevent blindness and boosts immunity, especially in children.

b. Iron and Folic Acid Supplements: Used to prevent anaemia in pregnant women and children.

c. Iodine Supplementation: Added to salt (iodized salt) to prevent goitre and brain development issues.

d. Zinc Supplementation: Supports immune function and reduces childhood mortality, etc.

3. Fortification-Based Interventions

Adding essential nutrients to commonly consumed foods to prevent deficiencies.

a. Fortified Flour: Enriched with iron and B vitamins to prevent anaemia.

b. Fortified Dairy Products: Milk and margarine are fortified with vitamin D to prevent rickets and osteoporosis.

c. Iodized Salt: Helps in preventing iodine deficiency disorders like goitre, etc.

4. Community and Policy-Based Interventions

Large-scale efforts by governments, NGOs and health organisations.

a. Food Security Programs: Ensuring access to sufficient and nutritious food through food aid and agricultural development.

b. Breastfeeding Promotion: Encouraging exclusive breastfeeding for at least six months to improve infant nutrition.

c. Regulations on Processed Foods: Implementing policies to reduce trans fats, sugar, and salt in processed foods.

d. Nutrition Monitoring and Surveillance: Collecting data on malnutrition rates to design effective interventions, etc.

Learning Tasks

1. Explain basic concepts in nutritional intervention.
2. Describe nutritional interventions that are available for individuals, families and communities.

Pedagogical Exemplars

1. Talk for Learning Approaches

a. In pairs/groups, use think-pair-share, mingling/talking points to explain basic concepts in nutritional interventions and present report for a whole class discussion. They should use a range of sources, e.g., videos, internet and other sources to undertake the exercise and report for class discussion.

2. Group Work and Collaborative Learning Approaches

a. In mixed ability/gender/cultural groups, visit a community nutrition centre in the hospital or social welfare centre to investigate the type of nutritional interventions that are available for individuals, families and the communities.

b. Present your findings for a whole class discussion and reflection.

Key Assessment

DOK Level 2 Skills of Conceptual Understanding

a. Explain nutritional intervention.

b. Discuss the benefits of nutritional intervention.

FOCAL AREA 2: HOUSEHOLD AND COMMUNITY-BASED FOOD AND NUTRITIONAL INTERVENTIONS

Key Concepts

Household-based food and nutritional interventions: Focus on ensuring adequate nutrition and food availability within families through dietary improvements, food preparation techniques and nutrition education.

a. Household food security and dietary practices

- i. Home gardening
- ii. Livestock rearing
- iii. Food preservation and storage
- iv. Meal planning and balanced diets, etc.

b. Nutritional education and awareness

- i. Breastfeeding and infant nutrition
- ii. Healthy cooking methods
- iii. Reducing processed foods
- iv. Special diets for health conditions, etc.

c. Household-based supplementation and fortification

- i. Fortified foods
- ii. Vitamin and mineral supplements, etc.

d. Community-based food and nutritional interventions

- i. Large-scale efforts that address food security and nutrition at the societal level through policies, programs, and collaborations.

e. School and public health nutrition programs

- i. School feeding programs
- ii. Nutrition awareness campaigns
- iii. Food banks and feeding centres

f. Agricultural and food production initiatives

i. Community gardens and farming projects

ii. Support for local farmers

iii. Livelihood and skill development programs

g. Public health and policy-based interventions

i. Food fortification policies

ii. Regulations on processed foods

iii. Nutrition surveillance and monitoring

Learning Task

Discuss household and community–based food and nutritional interventions supporting individuals, families and society to manage dietary related diseases.

Pedagogical Exemplars

Organise learners into mixed ability groups to watch video/ charts to examine household and community-based food and nutritional interventions supporting individuals, families and societies to manage dietary related diseases. Each group will present their findings to the class, fostering peer tutoring and encouraging respect for different viewpoints during presentations and discussion. Learners who exhibit clear understanding and the ability to perform tasks independently should rise to the challenge of researching, analysing information and producing charts/diagrams, projects and presentations.

1. **Group Work and Collaborative Learning Approaches**: In mixed ability groups, with the videos and charts examine household and community-based food and nutritional interventions supporting individuals, families and societies to manage dietary related diseases.

   a. Use a concept map to classify interventions under household-based and community-based categories. Present your findings for a whole class discussion.

   E.g., Interventions

   i. **Household-Based**

   - Nutrition Education
   - Food Assistance
   - Food Storage and Handling

   ii. **Community-Based**

   - Community Gardens
   - Farmers' Markets
   - Community Nutrition Programs
   - Food Policy and Advocacy

2. Experiential Learning Approach

a. Learners should conduct a role-play on household and community-based food and nutrition interventions. Provide learners with appropriate learning materials for role play

Sample Role-Play Activities

- Nutrition Education at a Community Health Centre: A community health worker conducts a nutrition education session for individuals in the community.
- A Family Planning Healthy Meals: A family hold a meeting to discuss how to prepare a nutritious meal on a budget. The father suggests buying local and seasonal foods, while the mother explains the importance of protein, vitamins and carbohydrates. The teenage child questions the need for reducing junk food and the younger sibling wants more sugary snacks. The parents educate the children about healthy eating habits, etc.
- A Farmer and Market Vendor Discuss Food Availability: A farmer visits a market vendor to sell fresh vegetables and grains. They discuss challenges in growing organic food. A customer asks for advice on affordable and nutritious meal options and the vendor encourages buying fresh produce instead of processed foods.
- School Feeding Program Debate: A head teacher of a basic school holds a community meeting to discuss implementing a school feeding program. The parent raises concerns about food quality, the government official explains the budget and the nutritionist emphasizes the importance of balanced meals.

Key Assessment

The teacher should focus on formative assessments, choosing from the following examples or creating their own formative assessment activities.

DOK Level 2: Skills of Conceptual Understanding

Classify interventions under household-based and community-based categories using a concept map.

DOK Level 3: Strategic Reasoning

Interview **three** people with different dietary related diseases and suggest the appropriate intervention to them

FOCAL AREA 3: BASIC RESEARCH SKILLS TO ASSESS THE IMPACT AND CHALLENGES OF HOUSEHOLD-BASED AND COMMUNITY-BASED FOOD AND NUTRITIONAL INTERVENTIONS

Key Concepts

Produce research tools and use data collection methods to carry out research tasks that relate to the impact and challenges of household and community-based food and nutritional interventions.

a. Research tools

i. Interview guide
ii. Questionnaire
iii. Observation checklist, etc.

b. Sample research tasks

i. Home gardening
ii. School feeding programs
iii. Breastfeeding education

c. Data collection methods

i. Interviews with households, community leaders, and health workers.
ii. Observations of food consumption, dietary habits and food availability.
iii. Focus group discussions with farmers, parents, and school officials, etc.

Expected outcomes

a. Impact of household and community nutritional interventions

i. Improved health outcomes: Reduced cases of malnutrition, anaemia and stunted growth in children.
ii. Economic benefits: Lower medical costs due to fewer diet-related diseases.
iii. Food security and sustainability: Ensures stable food supply and reduced dependency on external aid.
iv. Enhanced educational performance: Proper nutrition supports better concentration, memory and learning outcomes in students, etc.

b. Challenges in implementing food and nutritional interventions

i. Food insecurity and poverty: Many families lack access to nutritious food due to financial constraints.
ii. Cultural and traditional beliefs: Some local food taboos limit the consumption of nutrient-rich foods.
iii. Limited resources and funding: Inadequate support for community nutrition programs.
iv. Lack of awareness: Some individuals and families are unaware of proper nutrition practices, etc.

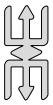
Learning Task

Discuss the impact and challenges of household and community-based food and nutritional interventions.

Pedagogical Exemplars

Put learners in mixed ability groups to watch videos/ /surf the internet and other sources to discuss the importance of household and community-based food and nutritional interventions.

Support groups to design a research tool to collect data from households, market vendors, health professionals and local leaders on the impact and challenges of household-based and community-based food and nutritional interventions. Promote peer tutorials and ensure that learners have understood the concept. Teachers guide learners in their discussions of the subject. Encourage all learners to take part.



Note

Teaching Guidance for production of questionnaires, interview techniques

a. Research tools

i. Interview guide

ii. Questionnaire

iii. Observation checklist, etc.

b. Sample research tasks

i. Home gardening

ii. School feeding programs

iii. Breastfeeding education, etc.

Present your research tools for peer-review.

E.g., Sample questions for the questionnaire

a. What are the most common foods consumed in your household?

b. How often do you eat fresh fruit and vegetables?

Daily [ ] Weekly [ ] Rarely [ ] Never [ ]

c. How do you preserve and store food to ensure availability?

d. Do you practice home gardening or livestock rearing?

Yes [ ] No [ ] (If no, why?)

e. How often does your household consume processed or packaged foods?

f. Are there any food taboos or cultural beliefs affecting food choices? etc.

Data collection methods

a. Interviews with households, community leaders, and health workers.

b. Observations of food consumption, dietary habits and food availability.

c. Focus Group discussions with farmers, parents, and school officials, etc.

Expected outcomes

a. Identify key challenges in food security and nutrition in the community.

b. Assess the effectiveness of household and community interventions.

c. Provide recommendations to improve food and nutrition programsBottom of Form, etc.

1. **Experiential Learning/Project based Learning Approaches**
   - **a.** Provide learners with appropriate material. Encourage learners in groups to watch videos/ surf the internet and other sources to discuss the importance of household and community-based food and nutritional interventions.
   - **b.** Support learners to design a research tool to collect data from households, market vendors, health professionals and local leaders on the impact and challenges of household-based and community-based food and nutritional interventions.

2. **Group Research Work**
   - **a.** In groups, learners should conduct field research by visiting selected households or community centres to gather data.
   - **b.** They should interview people of different cultural backgrounds to find out their food habit/lifestyles and discuss interventions to support the following specific groups
     - i. Diabetes
     - ii. Hypertension

3. **Experiential Learning Approach**
   - **a.** Learners working in groups should design a research tool and conduct group field research to collect data from households, market vendors, health professionals and local leaders on the impact and challenges of household-based and community-based food and nutritional interventions. They should be able to:
     - i. Compile data and identify the patterns and themes of responses, for instance common challenges in food interventions.
     - ii. Analyse the data and create a summary report of the major findings on the impact and challenges of interventions.
     - iii. Present your findings for a whole class discussion and assessment using charts, graphs or PowerPoint slides.

Key Assessment

The teacher should focus on formative assessments, choosing from the following examples or creating their own formative assessment activities.

DOK Level 3: Strategic Reasoning

- **a.** Discuss some of the difficulties in implementing nutritional interventions to support individuals, families and societies.

DOK Level 4: Extended Critical Thinking and Reasoning

Design a research tool to collect data from households, market vendors, health professionals and local leaders on the impact and challenges of household-based and community-based food and nutritional interventions.

WEEK 3: MEAL PLANNING FOR INDIVIDUALS AND FAMILIES

Learning Indicators

1. *Demonstrate appropriate cooking methods that help retain nutrients in food to promote healthy living.*
2. *Develop a meal plan that meets the nutritional needs of different individuals and families.*

FOCAL AREA 1: APPROPRIATE COOKING METHODS THAT HELP RETAIN NUTRIENTS IN FOOD TO PROMOTE HEALTHY LIVING.

Key Concepts

Some basic cooking methods help to retain the nutrients of the food making it nutritious (conservative methods of cooking). Examples of such methods of cooking are:

a. Steaming
b. Poaching
c. Grilling
d. Boiling

Learning Task

1. Conduct a cooking experiment comparing nutrient retention in different cooking methods.

Pedagogical Exemplars

Teachers may reinforce teaching by inviting learners to watch a demonstration/ video on how to cook using different methods of cooking to retain nutrients. In mixed groups, learners will discuss the various conservative methods of cooking and share their experiences.

In their groups, using a range of food commodities, learners will conduct a cooking experiment to compare nutrient retention in different cooking methods. Teachers may need to provide practical guidance. Encourage learners to ask questions and provide feedback on each group's work.

1. **Experiential Learning Approach**
   a. Learners will observe a practical demonstration/video on methods of cooking to retain nutrients and promote healthy living.

2. **Group work/ Collaborative Learning Approaches**
   a. In mixed cultural/random/friendship groups, conduct a cooking experiment comparing nutrient retention in different cooking methods

Key Assessment Strategies

The teacher should focus on formative assessments choosing from the following exemplars or create their own formative assessment activities.

DOK Level 3: Strategic Reasoning

Produce a short report on three methods of cooking which are best for the retention of nutrients.

DOK Level 4: Extended Critical Thinking and Reasoning

In groups, use steaming and poaching as methods of cooking to prepare two dishes and record the results of the experiment in terms of nutrient retention.

FOCAL AREA 2: CONCEPT OF MEAL PLANNING TO MEET NUTRITIONAL NEEDS

Key Concepts

a. Meal Planning

This is the process of organising meals in advance to ensure they are nutritious, balanced and meet the dietary needs and preferences of individuals or groups. This practice involves considering factors such as nutritional content, dietary restrictions, food availability, budget and time constraints. Effective meal planning can promote healthier eating habits, prevent food waste and save time and money. It is important that we plan meals to provide adequate meals for family members and to meet family goals such as:

i. ***Nutritional Balance:*** Ensuring meals provide essential nutrients, including carbohydrates, proteins, fats, vitamins and minerals. Incorporating a variety of food groups; fruits, vegetables, grains, proteins and dairy or alternatives.

ii. ***Dietary Needs and Preferences:*** Considering individual dietary restrictions (e.g., allergies, intolerances, medical conditions). Accommodating personal or cultural food preferences.

iii. ***Portion Control:*** Appropriate portion sizes to maintain a healthy weight and avoid overeating.

iv. ***Variety:*** A range of foods to prevent monotony and ensure a broad spectrum of nutrients.

v. ***Budgeting:*** Selecting cost-effective ingredients and planning meals within a budget.

vi. ***Time Management:*** Planning meals that fit into the available preparation and cooking time, often incorporating batch cooking or prep-ahead strategies.

vii. ***Food Safety:*** Proper handling, storage, and cooking to prevent foodborne illnesses.

viii. ***Environmental Considerations:*** Choosing sustainable and locally sourced ingredients to minimise environmental impact.

b. Meal planning terminologies

i. ***A dish*:** Prepared item of food served in a bowl or on a plate.

ii. ***Side Dish*:** A food item that accompanies the main course.

iii. ***Main Dish***: The protein part of a meal.

iv. ***Accompaniment:*** The carbohydrate part of a meal

v. ***One Pot Dish*:** A meal which has both the protein and accompaniment prepared together in the same pot or saucepan, e.g., Jollof rice, 'apapransa", 'mpotompoto"

vi. ***Course*:** This refers to how a meal is divided up or eaten during a meal.

vii. ***Main Meal***: A main dish and an accompaniment eaten together.

viii. ***Meal:*** A collection of prepared dishes eaten at a sitting.

ix. ***Menu*:** A list of prepared dishes available to a customer or a bill of fare. It is usually written. It can be written for various days, weeks, months, etc. There can also be a variety of menus for breakfast only, lunch only, or supper only as we find in restaurants and hotels. E.g., A la carte, Table d'hote, Ethnic menu

x. **Diet**: This refers to the food eaten by an individual. Some diets are termed as "special diets", e.g., low fat diet, low salt diet, diabetic diet

xi. ***Snack or Elevenses***: A snack that is eaten in the morning around 11.00 am and the name refers to the time of day that it is taken. Light, nutritious foods served or eaten in-between meals.

xii. ***Dessert:*** A sweet dish which is eaten after a main meal. It normally contains sugar. e.g. ice cream, trifle, cut orange and apples.

xiii. ***A two-course meal*:** A main meal and a dessert or an appetizer and a main dish.

xiv. ***A three-course meal*:** An appetizer or starter, a main dish and accompaniment and a dessert

xv. ***A balanced meal***: Should provide a balance of texture, flavour, colour, nutrients and variety of foods to be appetising.

c. Factors to consider in planning healthy meals for the family

Meals should be eaten and enjoyed by all family members. It is therefore important for the meal manager to work within time and money limitations and the food preferences of family members. Consideration should be given to the following factors:

i. ***Good Nutrition:*** People require essential nutrients. All people need the same nutrients, but not in the same amounts. The family is made up of different individuals and these individuals have different food needs. Growing children and pregnant women, the aged, for example, need more of some nutrients than normal adults. Active people need more nutrients than inactive people. The Ghanaian six food groups can serve as a guide when planning nutritious meals. It helps to determine the number of servings each family member needs from each food group, how to select foods within each group and recommended daily portions.

ii. ***Availability of Money*:** Once a family has determined the amount of money available for food, careful planning ensures they stay within the food budget. As much as possible, buy foods that are not expensive, but nutritious. Making use of food items from the backyard garden can also help to save money. The amount of money spent on food is determined by factors such as family size, family values, ages of family members, family income and energy and time available.

iii. ***Equipment and Cooking Facilities:*** Cooking facilities such as fuel, space and storage will influence the choice of foods to be included on the menu. For example,

storage facilities like a freezer will determine whether you were able to eat palm nut soup daily or if you have access to an oven to bake products daily.

iv. ***Health conditions of the family***: Special health problems also influence food needs. Individual health needs should be considered to make mealtimes positive for all members of the family.

v. ***Food preferences:*** Food preferences are learned, and they are affected by many factors such as ethnic origin, religious beliefs, socio-economic status, family background, education, standard of living, goals and ambitions. Food preferences can also be affected by sight, smell, and touch. Therefore, the flavours, colour, texture, size, shape and temperature of foods are important in determining food acceptance and enjoyment.

vi. ***Regularity and service of meals*:** Mealtimes provide opportunities for the family to meet, share and exchange ideas and enjoy one another's company. Meal planning should ensure that the family can meet regularly for some meals.

Fig. 2: *Nutrients for proper meals*

d. Reasons for planning meals

i. ***Saves Time***: Planning your meals ahead of time will ensure that you shop to a menu and will save you a great amount of time in shopping and preparation.

ii. ***Saves Money:*** Planned meals are cheaper than eating fast food. Using a shopping list to purchase food items will reduce impulse buying.

iii. ***Improves Health/prevents obesity:*** Planning in advance allows you to cook a healthy meal every day by including the correct portion sizes and nutrients to meet the nutritional needs of each member of the family.

iv. ***Family time:*** Because planning meals allows for more free time, there is more time available to spend with family.

v. ***Teaching Essential Skills:*** By including children in the meal planning process, they can learn many skills for themselves to use.

vi. ***Brings Variety:*** Planning meals will create variety. This could be achieved through using a variety of foods as well as varying the methods of cooking, etc.

Meal patterns

If you eat regular meals and include the recommended number of servings or portions from the six food groups, you have good eating habits. You are probably getting all the nutrients you need. One way to meet your daily nutrient requirements is to plan what you will eat according to meal patterns. Meal patterns are outlines used for meal planning. They are built around the basic foods which are normally served at each meal. In Ghana, it is usual to eat three meals a day. Basic meal patterns consist of breakfast, lunch and supper or dinner.

i. ***Breakfast Patterns:*** Breakfast is the first meal of the day, and it is a meal of paramount importance because without it, it is difficult to get all the daily nutrients. Breakfast can vary from light to heavy depending on the foods included. A light breakfast includes fruit or juice, cereal or bread and a beverage. A heavy breakfast includes fruit or juice, cereal or main dish food, and accompaniment. Main dishes for breakfast include eggs, meats, pancakes and similar foods. In Ghana, a heavy breakfast may include fish and *'kenkey'*, okro stew with '*banku'*, *'waakye*' and many others.

ii. ***Lunch or Supper Patterns***: Lunch and supper meals are very similar. The difference is the time of day these meals are eaten. Lunch is eaten in the middle of the day while supper is an evening meal. A well-balanced lunch or supper includes at least one serving from each of the six food groups; animal foods, cereals and starchy roots and plantain, fruits and vegetables, and fats or oils.

iii. ***Dinner Patterns:*** For many people, dinner is the one meal of the day which can be eaten leisurely and shared with family members. Like lunch, dinner should provide one-third of the day's total nutrients. Dinner is a heavier meal than lunch and is usually the richest meal in terms of protein.

iv. ***Snacks:*** If the meal manager plans between meals, snacks can satisfy nutritional needs as well as hunger. Fresh fruits, fruit drinks, milk shakes, roasted groundnuts, roasted plantain, pastries and biscuits are good snacks. They supplement other foods eaten during the day. Family members who need to watch their weight can select snacks which are nutritious and low in calories (kilojoules).

v. ***Brunch or Bruncheon***: It is a combination of breakfast and lunch. Brunch is often served after a morning event or prior to an afternoon one, such as a wedding or sporting event. It is also a meal which is served when breakfast is not taken: it is served between eleven and twelve o'clock.

vi. ***Desserts:*** Desserts are not included as part of the meal pattern because they tend to be generally high in sugar and fat and lack other nutrients. Notwithstanding, they could be used efficiently when they form part of the general planning of meals.

Table 1: Sample Menu for a Day's Meal

Breakfast	Lunch	Dinner/Supper
Fruit or fruit juice	Main dish	Main dish
Main dish	Accompaniment	Accompaniment
Bread	Side dish	Side dish
Beverage or porridge	Dessert/Fruit	Dessert/Fruit

Learning Tasks

1. Share experiences on food commodities and healthy meals.
2. Discuss the factors to consider in planning healthy meals for the family.

Pedagogical Exemplars

1. Group work and Collaborative Learning

a. In groups, discuss the factors to consider when planning healthy meals for the family including the terminologies used in meal planning.

b. Guide the groups to present their findings using varied modes of presentation.

2. Experiential Learning

a. In mixed/ability groups surf the internet/watch videos/pictures/posters on meal planning for individuals and special groups in the family to assess the role of cultural and socio-economic factors in shaping food choices and meal patterns.

b. Guide the learners' groups to discuss the meal patterns using charts/pictures/posters.

c. Encourage the learners to relate the discussion to their immediate environment and experiences using everyday practices and use different resources to motivate active participation of all learners (male, females and SEN learners), etc.

Key Assessment

DoK Level 2: Skills of Conceptual Understanding

1. State at least two reasons for planning meals for individuals and the family.
2. Explain the importance of considering the nutritional requirements of all family members when planning a meal.

3. Explain the importance of meal patterns on the nutritional intake of individuals, families and society
4. Identify at least three difficulties in implementing nutritional interventions to support individuals, families, and societies.

DoK Level 3: Strategic Reasoning

Describe the socio-economic factors to be considered when planning meals for the family

Hint

The recommended Mode of Assessment for Week 3 is Poster Presentation. Refer to question 4 of DoK level 2 as a example of a poster question. The outline indicating a detailed scope and rubrics for learners on their poster assessment has been provided in Appendix C. See Teacher Assessment Manual and Toolkit pages 76 for more information on how to organize Poster assessment

WEEK 4: MEAL PLANNING FOR INDIVIDUALS, FAMILIES AND THOSE WITH DIETARY RELATED DISEASES

Learning Indicators

1. *Develop a meal plan that meets the nutritional needs of individuals and families*
2. *Plan special meals to support groups of individuals suffering from dietary related diseases in the family*

FOCAL AREA 1: DEVELOP A MEAL PLAN THAT MEETS THE NUTRITIONAL NEEDS OF INDIVIDUALS AND FAMILIES.

Key Concepts

A meal planning format is a structured template or outline used to plan and organise meals for specific groups of people and periods such as a day, week, or month. It typically includes essential details like meal type, ingredient, cooking methods and serving/portion sizes.

a. Components of Meal Planning Formats

i. Meal Type: Breakfast, Lunch and Dinner
ii. Menu: List of dishes or courses to be served
iii. Ingredient List: List of ingredients required for each dish
iv. Cooking Methods: Cooking techniques and methods used for each dish
v. Serving Sizes: Number of Serving and Portion sizes
vi. Dietary Restriction (vegetarians, Gluten – Free), etc.

b. Benefits of Using a Meal Planning Format

i. Time saving
ii. Reduces food waste
iii. Promotes healthy eating
iv. Supports dietary restrictions
v. Improves meal planning organisation

Example: Meal Planning Template

Section A: Dishes

Table 2: Dishes, reason for choice and ingredients & quantities required

Dishes chosen	Interpretation/Reason for Choice	Ingredients & Quantities required

Section B: Total Quantities of Ingredients

Table 3: Ingredients

Total quantities of all ingredients			
Fresh stores	**Quantities**	**Dry stores**	**Quantities**

Section C: Time Plan

Table 4: Time Plan

Order of Work	
Time	**Activity**

FOCAL AREA 2: SPECIAL MEALS TO SUPPORT SPECIAL GROUPS OF INDIVIDUALS SUFFERING FROM DIETARY RELATED DISEASES IN THE FAMILY

Key Concepts

a. Planning Meals for Special Groups

The life cycle has several stages: prenatal, infancy, early childhood, late childhood, adolescence, middle age, and old age. Each stage has different nutritional needs and poor nutrition at any stage may create health problems. Careful selection of food from the six

food groups and effective planning and preparation of meals for each stage would promote a good life and avoid nutritional ailments.

Fig. 3: *The Ghanaian Six Food Groups*

- ***Meals During Pregnancy****:* Diet during pregnancy affects both the mother and the foetus. The mother's nutritional status prior to pregnancy is very important to the outcome of the pregnancy. Good nutrition is especially important because the mother nourishes the foetus through her own body. The nutrient needs of the foetus must be met by the food the mother eats. If they are not met, the nutrient may be taken from the mother's tissues, causing her to have deficiencies. During the first trimester of pregnancy, the nutritional need of the foetus is small. However, during the second trimester, nutrients must be increased in the diet, especially protein, calcium, and iron in order to provide both the foetus and the mother with sufficient nutrients.

  The foetus needs calcium for well-formed bones and strong teeth later in life. The need for iron is especially high during the last six months of pregnancy; to build up iron stores before birth and for the increase in the volume of blood. Breast milk contains very little iron, so the mother must build reserves to last for at least four months after the birth of the baby. A pregnant mother's diet contains foods from all the food groups. She needs a lot of fruits and vegetables, legumes, and cereals. A good mixture of legumes and cereals like 'waakye' or corn dough porridge and 'koose' are good for the pregnant mother. Meat and other animal foods, and fats and oils should be eaten in moderation. Pregnant women should avoid eating too much salt and sugar, alcohol, and smoking. Overeating and eating during the night should also be avoided because it could lead to excessive gain in weight.

- ***Meals for lactating mothers****:* During lactation, a mother has an increased need for energy, protein, vitamins and minerals for the secretion of milk. Fluids are needed to

provide water in the milk. Lactating mothers should drink a lot of fluids in the form of water, fruit juices, and soups. Nutritional needs of lactating mothers are only slightly higher than those of pregnant mothers. Lactating mothers should avoid alcohol and take medication only under supervision. Lactating mothers should eat a lot of fruits and vegetables and main dishes like 'Kontomire' stew, palm nut, and groundnut soups to which turkey berries (Kwahunsusua) has been added.

- ***Meals for Infants:*** Infants refer to children from birth to five years. They are often divided into 0-2 years and 3-5 years. Ideally, babies should be fed with a mother's breast milk until they are about six months old. Exclusive breastfeeding means giving babies only breast milk, and no other feeds until they are six months old. It is believed that if a mother produces enough breast milk it should provide the baby with enough water, energy and all the nutrients to meet the baby's needs. After this period, the baby would be ready both physically and physiologically to handle the weaning foods provided for it. The greatest advantage of breastfeeding is the immune characteristics the mother gives her baby through the very first milk she produces called colostrum. Babies grow faster during infancy than at any other time during their life. By the time a baby is one year old, he or she might weigh three times or more than at birth. This growth will depend largely on the kinds and the amounts of food that he or she eats. Babies' stomachs are small therefore; it is necessary for them to eat very often about every four hours. Graduating from six months, an infant's food should start from an almost liquid diet through a semi-solid diet to an adult diet. You may start with fruit juice, cereal, egg yolk and fruit puree. By the time a baby reaches 1½ years, they must be able to eat an adult diet. The change from baby diets to adult diet is called weaning. The baby is gradually removed from breast milk to semi solid foods, to adult food and care must be taken with the introduction of the various foods. Remember that the energy and protein needs are high during the weaning period. Any deficiencies may lead to protein energy malnutrition which could adversely affect the normal growth of the child. When planning meals for infants it is important to serve food attractively; vary the dishes to prevent monotony and serve small portions at a time
- ***Meals for Older Children:*** Children of this age are between six and twelve years old and grow at a steady rate. Many of the food/eating habits carried into adulthood are developed during these years. The amount of food a school age child needs will depend on his or her growth rate and physical activity. A child's appetite is a reliable indicator of his energy and nutritional need. Foods given to this age group should contain high proportions of protein, vitamins and minerals to promote growth and development and enough energy for the increase in physical activity. A variety of well-balanced meals must be given to widen the scope of the child's diets. Meals must be adequate in quantity.
- ***Meals for Adolescents:*** This is a group of young children who are between the ages of thirteen and nineteen, mostly referred to as teenagers. Adolescents undergo a period of growth spurt where there is very rapid growth. For girls, it starts as early as 13 years, and for boys, it is about 14 years. During this period more energy is needed because of the increased activity of this age group. They need as much protein, minerals and vitamins as adults. Because of their busy daily schedules, snacks become an important part of their daily meals and therefore snacks must be well-chosen so that they can provide the necessary nutrients. Poor nutrient intake during the adolescent years, especially calcium and iron could lead to health problems later in life.

- ***Meals for Adults:*** Energy needs of adults decrease as people become older. Adults who have active lives require more energy than adults who live sedentary lives. Adults require less calories than adolescents. They should plan their meals to improve the nutritional quality of their diets, because growth has seized, and most of the protein eaten is for the maintenance and repair of worn-out tissues. Eating balanced meals would help adults to meet their nutritional needs daily.
- ***Meals for the Aged:*** Being elderly is another phase of life. By the age of 60, people are said to be old. The aged need about the same amount of nutrients as younger people. However, because of their sedentary lifestyles, they require fewer calories to maintain a satisfactory weight. When planning meals for the elderly, foods which are good sources of proteins, vitamin C, iron, calcium, and dietary fibre must be included. The meals must be easily digested, they must be tasty and well-balanced.
- ***Meals for Vegetarians:*** A vegetarian is any person who does not eat animal flesh. There are various categories of vegetarians. They include:
- ***Vegans or strict vegetarians***: These are people who depend solely on vegetable/plant foods for their nutrients. They do not eat any animal food.
- ***Lacto-vegetarians***: People in this group will use milk in addition to vegetable/plant foods.

  They come under the broad group of partial vegetarians.

  - ***Ovo-vegetarians***: These vegetarians are also partial vegetarians, and they eat eggs in addition to vegetables.
  - ***Lacto-ovo-vegetarians***: eat eggs and use milk in their diet.
  - ***Pesco vegetarians:*** eat only fish and vegetables.
  - ***Fruitarians:*** *V*egans who eat mostly fruit.

b. ***Planning Meals for Vegetarians***

Vegetarians need the same amounts of nutrients as everybody else. The problem with their diet is that it is not easy to provide them with some of the important nutrients they require from only plant foods. Because animal foods are absent, it is more difficult to get complete proteins and vitamin B12. To be able to achieve a balanced meal that provides all the essential amino acids, they must choose a careful selection of foods from all the food groups. Important is the mixing of cereals and legumes in meals. E.g., Rice and beans (waakye); Groundnut soup and rice balls; Corn dough porridge and *'Koose' (*local fried beans cake) *and* Beans stew and *'Kenkey'.*

Vegetarians should eat a variety of fruits and vegetables in their diet. For partial vegetarians who eat eggs, milk or fish, meals do not pose a lot of problems because milk, eggs and fish provide complete proteins. Care must be taken to make vegetarian meals palatable and attractive. Vitamin B12, one of the very important B-complex vitamins, is found mainly in animal food. Vegans would therefore need to take this vitamin as a food supplement to avoid its deficiency.

Fig. 4:: *Preparation of special diet*

- ***Meals for Invalids and Convalescents****:* An invalid is a person suffering from an ailment whilst a convalescent is a person recovering from an ailment.

  - ***Invalids:*** Invalids are sick, may have a high temperature, general body weakness and poor appetite. These may affect their attitude towards food and eating. The homemaker must provide the correct feeding for the maximum amount of nourishment with a minimum amount of bulk.
  - ***Convalescents:*** The convalescent can eat any food, depending on the type of illness. They should be allowed to choose from a wide variety of foods that will provide the necessary nutrients for their quick recovery. As activity increases, large portions of energy giving foods may be given. Meals must be prepared with a greater variety of cooking methods.

- ***Diets for specific ailments***

  - ***Diabetic patients*** should avoid those foods which put a lot of glucose into the blood in large quantities. Their diets should contain a lot of fibre and they should avoid refined carbohydrate foods and saturated fats.
  - ***Hypertensive patients*** should avoid eating a lot of salt and saturated fat. They should eat a lot of fruits and vegetables and whole grain products. Sample food commodities.
  - ***Diarrhoea*** makes patients lose a lot of fluids from their body. They must be made to drink a lot of water containing oral rehydration salt. Fruit juice, coconut water, soups, and various kinds of porridge can also be given.
  - ***Malaria*** - People suffering from malaria must take in a lot of fruits and foods that provide iron, and vitamins.
  - ***High temperatures*** - For ailments that have temperature as a symptom, liquids are very important. Soups, fruit juices, vegetable juices, milk shakes must be given very often.

    Note: In planning meals for invalids and convalescents. It is important to provide all the necessary nutrients in their right amounts to enable them to recover quickly. These nutrients include:

- Proteins that are needed for building, replacement and repair of the tissues that have been damaged by the ailment
- Energy is needed for body functions and to assist in recovery. Invalids may not be able to move about, therefore, they use less energy. Wholemeal foods should be given rather than refined foods.
- Vitamins and minerals are protective nutrients which help the body to fight diseases. They form part of antibodies and therefore, they are necessary in the invalid diet. Fruit juices, eggs, liver, leafy green vegetable, fish oils, legumes, and cereals are important in the invalid's diet.

Learning Tasks

1. Discuss the nutritional needs of individual members of a family at different stages in the lifecycle.
2. Surf the internet/watch videos/pictures/posters on meal planning for special groups of people.
3. Plan healthy meals for special groups of individuals in a family.
4. Plan meals using the Assignment Plan format, etc.

Pedagogical Exemplars

1. Managing talk for learning approaches

a. In mixed gender/random/pyramid groups, present a report for class discussion on how the nutritional needs of individuals and special groups in a family impact the meal planning process e.g.

i. Hypertensive

ii. Diabetic

iii. Anaemic, etc.

2. Group Work/Problem Based Learning

b. In mixed ability/gender/random groups, think-pair-share to discuss the challenges of planning healthy meals for special individuals in the family using an Assignment Plan format for practical activities in the next lesson and present it in class.

i. Nutritional requirements vary

ii. Food allergies and intolerances

iii. Budget constraints

iv. Time and convenience issues

v. Cultural and personal preferences

vi. Availability of special dietary foods, etc.

Present in class for feedback. Groups present their report using different forms of presentation.

Note

Learners use different ways/modes of presentations such as oral presentations, audio and videotape productions, photographic, written report.

Key Assessment

DoK Level 4: Extended Critical Thinking and Reasoning

a. Case study scenario

A family of six consists of a toddler, nursing mother, pregnant woman, adolescent, father and an aged person who is suffering from blood pressure (BP),

Study the family scenario carefully and respond to the following questions.

i. Assess the nutritional needs for each of the family members.

ii. Discuss the factors to consider when planning meals for each of the family members.

iii. Plan meals for at least **three** members of the family using the Assignment Plan format as follows:

Section A

Dishes Chosen

Dishes Chosen	Interpretations/Reasons for choice	Chief ingredients and quantities

Section B

Quantities of Ingredients

Total quantities of all ingredients

Fresh stores	Total quantities	Cost	Dry stores	Total quanti-ties	Cost

Section C

Time Plan

Time	Activity

Hint

*The recommended Mode of Assessment for Week 4 is **Case Study**. The outline indicating a detailed scope and rubrics for learners on Case Study assessment has been provided in Appendix D. See Teacher Assessment Manual and Toolkit pages 25 for more information on how to organize Case Study assessment.*

WEEK 5: PRACTICAL MEAL PREPARATION THAT MEET DIETARY NEEDS

Learning Indicator *Prepare and cook balanced meals that meet the dietary needs of individuals and special groups in the family.*

FOCAL AREA: MEAL PREPARATION

Key Concepts

Different health conditions can be observed in the family setting. These individuals may include pregnant women, infants, adolescents, the aged, vegetarians. These groups of people have special nutritional needs which must be met. The meals must therefore be prepared in such a way that each of these groups would have the nutrients they require in the right proportions to avoid nutrient deficiencies. To enhance learners' knowledge, understanding and appreciation of planning and preparing meals, teachers should organise practical activities. These will be designed to encourage learners to plan and prepare suitable meals for **three** of the following individuals /special groups in the family:

a. Toddler
b. Adolescent
c. Pregnant woman
d. Lactating mother
e. Invalid and convalescence

Note

Teachers should ensure that they

i. Mobilise all the required ingredients for the meal preparation
ii. Ensure tools and equipment for cooking are available
iii. Be mindful of the time allocated for cooking and serving
iv. Make conscious effort to cater for dietary needs of the individuals /special groups.

Fig. 5: *Meal Preparation*

Learning Tasks

1. Prepare and cook the meals that were planned in the previous session for individuals/special groups in the family using appropriate ingredients.
2. Display cooked food for peer appraisal.
3. Write and present a report on the preparation of meals for individuals and special groups in the family.

Pedagogical Exemplars

1. Problem based learning

In mixed gender/ability groups use knowledge of nutrition to prepare, cook and serve planned meals for **three** of the following individuals and special dietary groups in the family.

a. Individuals in the family:

i Toddler

ii Adolescent

iii Pregnant mothers

iv Lactating mother

v Invalid and convalescence

vi Children, etc.

b. Special groups with dietary related health conditions

i Obesity

ii Diabetics

iii Other medical conditions.

Display prepared dishes for peer and teacher appraisal

2. Experiential Learning

In small groups/task work group, interview a nutritionist or a dietician to find out how they cater for nutritional needs of special individuals in society. Reflect on the interview and present a report for peer review.

Key Assessment

DoK Level 4*:* Extended Critical Thinking and Reasoning

a. Prepare, cook and serve planned meals for **three** of the special groups in the family.

b. Write a report on the processes involved in the preparation of meals for people from **three** special dietary groups.

WEEK 6: SERVING TECHNIQUES AND TABLE SETTING

Learning Indicator *Apply proper serving techniques and table setting skills suitable for different individuals and special groups, ensuring meal presentation is hygienic and appealing.*

FOCAL AREA: SERVING TECHNIQUES AND TABLE SETTING

a. Meal Service

The process of preparing, presenting and serving food. The choice of an appropriate meal service promotes enjoyment for the individual, family or a group of people who dine together. There are many meal service styles available for individuals, families and groups. They can be classified as formal, informal or informal casual meal service. Meal service and table settings are very important aspects of dining that enhance the presentation and consumption of food. Different meal service styles are used depending on the occasion, cultural practices and the needs of individuals.

Table 5: Types of Meal Services

	Meal service	Description
1	American/Plate Service	Food is plated in the kitchen and served to guests. Common in casual and fine dining restaurants.
2	French Service	Cart French Service – The food is prepared and assembled at table-side. It is offered for small groups of VIPs. Banquet French Service – The food is prepared in the kitchen. The servers serve food on everyone's plate from the guest's left side.
	Gueridon service	Food is partially prepared in the kitchen and taken to the Gueridon Trolley to cook it completely.
3	Russian/Platter Service	Food is cooked in the kitchen, arranged on platters, and served to guests from the left side. Suitable for large banquets and formal dinners.
4	Buffet Service	Food is displayed on a table, and guests serve themselves. It is Ideal for large gatherings and parties.
5	Family Style Ser-vice	Food is placed in large serving dishes on the table, and guests help themselves. Promotes a communal and informal dining experience.
6	Modified English service	Food is brought to the table in serving dishes and served by one person, usually the table head.
7	Compromise ser-vice	It is a combination of the English service and a formal meal service. The main course is served at the table and the rest of the courses are served from the kitchen.

Table and Setting/ Laying: This refers to the arrangement of tableware for a meal, ensuring functionality and aesthetics.

Table 6: Table Setting Components

S/N	Tool	Example
1	Table cover /Tablecloth / Placemat	Tablecloth and placement, clean and appropriately sized for the table
2	Dinnerware	Plates, bowls and serving dishes
3	Flatware	Forks, knives and spoons
4	Glassware	Water glasses and wine glasses
5	Napkins	Cloth or paper folded neatly

b. Importance of Table Laying

Table laying, or table setting, is an essential skill in both domestic and professional dining settings. Proper table laying enhances the dining experience, promotes good etiquette, and ensures functionality. The reasons for table or tray setting/laying are:

i. **Enhances Dining Experience**: Aesthetics and atmosphere of a well-laid table creates a visually appealing environment, contributing to the overall dining ambiance. It sets the tone for the meal, whether it's a casual family dinner or a formal event. The appearance of a table can significantly influence the first impression of guests. A thoughtfully arranged table conveys a sense of hospitality and attention to detail.

ii. **Supports Individuals and Special Groups in the Family:** It is important to consider the requirements of individuals and special groups such as

- Children: Use plastic, unbreakable plates and cups to avoid sharp cutlery
- Elderly: Use non-slip placemats, easy-grip cutlery, and lightweight plates
- Visually impaired individuals: Arrange utensils consistently and describe food placement
- Wheelchair users: Ensure table height allows easy access to food and utensils,

iii. **Promotes Etiquette and Manners**: The laying of the table provides a guide to the way individuals, families and/or guests behave during mealtimes: Table setting serves as a guideline that indicates where to sit, where to place napkins and which utensils to use for each course. This helps maintain good manners and proper dining etiquette. The arrangement, tools and equipment also provide cultural significance demonstrating how different cultures have specific table setting traditions and customs. Understanding and implementing these practices shows respect for cultural diversity and enhances social interactions.

iv. **Ensures Functionality and Efficiency**: The organisation of the layout ensures that all necessary items (cutlery, glassware, napkins) are within reach, making the dining experience more efficient and enjoyable. It helps to manage the space at the table as the settings allow enough room for each individual family member or guest to ensure that serving dishes and accessories fit comfortably on the table.

v. **Reflects Professionalism**: Effective and efficient table setting promotes professionalism to achieve the Hospitality Industry Standards. In the hospitality industry, professional

table setting is very important as it reflects the establishment's standards, practices and commitment to providing high-quality service.

vi. **Skill Development**: Learning to acquire knowledge, understanding and develop the requisite skills and competencies in table setting techniques is an important skill for learners pursuing careers in hospitality, event planning and culinary arts. They demonstrate a high level of competence and attention to detail.

vii. **Enhances Meal Presentation**: Food presentation is enhanced because a well-set table complements the presentation of food, making the dishes look more appealing and appetizing. It enhances the overall dining experience and can even influence the perception of taste. Table settings can be customised to reflect seasonal themes, holidays or special occasions, adding an extra layer of enjoyment and celebration to the meal.

viii. **Encourages Mindfulness and Preparation**: Setting a table requires attention to detail and careful preparation. This mindfulness can translate to other areas of life, fostering a sense of pride and accomplishment in everyday tasks. The act of setting a table can be a calming and ritualistic activity, helping to mentally prepare individuals, families or guests for the meal and creating a sense of anticipation and appreciation.

c. Essential Skills for Table Laying

i. **Attention to Detail:** Ensuring every element is correctly placed taking note of small aspects like straightness of cutlery and alignment of glasses.

ii. **Knowledge of Table Setting Styles**: Understanding different types of table settings (formal, informal, buffet, etc.) as well as being familiar with etiquette and cultural variations in table settings locally and internationally.

iii. **Organisation and Planning:** Planning the table layout based on the menu and number of guests to ensure all necessary items are available and in good condition for all. Applying an aesthetic sense to the process can make the arrangement of the table visually appealing by promoting the co-ordination of colours and themes to enhance the dining experience.

iv. **Cleanliness and Hygiene:** Ensuring all tableware is clean and polished and maintaining a clean and tidy work area before, during and after meals is relevant to promoting food safety.

d. Steps for Laying a Table

i. Pre-laying activities

- Gather Supplies: Ensure you have all necessary items: tablecloth, napkins, cutlery, plates, glasses, and any decorative elements.
- Clean and Polish: Clean the table and all tableware thoroughly and polish glasses and cutlery to remove smudges and fingerprints.

ii. Laying/Setting Activities

- Lay the tablecloth evenly over the table, ensuring it hangs evenly on all sides and smooth out any wrinkles.

- Set the centrepiece in the middle of the table. It could be flowers, candles or any decorative item. Ensure it is not too tall or obtrusive, allowing guests to see each other across the table.
- Place the dinner plate in the centre of each cover.
- Place the salad plate on top of the dinner plate or to the left.

iii. Arrange the cutlery

- Place forks to the left of the dinner plate. The salad fork goes to the left of the dinner fork.
- Place knives to the right of the dinner plate, with the blade facing inward. The dinner knife is placed closest to the plate.
- Place spoons to the right of the knives. The soup spoon goes to the right of the dinner knife.

iv. Set the Glassware

- Place the water glass directly above the knife.
- Place the white wine glass to the right and slightly below the water glass.
- The red wine glass goes above the white wine glass.

v. Place the Napkins

- Folded Napkin: place the napkin to the left of the forks or on the dinner plate.
- Napkin Ring (if used): Slide the napkin through the ring and place it on the dinner plate or to the left of the forks.

vi. Add Additional Tableware

- Bread Plate: Place the bread plate above the forks, to the left of the dinner plate.
- Butter Knife: Lay the butter knife horizontally across the bread plate.

vii. Finishing Touches

- Place condiments and seasoning such as salt, pepper and any other condiments on the table.

viii. Final Check

- Ensure everything is clean, aligned and in the correct position.

e. Example of a Formal Table Setting

i. Centrepiece: Flowers or candles in the centre.

ii. Plates: Charger plate with a dinner plate on top, and a salad plate on the top left.

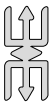
iii. Cutlery: Forks on the left (salad fork outside, dinner fork inside), knives on the right (dinner knife closest to the plate), spoons on the right of the knives.

iv. Glassware: Water glass above the knife, white wine glass to the right of the water glass, red wine glass above the white wine glass.

v. Napkin: Folded on the dinner plate or to the left of the forks.

vi. Additional Items: Bread plate with butter knife above the forks, dessert spoon and fork horizontally above the dinner plate if necessary.

By mastering these skills and steps, you can lay a table that is not only functional but also aesthetically pleasing, ensuring a pleasant dining experience for all guests.



Note

Cover is the arrangement of a place setting for one person. It consists of all dinnerware, glassware and cutlery used by one person at a table.

Learning Tasks

1. Explain the concept of meal service and the types of meal service.
2. Identify table and tray setting/laying components and their functions.
3. Demonstrate the skills and steps for table setting/laying to set tables for different occasions and cultural settings.

Pedagogical Exemplars

1. Talk for learning

a. Ask learners in mixed gender/cultural groups to share experiences on how tables and trays are set in their homes.

b. Groups present their findings for a whole class discussion.

2. Group work

a. Engage learners in mixed gender/cultural groups to discuss tools and equipment used in table and tray settings (table appointments).

b. In mixed ability groups, discuss points to consider when setting a table/tray.

c. Ask learners in mixed gender/cultural groups to discuss table etiquette.

d. Engage groups to present their findings using varied modes of presentation.

3. Experiential learning

a. Ask learners in mixed ability/gender groups to embark on a field trip to hotels/restaurants/chop bars in the community to observe table setting styles and present a report in class.

b. Guide learners to watch videos on table setting and explore the techniques of setting a table.

c. Guide learners to exhibit the skills of table/tray setting for appraisal.

d. Conduct practical activity to exhibit the skills of meal service and table setting for individuals and special groups in the family for peer appraisal.

Key Assessment

DoK Level 3 Strategic Reasoning

a. Discuss the importance of table laying to the individual, family and society.

b. Illustrate how table setting/laying is an enabling environment to promote good table manners among individuals, family and society.

c. Illustrate how table setting/laying is an enabling environment to promote professionalism in the hospitality industry.

d. Plan and lay appropriate table settings for a selected meal service of your choice to a given meal planned in the previous lesson.

Hint

*The Recommended Mode of Assessment for Week 6 is **Mid-semester Examination.** Refer to **Appendix E** at the end of Section 1 for further information on how to go about the mid-semester examination.*

Section 1 Review

The nutrition section addresses issues of a balanced diet for maintaining good health, common dietary related diseases and their causes among individuals, families and the community, effects of excessive consumption of processed foods and sugary drinks on health, basic concepts of nutritional interventions, household and community-based food and nutritional interventions supporting individuals, families and societies, research skills to assess the impact and challenges of house-based and community-based food and nutritional interventions.

Learners will be encouraged to specifically target meal planning for individuals, family members and individuals with special dietary needs. which involves planning with the assignment planning format. and using appropriate cooking methods that help retain nutrients in food to promote healthy living. Learners will prepare and cook balanced and nutritious meals that meet dietary requirements and individual needs. They will also learn about the principles and practices of serving food including table setting in a manner that is safe, hygienic and appealing.

The learner will be encouraged to talk and share ideas confidently among peers and to apply research principles to navigate the complexities of nutritional interventions and its challenges. Learner-centered approach pedagogies such as experiential learning, collaborative learning and the use of pictures, videos, internet resources will be utilised to teach the concepts. With the integration of GESI, SEL and differentiation in the pedagogical and assessment strategies, the emphasis is on formative assessment and the end goal of providing information about learners' progress in terms of their holistic development. Assessment activities include presentations, peer editing critique, oral responses among others. This section will help build learners' confidence and ability to accommodate, be responsible and solicit support from others in managing personal and family situations in healthy living.

APPENDIX A: Sample Portfolio Assessment

Task: Compile and submit a comprehensive portfolio that represents your work for the entire academic year. The portfolio should include a selection of exercise/assignments, project works, reflective pieces and both mid-semester and end of semester examination papers

Structure and Organisation of the Portfolio

As part of the structure of the portfolio assessment, make sure the following information has been provided:

1. Cover Page with
   - **(a)** Learner's name
   - **(b)** Class
   - **(c)** Subject
   - **(d)** Period/date, etc.
2. Table of Contents which has the list of items included with page numbers.
3. Brief description/background of items such as background information for each included artefact, etc.

Learners' work to be included in the Portfolio

1. Clearly explain the purpose of the portfolio and its various components to the learners. Provide examples and templates for each section to guide them in their work.
2. Set up regular review sessions, every 4 weeks, to monitor learners' progress. During these checkpoints, they offer feedback and guidance to help them improve their portfolios.
3. Share the scoring rubrics with the learners and thoroughly explain how their work will be evaluated

Set the final due date for portfolio submission in Week 22 of the academic calendar. Offer a grace period for learners to make revisions based on the final feedback they receive.

Mode of Submission/Presentation

1. Clearly inform all learners of the final deadline for portfolio submission to ensure that all work is completed and submitted on time.
2. Learners should organise their portfolios in a clear and logical manner, with each section clearly labelled and easy to access.
3. Learners may submit their portfolios either in physical form or via the school's online submission system.
4. For digital submissions, learners should upload their portfolios either as a single file or in a well-organised folders within the online platforms.
5. Ensure the portfolio contains all required components: assignments, projects, quizzes, tests, reflective pieces, mini-research work, as well as mid-semester and end of semester examination papers, etc**.**

Feedback Strategy

1. Schedule regular meetings to review learners' progress, set new goals, and make any necessary adjustments to their learning strategies.
2. Provide helpful comments throughout the learning process to support learners 'development. Ensure that learners clearly understand how to use this feedback to continually improve their work and achieve better results.

Scoring rubric/Marking Scheme

Learner's pieces of work	Items	Marks per item	Total Marks
Assignment/Exercise	2	1 mark each	2 marks
Projects works (individual/Group)	2	2.5 marks each	5 marks
Mini – project work (week 21)	1	2marks	2 marks
Reflective Piece (week 13)	1	2marks	2 marks
Mini – research work (week 10)	1	2marks	2 marks
Mid – semester Examination Papers	2	2marks each	4 marks
End of Semester Examination	1	3 marks	3 marks
Total Marks			**20 marks**

APPENDIX B: Group Project

Sample Project

"Nourishing Lives: Planning Healthy Meals for Special Dietary Needs in Ghanaian Households"

Project Objective

You will **develop a realistic and healthy meal plan for a week** for an individual or family with a dietary-related disease (e.g., diabetes, hypertension, anaemia). You will consider local food resources, proper cooking methods that retain nutrients, and the nutritional needs of the chosen group.

Learning Indicators Addressed

1. Demonstrate appropriate cooking methods that help retain nutrients in food to promote healthy living.
2. Develop a meal plan that meets the nutritional needs of different individuals and families.
3. Plan special meals to support groups of individuals suffering from dietary-related diseases in the family.

Project Steps

Step 1: Choose a Case Study

Select one of the following:

- An elderly person with **hypertension**
- A teenager with **anaemia**
- An adult with **diabetes**
- A pregnant woman in the third trimester
- A child recovering from **malnutrition**

Step 2: Research and Gather Information

- Find out the nutritional requirements of the chosen case.
- Identify **local, affordable foods** that support the condition.
- Research **healthy cooking methods** that retain nutrients (e.g., steaming, grilling, boiling).

Step 3: Plan a 1-Week Meal Plan

- Use a table format to list meals (breakfast, lunch, dinner, and snacks).
- Ensure meals are **balanced and realistic** for the Ghanaian context.
- Indicate **portion sizes** and meal times.

Step 4: Choose and Prepare Two Meals from the Plan

- Select two meals and **prepare them using appropriate cooking methods** that retain nutrients.
- Take **photos** or keep a **short record** of the preparation steps.

Step 5: Reflect and Justify

Write a brief explanation (100–150 words)

- Why you selected the meal plan
- How it meets the nutritional needs
- How cooking methods were chosen to preserve nutrients

Resources (Low-Cost)

- Food ingredients from the local market (e.g., kontomire, garden eggs, millet, maize, local beans, yam, plantain, moringa)
- Cooking tools: saucepan, knife, stove/charcoal
- Notebook or phone to document recipes
- Community health worker interviews (optional)

Tips and Guidance

- Focus on **affordability and local availability** of ingredients.
- Avoid deep-frying; instead use steaming, boiling, roasting, or grilling.
- Include fruits and vegetables in all meals.
- Minimize salt and sugar for hypertension and diabetes.
- Use iron-rich foods (e.g., beans, leafy greens) for anaemia.
- Include **clean water** and **safe hygiene practices** during preparation.

Timeline (3 Weeks)

Week	Task
Week 1 (Days 1–5)	Choose case, research, and draft meal plan
Week 1 (Days 6–7)	Finalise meal plan, gather ingredients
Week 2	Prepare and document two selected meals
Week 3	Write reflection and submit project

Rubric for Assessment (Total: 20 Marks)

Criteria	Exemplary (5)	Proficient (4)	Basic (3)	Needs Improvement (1–2)
Meal Plan Quality	Balanced, detailed, realistic meals for 7 days	Mostly balanced, minor omissions	Some meals not realistic or unbalanced	Many unrealistic or incomplete meals
Relevance to Health Condition	All meals suit the dietary condition perfectly	Most meals appropriate	Some inappropriate meals	No clear link to condition

Cooking Methods Used	Excellent nutrient-retaining methods clearly shown	Good methods with few issues	Acceptable methods but some poor choices	Poor methods with no consideration for nutrition
Creativity and Local Food Use	Highly creative with excellent local food use	Good use of local food	Limited creativity or local food use	No creativity or imported food dominates
Reflection and Justification	Clear, thoughtful, insightful	Adequate justification	Basic explanation	Incomplete or missing justification

APPENDIX C: Sample Scoring Rubrics for Case Study

a. Sample Case Study Scenario

There is a family of six members which consists of a toddler, nursing mother, pregnant woman, adolescent, father and an aged person who is suffering from blood pressure (BP),

Study the family scenario carefully and respond to the following questions

i. Assess the nutritional needs for each of the family members.

ii. Discuss the factors to consider when planning meals for each of the family members.

iii. Plan meals for at least three members of the family using the Assignment Plan format as follows, etc.

Criteria	Excellent (4)	Good (3)	Satisfactory (2)	Needs Improvement (1)
1. Research Depth	Shows comprehensive understanding of the family's nutritional needs, includes interview/secondary data, and considers cultural, health, and economic factors.	Covers most essential needs with minimal omissions; research is mostly sound.	Limited research; misses at least two important aspects of family nutrition.	Superficial work; lacks depth or clear research method; major nutritional needs omitted.
2. Accuracy and Relevance	All nutritional recommendations are correct and backed by reliable sources (e.g., WHO, FAO, local nutrition guide).	Mostly accurate; a few minor factual errors; generally relevant sources used.	Some correct points but includes noticeable errors or misapplied concepts.	Several factual inaccuracies; lacks credible sources; not aligned with the scenario.
3. Clarity and Organization	Information is well-organized using headings/subheadings; writing is clear and concise; meal plans are easy to read.	Writing is mostly clear with minor organizational lapses; ideas are generally easy to follow.	Organization needs improvement; writing lacks cohesion in places.	Poor structure; difficult to follow or understand the learner's ideas.
4. Critical Thinking and Application	Demonstrates insightful analysis of individual needs; creatively and appropriately adapts meals using local foods; considers affordability and cultural relevance.	Good analysis with some critical thinking; meals suit individuals but may lack depth in reasoning.	Basic analysis; plans show some understanding but may not fully meet individual needs.	Minimal or no evidence of critical thought; plans do not suit nutritional needs.

5. Practicality of Meal Plans	Meals are realistic, affordable, use low-cost local resources, and meet nutritional requirements of target individuals.	Mostly realistic; meals are nutritious but may include a few impractical choices.	Some meals are suitable but lack affordability or key nutrients.	Meals are impractical, unaffordable, or nutritionally unbalanced.
6. Use of Assignment Plan Format	Fully uses the correct format (name, age, condition, nutrient needs, food items, reason).	Format followed with slight omissions or minor structural issues.	Format used but lacks consistency or key elements.	Format not followed; missing required information or disorganized.

Total Score: /24

APPENDIX D: Sample Scoring Rubric for Poster Assessment

1. Assessment Mode: Poster Assessment:

Sample Question: Identify at least three difficulties in implementing nutritional interventions to support individuals, families, and societies.

Answer: *20 marks for total correct score*

a. ***Difficulties in implementing nutritional interventions –***

i. *Limited financial resources – individuals and families may sometime struggle to afford healthy food options*

ii. *Inadequate access to health care – individuals and families may live in areas where accessing health care service including nutritional counselling nay be a barrier*

iii. *Culture and Tradition – Some cultural practices make it difficult to adapt to new and improved nutritional habits*

iv. *Lack of Policy support – The societies may face challenges on policies that support nutritional programmes and initiatives*

v. *Emotional Eating Habits – Individuals and families may struggle with emotional perceptions about certain foods making it challenging to adapt to healthy eating pattern*

vi. *Food assistance programme limitations – Societies may face food assistance programme limitations that may be difficult for them to have access to healthy food options*

vii. *Exposure to Food Marketing – Individuals and families may be exposed to marketing tactics that promote unhealthy eating practices.*

viii. *Language Barrier – Individuals, families, and societies with deficiencies in certain languages may face challenges in understanding and accessing nutritional information.*

2. Scoring Rubric/ Marking Scheme

Criteria	*Excellent (5 points)*	*Good (4 points)*	*Satisfactory (3points)*	*Needs improvement (2 points)*	*Poor (1 point)*
Identification of difficulties in implementing nutritional Interventions	*Identifies more than three clear difficulties in implementing nutritional Interventions with comprehensive details*	*Identifies three clear difficulties in implementing nutritional interventions with good details*	*Identifies at least three difficulties in implementing nutritional Interventions but details may be generic*	*Identifies fewer than three difficulties in implementing nutritional interventions or provide vague details*	*Fails to correctly identify or explain any difficulty in implementing nutritional interventions*

Depth of Analysis	*Provides an in-depth analysis of how the difficulty in implementing nutritional interventions affects individuals, families and societies.*	*Provides thorough analysis with minor gaps in how the difficulty in implementing nutritional interventions affects individuals, families and societies.*	*Provide a basic analysis with some understanding of the connections between the difficulty in implementing nutritional intervention and the individuals, families, and societies health needs*	*Analysis lack depth and contains significant inaccuracies or omissions*	*Provides incorrect or no analysis of the connections between difficulty in nutritional intervention implementation and the individuals, families and societies.*
Use of examples	*Uses multiple detailed examples to illustrate the influence of nutritional interventions on the health needs of the individual, families and societies.*	*Use as least one relevant example to support the analysis.*	*Examples used are relevant but lack details or do not fully illustrate the influence effectively*	*Examples are minimal, irrelevant, or incorrectly applied*	*No examples are provided, or examples used are completely irrelevant*
Clarity and Coherence	*Presentation of the Poster is exceptionally well organised, clear and logically structured; enhances understanding of the difficulties in implementing nutritional interventions and its effects on the individuals, families and societies.*	*Generally, well organised, and clear with minor lapses incoherent that do not impede understanding*	*Organizations and coherent are adequate but could be improved to aid understanding*	*Disorganised or poorly structured; significantly hampers understanding*	*Lacks any logical structure; very difficult to understand*

APPENDIX E: Sample Table of Specification for Mid – Semester Examination

Below is a Table of specification that provides the number of items to be constructed on the various indicators as well as the DoK levels. Please ensure to follow it to construct your items.

WEEK	FOCAL AREA	TYPES OF QUESTIONS	DOK LEVELS				TOTALS
			1	2	3	4	
1	Importance of consuming a balanced diet for maintaining good health.	Multiple Choice	1	1	-	-	2
	Common dietary-related diseases and their causes among individuals, families, and the community	Essay	-	1	-	-	1
	Effects of excessive consumption of processed foods and sugary drinks on health.	Essay	-	1	-	-	1
2	Basic concept of nutritional interventions.	Multiple Choice	1	1	2	-	4
	Household and community-based food and nutritional interventions supporting individuals, families, and societies.	Multiple choice	-	1	2	-	3
	Research to assess the impact and challenges of household-based and	Essay	-	1	1	-	2
3	Appropriate cooking methods that help retain nutrients in food to promote healthy living.	Multiple choice	2	1	1	-	4
	Develop a meal plan that meets the nutritional needs of different individuals and families	Essay	-	-	-	1	1
4	Plan special meals to support special groups of individuals suffering from dietary related disease in the family.	Multiple Choice	1	2	-	-	3
5	Prepare and serve balanced meals that meet the dietary needs of individuals and special groups in the	Multiple Choice	1	2	1	-	4

Total Number of Questions

Multiple choice question	20
Essay	5

SECTION 2 FOOD PRESERVATION

STRAND: NUTRITION AND HEALTH

Sub-Strand: Food Security

Learning Outcomes

1. *Demonstrate an understanding of the principles of food preservation and their importance in ensuring food security at the household level.*
2. *Apply appropriate food preservation techniques to extend the shelf life of perishable foods for sustainable healthy living.*

Content Standards

1. Explain the principles and methods of food preservation and their role in ensuring food security.
2. Demonstrate the ability to apply appropriate food preservation techniques to extend the shelf life of perishable foods and promote sustainable food security practices.

INTRODUCTION AND SECTION SUMMARY

This section of the teacher manual covers food security which is a second sub-strand to Nutrition and Health. The section is targeted to provide learners with a detailed understanding of Food preservation and Food packaging following scientific principles to enable learners to preserve food in times of abundance to be used in times of scarcity and lean days. Journeying through this section will also highlight the methods needed to preserve food in order to expand the food life span and introduce innovative ways of creating food packages to make them appealing and market smart.

Week 7 Principles and importance of food preservation.

Week 8 Methods of food preservation and their effectiveness.

Week 9 Differentiate between various methods of food preservation.

Week 10 Application of food preservation methods.

Week 11 Application of food preservation methods**.**

Week 12 Package and store preserved food.

SUMMARY OF Pedagogical Exemplars

Learner centered approaches are adopted under each focal area to make lesson deliveries much more interactive in this section. However, the teacher is expected to explore and apply other Pedagogical Exemplars suitable for each focal area and not to limit himself/herself to those mentioned in the section. Some of the Pedagogical Exemplars that are captured in this section include Problem-based Learning, Experiential Learning, Group work and Collaborative

Learning, Talk for Learning Approaches, Structured Talk for Learning, Managing Talk for Learning, to mention but a few. The teacher is also encouraged to incorporate GESI, SEN, SEL, the 21st Century skills, Core National Values and ICT in the lesson delivery, to make it more interactive, inclusive and learner focused.

ASSESSMENT SUMMARY

Various forms of assessments should be carried out to ascertain learners' performance on the concepts that will be taught under this section. Teachers are entreated to administer these assessments and record them for onward submission into the Student Transcript Portal (STP). The following assessment would be conducted and recorded for each learner:

Week 7: *Homework* ***Week 10:****Practical Work*

Week 8: *Group Discussion and presentation* ***Week 11:*** *Practical Work*

Week 9: *Demonstration* ***Week 12:*** *End of semester examination*

WEEK 7: PRINCIPLES AND IMPORTANCE OF FOOD PRESERVATION

Learning Indicator: *Describe the principles of food preservation and how they help maintain food quality and safety.*

FOCAL AREA: CONCEPT OF FOOD PRESERVATION, PRINCIPLES, AND ITS IMPORTANCE

Key concept

To prevent food spoilage and avoid post-harvest losses food must be preserved. When food is preserved, it lasts longer than it would naturally do.

Food preservation

a. Food preservation is the process of treating and handling food to prevent or slow down spoilage while maintaining its quality, safety and nutritional value. The principles of food preservation are based on controlling factors that cause food deterioration, such as microbial growth, enzyme activity and chemical changes

Fig. 6: *Preserved vegetables*

a. The importance of preserving food

Food waste at home affects food security and can contribute to global food insecurity as resources such as water, labour and energy used in the production of food are wasted. The preservation of food is important as it will help to maintain the following:

- Extend shelf life: This ensures food is available for consumption over an extended period, reducing wastage at household and commercial levels.
- Prevent food wastage: Less food is thrown away and consumers can use products before they become unsafe.
- Reduce post-harvest losses: Farmers and food suppliers reduce losses, ensuring continuous availability of food throughout the year.

- Support efficient food distribution: People in remote areas or during emergencies have access to safe and nutritious food.
- Encourages sustainable food consumption: Families save money while contributing to food security by making the most of available food.

b. Principles of food preservation: Enzymes, bacteria, yeasts, and moulds will cause food to spoil unless they are prevented from doing so. These agents of spoilage survive in certain conditions such as air, food, warmth and moisture. It is therefore very important to remove these conditions as well as the right concentration and pH of a medium is also necessary to ensure food can be preserved appropriately. The destruction of the causes of spoilage must be done in such a way that no damage or minimum damage is done to the nutrients of the food. Control of moisture, addition of safe chemicals, altering pH, exclusion of air and preservation by temperature control contribute to food preservation.

c. Scientific principles for food preservation: To preserve foods, the favourable conditions for food spoilage growth must be arrested through scientific principles such as:

- Prevention of microbial growth: Temperature control ensures micro- organisms grow slowly in lower temperatures such as in freezers or refrigerators or in high temperatures as in cooking and pasteurisation.
- Moisture control: Reducing the water content in foods through drying/ dehydration.
- Acidity levels: low pH levels arrest microbial growth in pickling and fermentation of foods.
- Prevention of oxidation: Addition of antioxidants prevents or reduces oxidation in food.
- Proper packaging and storage: Provide a modified atmosphere to prevent food spoilage.
- Temperature control: organisms grow slowly in slowly in lower temperatures such as freezers and fridge or in high temperatures such as cooking and pasteurisation.

Learning Tasks

1. Definition of food preservation
2. Explanation of the importance of food preservation
3. Analysing principles underlying food preservation

Pedagogical Exemplars

1. Problem based learning

a. Ask learners in mixed ability/gender groups to brainstorm why food spoils and how preservation helps. Explain the concept of food preservation and the views discussed within your group.

b. Engage learners in mixed ability/gender groups to use pictures/videos/realia to explain the importance of food preservation.

c. In groups use videos/real-life scenarios such as food wastage at home to discuss food security and present group findings using different modes of presentation.

Example scenarios

- Spoiled vegetables in the refrigerator
- Leftover cooked rice discarded
- Bread growing mould too quickly

Practicing food preservation techniques such as proper storage, refrigeration, freezing and drying helps to reduce food wastage and promotes food security.

2. Managing talk for learning approaches

a. In pairs, share your experiences to discuss the importance of food preservation and feedback in your pairs

E.g. **Importance of food preservation**

- Food preservation reduces food costs.
- It ensures food security.
- To make food safe for consumption.

3. Group Work and Collaborative Learning

a. Guide learners in their mixed ability/gender/cultural groups to discuss the major principles of food preservation

b. Invite learners to present their findings using varied presentation modes for peer appraisal

Key Assessment – Home work

DoK Level 2: Skills of Conceptual Understanding

a. Describe the concept of food preservation.

b. Explain three important reasons for preserving food.

DoK Level 3: Critical Reasoning

Explain three different principles underlying food preservation.

WEEK 8: METHODS OF FOOD PRESERVATION AND THEIR EFFECTIVENESS

Learning Indicator: *Describe the various food preservation methods and their effectiveness in extending food shelf life.*

FOCAL AREA: METHODS OF FOOD PRESERVATION AND THEIR EFFECTIVENESS IN EXTENDING FOOD SHELF LIFE

a. Methods of preservation

Methods used to preserve food include drying, freezing, use of safe chemicals, canning or bottling. Food to be preserved must be wholesome, fresh, firm, and mature. Almost any food can be preserved, and the choice of preservation method depends on the kind of food being preserved. All the methods of preserving foods are based on the principles of preventing or retarding the causes of spoilage i.e., microbial decomposition, enzymatic chemical reactions and damage from mechanical causes, insects and rodents. When spoilage organisms are destroyed and the food protected so that no other microorganisms are allowed to re-enter the food, the preservation is permanent.

b. Causes of food spoilage and related preservation methods

i. Microbial growth Microorganisms such as bacteria, moulds and yeasts break down food components, leading to spoilage, off-odours, slimy textures and foodborne illnesses. The conditions that favour growth include Warm temperatures, moisture, oxygen and nutrients.

Related preservation methods

- Freezing: Slows down microbial activity by reducing temperature.
- Canning and Pasteurisation: Uses heat to kill microbes and extend shelf life.
- Drying: Removes moisture to prevent microbial growth.
- Salting and Sugaring: Creates a high osmotic environment that dehydrates microbes and inhibits their growth, etc.

ii. Enzyme activity Enzymes naturally present in food speed up biochemical reactions, causing ripening, browning and texture changes. For instance, overripe fruits, browning of cut apples and potatoes.

Related preservation methods

- Blanching: Brief boiling or steaming before freezing to inactivate enzymes.
- Refrigeration: Slows down enzymatic activity.
- Acidification (Pickling): Lowering pH with vinegar or lemon juice slows enzyme activity.

iii. Oxidation: Chemical reactions with oxygen which occur due to exposure of food to oxygen that leads to rancidity in fats, loss of colour in fruits and vegetables and nutrient

degradation. This includes rancid oil, browning of cut fruits, loss of vitamin C in exposed food.

Related preservation methods

- Vacuum Packaging: Removes air to slow oxidation.
- Antioxidants (Vitamin C, Citric Acid): Prevents oxidation in food.
- Refrigeration & Freezing: Slows down chemical changes caused by oxygen.

iv. **Moisture content:** Excess moisture encourages microbial growth, enzymatic activity, and texture deterioration. For example, mouldy bread, slimy vegetables and softened cereal.

Related preservation methods

- Dehydration by drying, smoking, and freeze-drying reduces moisture to inhibit spoilage.
- Use of desiccants such as Silica Gel in packaged food absorb excess moisture.
- Proper storage using airtight containers and or refrigeration to prevent moisture absorption from the environment

Learning Task

Describe the causes of food spoilage and the related preservation methods.

Pedagogical Exemplars

1. **Talk for learning approaches**
   a. In mixed ability/gender groups, identify different factors affecting food spoilage and how they relate to preservation methods.
   b. In mixed ability/gender groups, explain how food preservation contributes to reducing food waste and enhancing food security.

Key Assessment

DoK Level 2 Skills of Conceptual Understanding

Discuss three reasons for food spoilage.

DoK Level 3 Strategic Reasoning

Describe three different methods of food preservation.

Hint

*The recommended Mode of Assessment for week 8 is **Group Discussion.** See Teacher Assessment Manual and Toolkit (pages 52–53) for more information on how to go about group discussions.*

WEEK 9: DIFFERENTIATE BETWEEN METHODS OF FOOD PRESERVATION

Learning Indicator: *Differentiate between various food preservation methods such as drying, freezing, fermentation and canning.*

FOCAL AREA: DIFFERENTIATE BETWEEN VARIOUS FOOD PRESERVATION METHODS SUCH AS DRYING, FREEZING, FERMENTATION AND CANNING

Key Concepts

1. **Methods of food preservation**
   a. ***Temperature control method*:** Refrigerators have star ratings which indicate the level of coldness of the fridge and how long food can be kept in the fridge.
      i. **Cold temperatures:** Cold temperatures in the refrigerator and freezer inhibit the growth of micro-organisms, but do not destroy them. Some micro-organisms are destroyed at freezer temperatures up to -18°C. Food removed from the fridge or freezer and left to thaw at room temperature would start to spoil when food attains the right temperature for microbial growth. The length of time food will remain wholesome varies with the temperature at which it is held. In the fridge, food keeps for a few days only. In the freezer, the length increases to several weeks or months. In the freezer, both temperature and humidity are controlled, which supports preservation.
      ii. **Hot temperatures:** Hot temperatures preserve food by destroying micro-organisms and enzymes. Yeast, moulds, bacteria, and enzymes are readily destroyed at boiling temperatures. The heat must be maintained long enough to permit all parts of the food to reach the necessary temperature.
   b. **Canning process:** Bacteria are less readily destroyed because they form spores, which can be resistant to heat. Canning is the principal method by which foods are preserved by heat treatment. The principle is that food is sealed in a can which is heated to a temperature that all harmful bacteria and spores capable of growth during storage are killed. No micro-organisms can gain access to food. Any type of food can be canned. Unlike frozen foods which do not lose most of their nutrients, canned foods may lose some nutrients due to the heat treatment. Thiamine and ascorbic acid may be lost. Canned foods may also lose some of their original flavours. Properly canned foods remain edible for very long periods if the cans are not damaged. When spoilage of canned foods occurs, it is usually caused by defects in the canning due to the inadequate heat treatment or expulsion of air or from improper sealing of the can.
   c. **Use of chemical preservatives**: Salts, sodium nitrate, sugar, vinegar, alcohol, wood smoke and various spices have come to be regarded as chemical preservatives. Micro-organisms cannot tolerate high concentrations of chemicals used in food. Vinegar, for example, discourages the growth of many micro-organisms. It performs this function when food is pickled.

i. **Salting:** Meat and fish have been preserved by salting for a very long time. This method is often used in combination with drying or smoking. Bacon and ham and corned beef are preserved with salt.

ii. **Smoking**: Smoking is another technique of chemical food preservation. Smoked foods have an outer layer consisting of phenols and aldehydes which have anti-microbial effect as well as a distinct taste. The preservative effect is limited to the outside of the food even though heating delays spoilage of the interior.

iii. **Sulphur dioxide:** Sulphur dioxide is a gas used to prevent the growth of unwanted organisms, especially in wines. The gas is rarely used these days, instead, sulphites, hydrogen sulphate and meta sulphites are used. Sulphites have a disadvantage of destroying thiamine in food. Peeled potatoes are kept in sulphite solutions to prevent browning.

iv. **Nitrites:** Nitrites are used to inhibit the growth of clostridium botulinum bacteria which is responsible for the deadly form of food poisoning called botulism.

v. **Antioxidants:** Fatty foods are particularly prone to rancidity due to the oxidation of unsaturated fatty acids. Antioxidants which occur naturally in some fats tend to prevent oxidative changes, which produce rancidity. Vitamin E in palm oil prevents oxidation of the fatty acids and this is why palm oil does not become rancid.

vi. **Sugar and salt:** Concentrated solution of sugar and salt work by surrounding the cells of the micro-organism and draw fluids out of the cells to destroy them.

vii. **Acids**: Acids can also be used as preservatives because most bacteria grow well in neutral mediums. When the medium becomes acidic, they are usually killed, unless they form resistant spores. A scale of 1-14 is used. pH values of 1-6 are acidic, 7 is neutral and 8-14 are alkaline. Acids such as acetic acid are used to preserve foods. Example, acetic acid or vinegar is used in pickling.

d. Drying or dehydration: Micro-organisms depend on moisture for growth and reproduction. Dehydration removes water from the cells of micro-organisms and destroys them. Food placed on large, perforated trays is put in the sun for hot air to blow over it.

i. **Spray drying method**: This is used for drying liquid foods such as milk, eggs and cocoa to convert them into powder. The liquid food enters a large, drying chamber as a fine spray. It mixes with warm air. The water evaporates and the inner powder falls to the bottom of the chamber and is removed.

ii. **Roller drying method:** The liquid food is sprayed onto hot rotating rollers. The moisture is removed, and the dry food is scraped off. Spray-dried foods reconstitute better than roller-dried foods.

iii. **Sun drying method:** Drying food in the sun is the simplest method of drying food and the oldest method of preservation. It depends on weather conditions (high temperature and low humidity). Sun-drying takes a long time. Foods to be dried must be placed on racks, off the ground and food must be stirred occasionally.

iv. **Oven drying method**: The conventional oven can be used for drying food. The oven is set at a very low temperature and the food is placed on baking sheets. The

food is cut into very small thin strips so that it can dry very quickly. If the oven temperature is raised too high, the food would cook instead of drying.

v. **Freeze drying**: This is a commercial process that combines freezing and drying. Raw or cooked foods can be freeze-dried. During freeze-drying, water sublimes. Sublimation means changing from solid to gas without becoming liquid. Freeze-drying takes place in special chambers in which pressure is low. Freeze-dried foods are spongy. Only limited changes occur in the food. They have long shelf life. Freeze-dried foods are reconstituted before use. When reconstituted, freeze-dried foods have almost the same properties as fresh foods.

vi. **Purposes of drying:** Drying preserves food so that it can have a longer shelf life. The drying process decreases the weight and bulk of food, making it easier to package and transport. Drying makes food convenient to use and takes less time to prepare.

vii. **Storage of dried foods:** After drying, the food should contain between 15-20 percent of their original moisture. Once dried, they should be stored in airtight containers, away from moisture. They need to be checked from time to time to make sure they do not become mouldy. Foods that can be dried include fruits and vegetables, starchy roots, Plantain, cereals, egg, milk, meat, fish and legumes.

e. Irradiation: Irradiation is one of the newest methods of food preservation. Food is carried into a metal-plated room to the source of the gamma and beta rays. The food is irradiated for a specified amount of time. Foods irradiated undergo very little change in flavour, colour, odour or nutritional value. This method of food preservation has not gained much popularity because of people's fear of the health hazards that may be caused if doses of rays exceed the recommended level.

Learning Task

Surf the internet and other sources to find information on modern/current ways of preserving food commodities.

Pedagogical Exemplars

1. Talk for learning approach

In mixed ability/gender groups, think-pair-share discuss how to use technology to preserve food commodities and present to class.

E.g.

Sample foods to preserve

- Fish
- Pepper
- Cassava
- Maize

Methods of food preservation

- Canning
- Pickling
- Drying / dehydration
- Freezing
- Salting, etc.

2. **Talk for learning approach**
   - **a.** In a whole class discussion, individually share your experiences and your knowledge and skills of how food preservation can be applied to promote sustainable food security in households.
   - **b.** Discuss the challenges facing food preservation at household, community, and national levels.

3. **Experiential learning/Group work**
   - **a.** In mixed cultural/gender watch videos or case study scenarios to analyse the advantages and limitations of different food preservation techniques.
   - **b.** Invite a food preservation expert or local food processor to demonstrate a preservation method.
   - **c.** In mixed cultural/gender groups, research and present on a selected food preservation method.

Key Assessment

DoK Level 2 Skills of Conceptual Understanding

- **a.** Identify at least four food items that can be preserved
- **a.** Suggest the most appropriate method for preserving each food item stated in (a) above

DoK Level 3 Strategic Reasoning

- **a.** Prepare preserves and select the packaging for your preserves.
- **a.** Explain the rationale for your choice of packaging and explain why it is important to package food appropriately.

WEEK 10: APPLICATION OF FOOD PRESERVATION METHODS

Learning Indicator: *Demonstrate the application of food preservation methods to support sustainable food security at the household and community level.*

FOCAL AREA: DEMONSTRATION ON SCIENTIFIC PRINCIPLES IN FOOD PRESERVATION

The concept of preserves

The treatment given to food to prevent its decomposition or to maintain something in its original or existing state.

a. Types of Preserves

i. **Jams** are sweet spreads made by cooking fruits in sugar and water till they set.

ii. **Conserves** are spreads in which the fruit or fruit pieces remain intact.

iii. **Jellies** are made from strained fruit juices that are boiled with sugar.

iv. **Marmalade** is similar to jam but is made using citrus fruits.

v. **Shito** is a hot black pepper sauce, etc.

b. Practical preparation of preserves

Note

Teachers should ensure that they

i. Mobilize all the required ingredients for the preparation of preserves.

ii. Ensure tools and equipment for cooking are available.

iii. Allocate sufficient time for the preparation, cooking and packaging of preserves.

c. Preparation of Shito

Ingredients

i. 280g powdered herrings

ii. 280g powdered shrimps

iii. 224g tomato puree

iv. 28g powdered red pepper

v. 224g blended onions

vi. 28g ground ginger

vii. 3g white pepper

viii. 3g ground garlic

ix. ½ lit cooking oil

x. Salt to taste, etc.

Method

i. Heat oil in a saucepan.
ii. Pour in onions and spices.
iii. Cook for 15 minutes, stirring well to avoid sticking.
iv. Add pepper and tomato puree.
v. Continue cooking for about 40 minutes until the onion is well-cooked.
vi. Add powdered fish and shrimp and salt.
vii. Cook for 10 minutes or until the vapour coming from the Shito is minimal.
viii. Remove and cool.
ix. Serve with other accompaniments or pour into sterilised bottles to be used later, etc.

d. Preparation of Mango Jams

To make jam, the following are important:

Make sure the fruits are firm; over ripe fruits cause jam to ferment and go mouldy.

Use the right proportion of sugar to fruit. If the fruit lacks pectin, add additional pectin in the form of lemon juice or commercial pectin.

Method

- Always simmer fruits gently before adding sugar. This softens skin and extracts pectin.
- Stir until sugar is dissolved then boil steadily without stirring until the setting point is reached.
  - Use a big pan so that jam does not boil over. Over-boiling makes jam sticky.
  - Boiling beyond the setting point makes oranges, for example lose their jellying properties.
- Test early for setting of jams and jellies.
  - Test with sugar thermometer. Jam sets at 110°C 220°F.
  - Stir thoroughly with a wooden spoon. Turn the spoon round to cool the jam on it, then hold the spoon horizontally; if jam is set, it will form a firm drop.
  - Put a little jam on a cold saucer. It should wrinkle and feel firm if it is adequately set.
- Allow jam to cool slightly before bottling. Fill jars to the top. Cover jars while hot with waxed paper or cellophane. Store in a cool, dry place, etc.

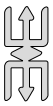
e. Packaging preserves

Select suitable packaging for the product. Consider the following:

i. Aesthetics i.e., does the product look inviting to the customer
ii. Follow scientific principles to ensure food safety and security

f. Marketing strategies for preserves: Craft a compelling marketing strategy to support your preserves within the local community by:

i. Determining your product and price
ii. Identifying your customers
iii. Creating a website
iv. Offering a loyalty program
v. Partnering with a delivery service
vi. Teaming up with food bloggers
vii. Implementing effective feedback systems
viii. Improving the sustainability and growth potential of your business



Note

Discuss the value of love, honesty, truthfulness in the use of additives. Do not use formalin to preserve fish or meat for consumption. Do not use unwholesome ingredients to prepare preserves for sale or consumption.

Learning Tasks

1. Surf the internet and other sources to find out modern/current ways of preserving food commodities.
2. Practical preparation and packaging of preserves.
3. Produce marketing strategies to support your preserves within the local community.

Pedagogical Exemplars

1. **Experiential/collaborative learning**
   a. Ask learners in groups to surf the internet and other sources to find out the modern/current ways of preserving food commodities and report in class.
   b. Assist learners in groups to prepare some preserves using required ingredients. Present the preserves for gallery walk/exhibition. Let learners take a gallery walk to observe each other's exhibit and appraise their products. Encourage learners to employ scientific principles in the preparation of the preserves.
   c. Conduct a mini-project to preserve a food item at home and document the process

2. **Group work**
   a. Ask learners in groups to suggest marketing strategies for their preserves and produce their marketing strategy as a report in class for peer review.

Key Assessment

DoK Level 4: Extended critical thinking and reasoning

Prepare preserves and select the packaging for your preserves.

WEEK 11: APPLICATION OF FOOD PRESERVATION METHODS

Learning Indicator: *Demonstrate the application of food preservation methods to support sustainable food security at the household and community level*

FOCAL AREA: DEMONSTRATION ON SCIENTIFIC PRINCIPLES IN FOOD PRESERVATION (2)

a. Practical preparation of preserves

In our previous week we practiced how to produce shito and Mango Jams. This week we will be preparing the following preserves

i. Orange Marmalade
ii. Pineapple Jams
iii. Pickling

Note

Teachers should ensure that they

i. Mobilize all the required ingredients for the preparation of preserves
ii. Ensure tools and equipment for cooking are available
iii. Allocate sufficient time for the preparation, cooking and packaging of preserves

b. Preparation of Orange Marmalade

Ingredients

i. Orange 450g
ii. Water 2-3 pints Sugar 900g
iii. Lemon I large

Method:

- Cut oranges and remove the pips.
- Soak the peel and pulp overnight.
- Tie the pips and the pulp mixture in muslin
- Put the fruit, water and pips in a covered pan and simmer slowly about 1 ½ hours.
- Take out the bag of pips and stir in the sugar and lemon juice.
- Boil rapidly uncovered until set about 20 minutes.
- Pour into sterilised jars and cover.

c. Preparation of Pineapple Jam

Ingredients

i. Pineapple 800g

ii. Sugar 800g

iii. Water 2 pints

iv. Ginger 1 medium root

Method

- Wash and peel pineapple
- Grate into pulp
- Wash and grate ginger
- Put fruit, ginger and water into a saucepan and simmer gently till soft (about 1 ½ hours)
- Warm the sugar. This helps sugar to dissolve faster without cooling the juice.
- Add sugar to the cooked fruits and stir until it dissolves.
- Allow jam to boil, stirring from time to time and removing any scum.
- Test the jam for setting when it begins to make noise and the bubbles break slowly.
- Warm bottles and pour jam into them.

d. Preparation of Pickled Red Onion

Ingredients

i. Red onion

ii. Peppercorns

iii. Water

iv. Vinegar

v. Salt

vi. Sugar

Method

- Cut onions in half and slice thinly
- Add onions to bowl with peppercorns
- Heat water, vinegar, salt and sugar until dissolved (simmer)
- Cool liquid slightly and pour over onions
- Warm preserving jars and add onions

e. Packaging preserves

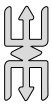
Select suitable packaging for the product. Consider the following:

i. Aesthetics i.e., does the product look inviting to the customer

ii. Follow scientific principles to ensure food safety and security

f. Marketing strategies for preserves: Craft a compelling marketing strategy by:

- **i.** Determining your product and price
- **ii.** Identifying your customers
- **iii.** Creating a website
- **iv.** Offering a loyalty program
- **v.** Partnering with a delivery service
- **vi.** Teaming up with food bloggers
- **vii.** Implementing effective feedback systems
- **viii.** Improving the sustainability and growth potential of your business



Note

Discuss the value of love, honesty, truthfulness in the use of additives. Do not use formalin to preserve fish or meat for consumption. Do not use unwholesome ingredients to prepare preserves for sale or consumption.

Learning Tasks

1. Surf the internet and other sources to find out modern/current ways of preserving food commodities.
2. Practical preparation and packaging of preserves.
3. Produce marketing strategies for preserves.

Pedagogical Exemplars

1. Experiential/collaborative learning

- **a.** Ask learners in groups to surf the internet and other sources to find out modern/current ways of preserving food commodities and report in class.
- **b.** Assist learners in groups to prepare some preserves using required ingredients. Present the preserves for gallery walk/exhibition. Let learners take a gallery walk to observe each other's exhibit and appraise their products. Encourage learners to employ scientific principles in the preparation of the preserves
- **c.** Conduct a mini-project to preserve a food item at home and document the process

2. Group work

- **a.** Ask learners in groups to suggest marketing strategies for their preserves and produce their marketing strategy as a report in class for peer review.

Key Assessment

DoK Level 4: Extended critical thinking and reasoning

Prepare preserves and select the packaging for your preserves.

WEEK 12: PACKAGE AND STORE PRESERVED FOOD

Learning Indicator: *Package and store preserved food under suitable conditions to maintain quality and safety*

FOCAL AREA: PACKAGE PRESERVES USING SCIENTIFIC PRINCIPLES

The Scientific principles of packaging focus on understanding materials, their properties and how they interact with products to ensure protection, preservation, safe handling, efficient storage, and transportation.

a. Physical Principles

- **i.** Protection: Packaging materials should absorb shocks and vibrations to prevent damage to the product
- **ii.** Containment: Packaging should prevent leakages and spillages of contents or products
- **iii.** Structural integrity: throughout transportation, storage and handling packaging should maintain its shape

b. Chemical Principles

- **i.** Chemical resistance
- **ii.** Withstand corrosion
- **iii.** Non-toxicity

c. Biological Principles

- **i.** Sanitation: Packaging should be easy to clean and sanitise.
- **ii.** Pest Control: Packaging should prevent pest infestation.

Meaning of Food Packaging

Food is the science, art, and technology of protecting products for distribution, storage, sales, advertisement and use.

Importance of Food Packaging

- **a.** Prevent contamination
- **b.** Make food attractive
- **c.** Prevent transfer of flavour
- **d.** Protect products for distribution, storage, sales, advertisement and use.

Food packaging materials and qualities of materials used in the food industry.

- **a.** Vapour proof
- **b.** Grease proof
- **c.** Waterproof

d. Odourless

e. Glass

f. Vacuum Packaging: Removes air to slow oxidation

Learning Tasks

1. Surf the internet and other sources to find out modern/current packaging practices/process for preserves.
2. Visit local markets or food processing centres.
3. Research ways that packages and labels promote marketing of preserves.

Pedagogical Exemplars

1. Experiential Learning/Project-Based Learning

a. In groups, visit a local market or food processing centre to observe how preserved/ processed foods are packaged.

b. Report back in class on different types of packaging

1. Experiential/collaborative learning

a. In groups, surf the internet and other sources to find out modern/current packaging practices/process and report back in class.

b. Assist learners in groups to design and prepare packages for preserves using scientific principles as a guide.

c. Let learners take a gallery walk to observe each other's exhibit and appraise their products.

3. Group work

a. In groups discuss the meaning and importance of packaging.

E.g., Packaging is the science, art and technology of protecting products for distribution, storage, sales, advertising and use.

b. In groups, package and label preserves for exhibition. Organise an exhibition to showcase your stored preserves for peer and teacher appraisal.

E.g.,

i. Marmalade

ii. Jam

iii. Pickles

iv. shito

Key Assessment

DoK Level 3: Strategic reasoning

Explain scientific ways of packaging preserves.

DoK Level 4: Extended critical thinking and reasoning

a. Prepare an appropriate modern package for your preserves using scientific principles.

b. Explain the rationale for your choice of packaging

Hint

The recommended Mode of Assessment for Week 12 ***End of Semester Examination****. Refer to* ***Appendix G*** *for a sample table of Specifications on areas for End of Semester Examination. This should be recorded in the student's Transcript Portal.*

SECTION 2 REVIEW

The aim of this section is to reinforce learners' competencies and emphasis essential points in food preservation and packaging, stressing the need to engage learners in hands-on learning. The learners are expected to understand and appreciate the concept of food preservation, principles and its importance, methods of food preservation and packaging. Learners will undertake practical sessions to prepare selected preserves and promote them using relevant marketing strategies. Additionally, learners will design and produce appropriate packages and labels using modern processes or scientific principles, to ensure food safety, security, efficient handling, storage and transportation. The approach of this section is carefully thought through so that learners may apply what they have learned in solving critical social issues in food safety and security.

APPENDIX F: Sample Scoring Rubric for Practical Assessment

TASK: Prepare an appropriate modern package for your preserves using scientific principles.

Total Score: 15 Marks: Each of the three criteria is scored out of **5 marks**

Scoring Rubric for Practical Assessment

Criteria	Excellent (5 points)	Good (4 points)	Satisfactory (3 points)	Needs Improvement (2 points or below)
1. Selection of Package Type	Clearly identifies a modern packaging type (e.g., vacuum-sealed jar, PET container) that is appropriate for the specific preserve (e.g., jam, pickles); explains the choice in relation to product type, shelf life, hygiene, and consumer appeal.	Selects an appropriate modern packaging type with some explanation of its suitability to the preserve; may omit one minor factor (e.g., shelf life or hygiene).	Selects a generally appropriate package type but offers vague or partial explanation; may overlook key details such as safety or storage requirements.	Package type is inappropriate, outdated, or irrelevant to the preserve; no explanation or justification is provided.
2. Appropriateness of Package for Preserve Type	The package fully suits the characteristics of the preserve in terms of shape, size, material, sealing method, and ease of use; packaging aligns with food safety and consumer expectations.	The package is generally suitable but may have one or two issues (e.g., size mismatch, slightly difficult to seal).	The package is somewhat suitable but has noticeable issues that affect functionality or safety.	The package is not suitable (e.g., leaks, contaminates food, or is hard to use), and compromises the preserve's quality.

3. Creativity and Application of Scientific Principles	Demonstrates originality and innovation (e.g., branding, labelling, ergonomic shape); clearly applies scientific principles like vacuum sealing, sterilization, or use of food-safe materials; aesthetically appealing.	Shows effort in creativity and applies scientific principles adequately (e.g., explains heat sealing, proper labelling); minor room for improvement in design or clarity.	Some creative elements present but lacks full understanding or application of scientific packaging methods; may have minor flaws in appearance or explanation.	Little or no innovation; packaging appears rushed or copied; scientific principles not applied or explained; lacks visual appeal.

Teacher Observation Checklist: Use this checklist to guide scoring and ensure that important elements are observed.

Item	Yes (✓)	No (×)	Comment (if needed)
Package is appropriate for the specific type of preserve			
Modern packaging materials are used (e.g., glass jars, PET, plastic film, etc.)			
Packaging includes clear labelling (e.g., product name, date, storage instruction)			
Packaging is sealed properly (airtight, tamper-proof, etc.)			
Student explains or demonstrates a scientific principle (e.g., sterilization, vacuum sealing)			
Package design is neat and visually appealing			
Safety and hygiene standards are observed			
Packaging is easy to store or handle (e.g., stackable, has handles, right size)			

APPENDIX G: Sample Table of Specification for End of Semester Examination

STRUCTURE OF THE EXAMS

PART 1- OBJECTIVES 40 MARKS. 1 MARK EACH

PART 2 – 6 ESSAY QUESTIONS. ANSWER 3 FOR 60 MARKS, 20 MARKS EACH.

TOTAL – 100 MARKS

WEEK	FOCAL AREA	TYPE OF QUESTION	DOK LEVELS				TOTALS
			1	2	3	4	
1	Importance of consuming a balanced diet for maintaining good health	Multiple choice	1		1		2
	Common dietary-related diseases and their causes among individuals, families, and the community	Multiple choice		1			1
	Effects of excessive consumption of processed foods and sugary drinks on health	Multiple choice	1				1
2	Basic concept of nutritional interventions.	Multiple choice	1	1	-	-	2
	Household and community-based food and nutritional interventions supporting individuals, families, and societies.	Multiple Choice	1	-	-	-	1
	Research to assess the impact and challenges of household-based and	-	-	-	-	-	-
3	Appropriate cooking methods that help retain nutrients in food to promote healthy living	Multiple Choice	1	1	1	-	3
4	Plan special meals to support special groups of individuals suffering from dietary related disease in the family.	Multiple	1		1		2
		Essay	-	-	-	-	-
5	Prepare and serve balanced meals that meet the dietary needs of individuals and special groups in the	Multiple choice		1	1	1	3
6	Serving techniques and table setting	Multiple choice	1	1	1	1	4
7	Concept of Food Preservation, Principles, and its Importance	Multiple Choice	1	1	1	1	4
		Essay			1		1

8	Methods of Food Preservation and Packaging	Multiple Choice		2	2		4
		Essay				1	1
9	Differentiate between various food preservation methods such as drying, freezing, fermentation and canning (1)	Multiple Choice		1	2	1	4
		Essay		1			1
10	Differentiate between various food preservation methods such as drying, freezing, fermentation and canning (2)	Multiple choice	1	1	1	2	5
11	Application of Scientific Principles in Food Preservation	Multiple choice		1	2	1	4
		Essay				1	1

Totals Number of Questions

Multiple Choice	40
Essay	6

SECTION 3 METHODS OF FOOD PREPARATION AND HEAT TRANSFER

STRAND: FOOD PRODUCTION

Sub-Strand: Food Production Technology

Learning Outcomes

1. *Exhibit the ability to apply knowledge and principles of heat transfer to select appropriate cooking methods for meal preparation and food processing*
2. *Apply scientific knowledge of heat transfer, cooking tools, and fuels in food processing to ensure food safety.*

Content Standards

1. Demonstrate an understanding of how to apply scientific principles of heat transfer in food preparation and processing to promote food safety.
2. Demonstrate the ability to apply knowledge and principles of heat transfer to select and use appropriate cooking methods, tools, and fuels for food preparation and processing.

Hint

*Assign **Individual Project** for the semester by Week 14. The project should be submitted by Week 16. See **Appendix H** at the end of this section for more information on how to organise individual projects.*

INTRODUCTION AND SECTION SUMMARY

This section covers the principles of heat transfer in food preparation and processing. Learners will apply the principles to different methods of food preparation and processing to promote sustainable food safety practices, The minimum competences required of a learner in this section, include their ability to understand, appreciate and apply the knowledge in the various focal areas of the section. At the introductory part of every focal area, learners are exposed to the theoretical aspect of the concepts and will then be assigned to undertake individual and group practical exploration of these concepts for practical understanding, discussions and assessments.

The weeks covered by this section are:

Week 13 Methods of food preparation and processing that apply heat transfer.

Week 14 Relating heat transfer to methods of food preparation

Week 15 Methods of food preparation for sustainable food safety practices.

Week 16 Challenges in heat transfer principles to food preparation and processing.

SUMMARY OF Pedagogical Exemplars

Teaching Foods and Nutrition effectively requires a clear understanding of the core concepts and their practical applications. This summary provides a pedagogical approach to teaching Methods of food preparation, Heat Transfer, with a focus on engaging students and enhancing their theoretical and practical comprehension of the focal areas. The teacher should explore and adopt other appropriate pedagogies for each focal area and not limit themselves to what is captured here. As a guide, Pedagogical Exemplars such as Group Work and Collaborative Learning, Experiential Learning, Managing Talk for Learning Approaches, Project-Based Learning and Structured Talk for Learning are used in the manual. The teachers are encouraged to incorporate GESI, SEN, SEL, the 21st Century skills, Core National Values and ICT in the lesson delivery, to make it more interactive and learner focused.

ASSESSMENT SUMMARY

A Variety of assessments forms should be carried out to ascertain learners' performance on the concepts that will be taught under this section. Teachers are entreated to administer these assessments and record them for onward submission into the Student Transcript Portal (STP). The following assessment would be conducted and recorded for each learner:

Week 13: *Homework*

Week 14: *Discussion and presentation*

Week 15: *Case Study*

Week 16: *Practical demonstration*

WEEK 13: METHODS OF FOOD PREPARATION AND PROCESSING THAT APPLY HEAT TRANSFER

Learning Indicator: *Discuss the various methods of food preparation and processing that apply principles of heat transfer.*

FOCAL AREA 1: HEAT TRANSFER

In cooking, heat transfer occurs through three methods, conduction, convection and radiation. Each of these methods involves different processes and can be used in various cooking techniques.

i. **Conduction:** Conduction involves the transfer of heat through direct contact between objects or substances. In cooking, this occurs when food comes into direct contact with a hot surface, such as a pan or griddle. Heat energy transfers from the hot surface to the food to cooking it e.g., cooking a cut of meat or yam on a stovetop pan. The pan, heated by the stove, transfers heat to the cut of meat or yam through direct contact to cooking it.

Fig. 7: *Infographic of conduction*

ii. **Convection:** Convection involves the transfer of heat through the movement of fluids (liquids or gases). In cooking, this can be observed in boiling, steaming or baking. Natural convection occurs when warmer, less dense fluid rises and cooler, denser fluid sinks, creating a circulation that distributes heat. Forced convection involves mechanical assistance, like a fan in an oven. For instance, boiling water; as water at the bottom of the pot heats up it becomes less dense and rises, while cooler water sinks, creating a circulation pattern that evenly distributes heat.

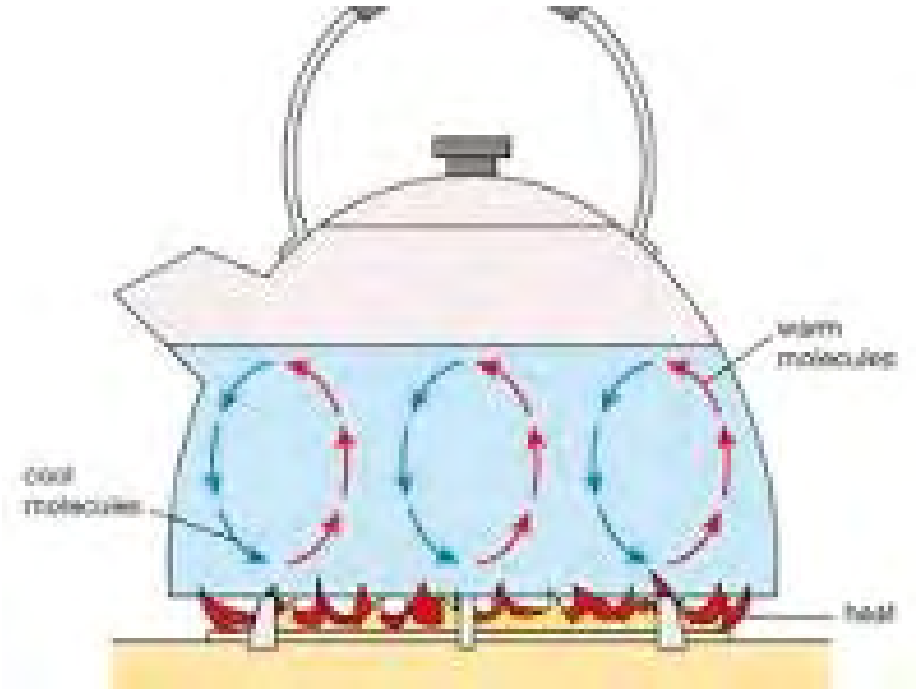


Fig. 8: *Infographic of convection*

iii. **Radiation:** Radiation involves the transfer of heat through electromagnetic waves, such as infrared waves. In cooking, this occurs without direct contact between the heat source and the food. The heat is radiated from a source and absorbed by the food, causing it to cook. For example, grilling. The heat radiates from the hot grill grates or coals to the food above cooking it.

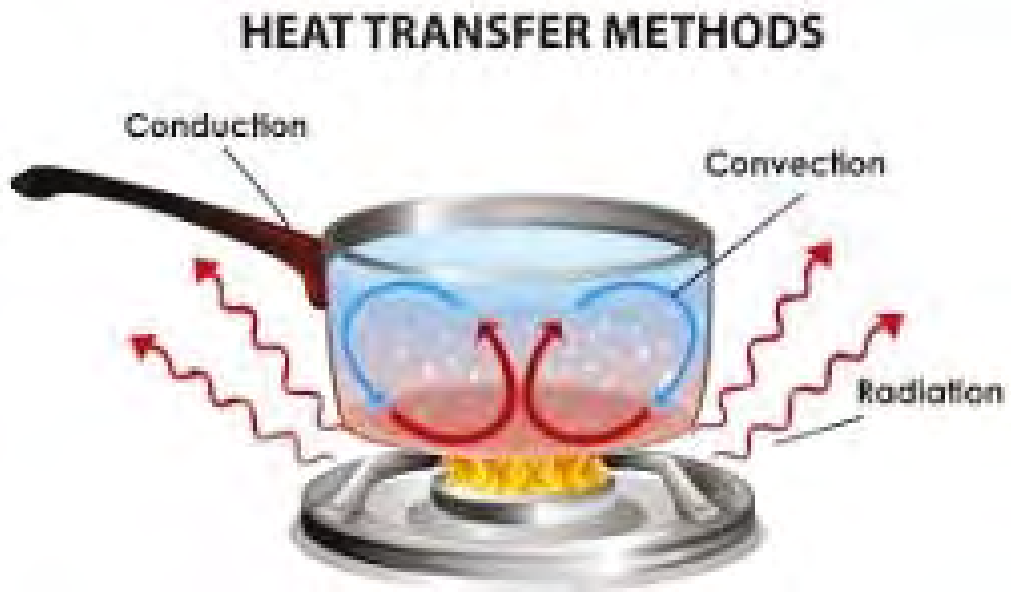


Fig. 9: *Infographic of radiation*

Learning Task

1. Watch videos/experiments on methods of heat transfer applied to different cooking methods.
2. Discuss the effect of heat on food during cooking.

Pedagogical Exemplars

1. Experiential learning

In mixed groups, watch videos/experiments of the various heat transfers used in food preparation and processing.

2. Managing talk for learning approaches

In mixed groups, explain the major principles of heat transfer that households apply in food preparation and processing.

a. Conduction

b. Convection

c. Radiation

In a whole class discussion, groups present the findings using different presentation modes.

Key Assessment

1. DoK Level 2: Skills of conceptual understanding

Explain any one of the following methods of heat transfer

a. Conduction

b. Convection

c. Radiation

FOCAL AREA 2: THE METHODS OF FOOD PREPARATION AND PROCESSING THAT APPLY PRINCIPLES OF HEAT TRANSFER.

Key Concepts

a. The methods of food preparation and processing that apply principles of heat transfer.

i. Conduction-Based Methods

- Frying: Shallow and deep frying
- Sautéing and Stir-Frying
- Boiling and Simmering
- Grilling: Contact grills
- Baking and Roasting

ii. Convection-Based Methods

- Boiling and Simmering
- Steaming
- Deep Frying
- Baking in convection ovens
- Pasteurisation and sterilization

iii. Radiation-Based Methods

- Grilling and Broiling
- Microwaving
- Infrared Cooking
- Food irradiation

b. Application of Heat Transfer in Methods of Cooking

The principles of heat transfer, conduction, convection and radiation are applied in various cooking methods to achieve specific culinary results. Understanding these methods helps in selecting the appropriate technique for different types of food to optimise flavour, texture and nutritional value.

i. Conduction Cooking Methods Conduction involves direct heat transfer from one material to another. This method is prevalent in cooking techniques where food is in direct contact with a hot surface.

- Pan-Frying: Food is cooked by direct contact with a hot pan. For example, frying eggs or pancakes involves heat conduction from the pan to the food, cooking it evenly from the bottom up.
- Sautéing: Is like frying but typically uses less oil and higher heat. This method quickly cooks food, such as vegetables or thin cuts of meat, by conducting heat from the pan surface.

ii. Convection Cooking Methods Convection relies on the movement of heat through fluids such as liquids or gases, either naturally or by mechanical means such as fans in ovens.

- Boiling: Involves heating water or another liquid to its boiling point, causing the liquid to circulate and cook the food submerged in it. This method is commonly used for pasta, vegetables, and eggs.
- Baking/Roasting: Utilises both conduction and convection. In a conventional oven, heat circulates around the food, cooking it evenly. Roasting typically refers to cooking at higher temperatures, often used for meats and vegetables to achieve a brown, crispy exterior.

iii. Radiation Cooking Methods Radiation transfers heat through electromagnetic waves, such as infrared radiation or microwaves, directly to the food.

- Grilling: Uses infrared radiation from a heat source, such as charcoal or gas flames, to cook food. The radiant heat chars the surface of the food, creating a distinctive flavour and texture.
- Broiling: Like grilling, but the heat source is located above the food. This method is ideal for quickly cooking or browning the surface of food items, such as steaks or vegetables.
- Microwaving: Uses microwave radiation to excite water molecules in food, generating heat and cooking the food quickly. This method is efficient for reheating or cooking small portions.

iv. **Combination Cooking Methods** Some cooking techniques combine multiple heat transfer methods to achieve specific culinary effects.

- Steaming: Uses convection by steam, often in combination with conduction if food is placed on a solid surface like a plate or rack within the steamer. Steaming is gentle and helps retain nutrients in vegetables and fish.
- Sous-Vide: Involves vacuum-sealing food and cooking it in a water bath at precisely controlled low temperatures. This method uses conduction from the water to the sealed food and can be combined with a final searing using radiation or conduction to add colour and flavour.

Learning Task

Explain how heat transfer is applied in different methods of cooking.

Pedagogical Exemplars

1. **Managing talk for learning approaches**
   a. In mixed groups, discuss how the principles of heat transfer influences food preparation and processing in households.

2. **Group work and collaborative learning**

In pairs, reflect on your knowledge of the methods of cooking to identify the methods of food preparation and processing that apply the principles of heat transfer.

Key Assessment

DoK Level 2 Skills of conceptual understanding

1. **a.** Explain at least three effects of heat on food constituents/nutrients.

   b. Explain how heat transfer is applied in at least two methods of cooking food.

WEEK14: RELATING PRINCIPLES OF HEAT TRANSFER TO METHODS OF FOOD PREPARATION

Learning indicator: *Relate the various principles of heat transfer to different methods of food preparation and processing*

FOCAL AREA: PRINCIPLES OF HEAT TRANSFER TO DIFFERENT METHODS OF FOOD PREPARATION

Key Concepts

Heat transfer is very important in food preparation and processing, affecting texture, flavour, nutritional value and safety. The three primary modes of heat transfer conduction, convection and radiation are applied in both household cooking and the food industry to ensure efficient and effective food production.

1. **Conduction in food preparation and processing**
   - **a.** Application in Households
     - i. Cooking on stovetops
     - ii. Baking in ovens
     - iii. Use of kitchen utensils
   - **b.** Application in the Food Industry
     - i. Thermal processing
     - ii. Manufacturing canned foods
     - iii. Meat processing
2. **Convection in Food Preparation and Processing**
   - **a.** Application in Households
     - i. Boiling and simmering
     - ii. Baking in convection ovens
     - iii. Deep-frying
   - **b.** Application in the Food Industry
     - i. Forced convection ovens
     - ii. Spray drying
     - iii. Air-blast freezing
3. **Radiation in Food Preparation and Processing**
   - **a.** Application in Households
     - i. Grilling and broiling

ii. Microwave cooking

iii. Toasting

b. Application in the Food Industry

i. Infrared heating

ii. Microwave processing

iii. Food irradiation

4. Implications for food preparation and processing

a. Nutritional impact

i. Some heat transfer methods help retain nutrients better than others convection in frying.

ii. Excessive heat exposure can degrade vitamins, nutrients

b. Food safety

i. Proper heat transfer ensures the destruction of harmful micro-organisms

ii. Uneven heat transfer can lead to foodborne illnesses if parts remain undercooked

c. Efficiency and cost considerations

i. The food industry uses advanced convection-based systems to enhance efficiency.

ii. Infrared and microwave heating reduce cooking times and energy consumption

d. Quality and sensory attributes

i. Different methods influence texture

ii. Maillard reaction and caramelization in baked goods rely on heat transfer principles

Learning Task

1. Discussion on principles of heat transfer that influence food preparation and processing in households.
2. Conduct an experiment to analyse the implications of heat transfer in food preparation and processing.

Pedagogical Exemplars

1. Managing talk for learning approaches

a. In mixed ability /gender groups, discuss how the principles of heat transfers influences food preparation and processing in households.

2. Group work/Problem base learning

a. In small groups conduct an experiment to analyse the implications of heat transfer in food preparation and processing.

b. Present your findings for a whole class discussion.

Key Assessment

DOK Level 2 Skills of conceptual understanding

Explain three implications of heat transfer in food preparation and processing.

Hint

*The recommended Mode of Assessment for week 14 is **Discussion and Presentation.** Refer to Teacher Assessment Manual and Toolkit (pages 52–53) for more information.*

WEEK 15: METHODS OF FOOD PREPARATION FOR SUSTAINABLE FOOD SAFETY PRACTICES

Learning indicator: *Discuss the different methods of food preparation and processing to promote sustainable food safety practices.*

FOCAL AREA1 DIFFERENT METHODS OF FOOD PREPARATION AND PROCESSING

Key Concepts

1. **Sustainable Cooking Methods**
   - **a.** Dry heat method
   - **i.** Baking
   - **ii.** Grilling
   - **iii.** Roasting
   - **iv.** Air frying
   - **v.** Solar cooking
   - **b.** Moist method
   - **i.** Boiling
   - **ii.** Stewing
   - **iii.** Steaming

2. **Sustainable Food Processing Methods**
   - **i.** Pasteurisation
   - **ii.** Fermentation
   - **iii.** Drying and Dehydration
   - **iv.** Freezing and Cold Storage
   - **v.** Vacuum Sealing and Packaging

Importance of using sustainable methods of food preparation and processing

Reducing food waste in preparation and processing

- **a.** Upcycling food scraps
- **b.** Composting
- **c.** Portion control cooking
- **d.** Using sustainable cooking Fuels

Learning Task

Discuss the importance of sustainable cooking methods.

Pedagogical Exemplars

Group work and Collaborative learning

b. In pairs, review knowledge on the methods of cooking learnt in JHS Career Technology.

c. In pairs, discuss the importance of using sustainable methods of cooking and processing food.

Key Assessment

DoK Level 2 Skills of conceptual understanding

Discuss the different methods of food preparation and processing to promote sustainable food safety practices.

FOCAL AREA 2: METHODS OF COOKING FOOD

Teaching the various methods of cooking is essential for equipping learners with practical skills and knowledge about food preparation and its impact on nutrition and health.

Table 7: Moist Heat Method of Cooking

S/N	Method of Cooking	Implications to Healthy Living	
		Advantages	Disadvantages
1. a.	Boiling: Cooking food in water at 100°C (212°F).	Simple and easy to execute also retains more nutrients compared to some methods, particularly if the cooking liquid is consumed e.g., soups.	Some vitamins (vitamin C and B vitamins) and minerals can leach into the water and be lost if the water is discarded.
2. b.	Steaming: Cooking food with steam by placing it above boiling water	Preserves most nutrients, colour, and flavour. Minimal use of fats and oils.	Can be time-consuming for certain foods. Requires a steamer or special equipment.
3. c.	Poaching: Gently cooking food in simmering liquid (below boiling point, 160-180°F or 71-82°C).	Good for delicate foods like eggs, fish, and fruits. Maintains moisture and tenderness without adding fats	Limited to certain types of food. Some nutrients may leach into the poaching liquid.

Table 8: Dry Heat Method of Cooking

S/N	Method of Cooking	Implications to Healthy Living	
		Advantage	Disadvantage
4. a.	Grilling: Cooking food on a grill or over direct heat.	Enhances flavour through caramelization and charring. Excess fats drip off, reducing overall fat content.	High temperatures can create harmful compounds e.g., Heterocyclic amines HCAs and Polycyclic aromatic hydrocarbons PAHs. Requires monitoring to prevent burning and overcooking.
5. b.	Baking/Roasting: Cooking food using dry heat in an oven, hot pan or pot.	Even cooking and suitable for a wide range of foods. Can cook without added fats if desired.	Long cooking times may reduce heat-sensitive nutrients. Some foods may require added fats to prevent drying out.
6. c.	Microwaving: Cooking food using microwave radiation.	Quick and convenient. Preserves nutrients better than some other methods due to short cooking times.	Uneven cooking can occur. Limited to foods that can be microwaved.

Table 9: Hot Fat Method of Cooking

S/N	Method of Cooking	Implications to Healthy Living	
		Advantage	Disadvantage
7. a.	Deep Frying: Cooking food by submerging it in hot oil or fat, usually at temperatures between 350°F and 375°F (175°C and 190°C)	Results in a crispy texture and can enhance flavour. Quick cooking method suitable for many types of food.	High in calories and fats, potentially leading to weight gain if consumed frequently. The formation of trans fats and other harmful compounds can occur when oils are reused or overheated. It can increase the risk of heart disease and other health issues when consumed in excess.
8. b.	Shallow Frying: Cooking food in a small amount of oil or fat, typically in a skillet or frying pan.	Allows for control over the amount of fat used, making it a potentially healthier option than deep frying. Can enhance the flavour and texture of food.	Still adds fats and calories to food. Potential formation of harmful compounds if the oil is overheated. Requires careful monitoring to avoid burning and excessive oil absorption.
9. c.	Sautéing: Cooking food quickly in a small amount of oil or fat over high heat.	Quick method that retains colour, texture, and nutrients. Allows control over the amount of added fat.	Requires constant attention to prevent burning. Depending on the oil used, it can add significant calories and fats.

d.	Stir-Frying: Quick cooking method that involves cooking small pieces of food in a small amount of oil over high heat.	Uses short cooking times, which helps preserve the vitamins and minerals in vegetables. Control the fat and calorie content of the dish.	Uneven cooking can occur due to portion size. Limited to foods such as vegetables and food that can be stir-fried.

Reasons for Cooking Food

Cooking food serves several important purposes, which enhance its safety, palatability, nutritional value and digestibility.

1. **Food Safety** Cooking is a very important step in food safety, as it helps to kill or inactivate harmful microorganisms, parasites and toxins that can cause foodborne illnesses.
   - **a.** Pathogen Reduction: Heat destroys bacteria such as Salmonella, E. coli, and Listeria, which can be present in raw meats, eggs and certain vegetables, etc.
   - **b.** Toxin Neutralisation: Some foods contain natural toxins or antinutritional factors that are neutralised or reduced by cooking. For example, lectins in beans are harmful if not adequately cooked.
2. **Palatability** Cooking enhances the sensory properties of food, making it more appealing to eat.
   - **a.** Flavour Development: Cooking processes, such as Caramelisation and the Maillard reaction, develop complex flavours and aromas that are absent in raw foods.
   - **b.** Texture Improvement: Heat can transform the texture of food, making it tender, crisp or chewy as desired. For example, cooking meat makes it tender, while baking can create a crunchy crust.
3. **Digestibility** Cooking breaks down the structure of food, making it easier for the human body to digest and absorb nutrients.
   - **a.** Protein Denaturation: Heat denatures proteins, making them more digestible and accessible to digestive enzymes.
   - **b.** Cell Wall Breakdown: In plant foods, cooking breaks down cell walls, aiding in the release of nutrients like carotenoids and increasing the bioavailability of minerals.
4. **Nutritional Enhancement** Cooking can increase the availability and absorption of certain nutrients, although some nutrients may be lost during the process.
   - **a.** Nutrient Bioavailability: Cooking can increase the bioavailability of nutrients such as lycopene in tomatoes and beta-carotene in carrots.
   - **b.** Antinutrient Reduction: Cooking reduces or eliminates anti nutritional factors, such as phytic acid in grains and legumes, which can inhibit the absorption of minerals like iron and zinc.
   - **c.**
5. **Cultural and Social Aspects** Cooking is deeply rooted in cultural practices and traditions. It plays a significant role in social interactions, celebrations and the expression of cultural identity.

a. Cultural Significance: Traditional cooking methods and recipes often reflect cultural heritage and are passed down through generations.

b. Social Connection: Sharing meals prepared through cooking fosters social bonds, family connections and community interactions.

Terminologies

i. Marinade
ii. Dice
iii. Knead
iv. Blend
v. Baste
vi. Blanch
vii. Coat
viii. Glaze
ix. Refresh
x. Sauté
xi. Toss

Learning Tasks

1. Surf the internet for information and other sources on methods of cooking food and their impact on healthy living.
2. Describe the advantages and disadvantages of different methods of cooking.
3. Conduct demonstrations or use video demonstrations to practice cooking using different methods.

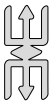
Pedagogical Exemplars

1. Group work and Collaborative learning

Explain common terminologies used in food preparation and processing and present your findings for a whole class discussion.

2. Experiential learning

In groups, watch videos conduct experiments on different methods of cooking to prepare suitable dishes. Write a report describing the advantages and disadvantages of different cooking methods



Note

Emphasise the need for the following

Kitchen Safety Instruct students on essential kitchen safety practices, such as proper handling of knives, safe use of appliances, and preventing burns and cuts.

Food Hygiene Cover the basics of food hygiene, including proper food storage, avoiding cross-contamination and maintaining cleanliness during food preparation

Key Assessment

DoK Level 2 Skills of conceptual understanding

Case Study Scenario

Ama and Milly are secondary school students who love street foods like Noodles and fried chicken. However, they have recently learned about the health risks associated with consuming too much fried food, including high cholesterol and heart disease. They want to find healthier cooking methods that can still satisfy their taste preferences.

Reflect on the case study scenario and complete the table with information on the methods used in cooking the food Ama and Milly like eating regularly.

S/N	Method of Cooking	Implications to Healthy Living	
		Advantage	Disadvantage

DoK Level 3 Strategic reasoning

a. Suggest alternative cooking methods that Ama and Milly could use to prepare their favourite foods in a healthier way.

b. For each method, explain how it could reduce the health risks while maintaining or enhancing the flavour of the food.

Hint

*The recommended Mode of Assessment for week 15 is a **Case Study.** Refer to Teacher Assessment Manual and Toolkit (pages 22 – 25) for more information on how to organize Case Study assessment.*

WEEK 16: CHALLENGES OF APPLYING HEAT TRANSFER PRINCIPLES IN FOOD PREPARATION AND PROCESSING

Learning Indicator: *Analyse the challenges of applying the various heat transfer principles in food preparation and processing*.

FOCAL AREA: CHALLENGES IN APPLYING THE VARIOUS HEAT TRANSFER PRINCIPLES IN FOOD PREPARATION AND PROCESSING.

Key Concepts

Challenges in conduction-based methods

a. Heat distribution may be uneven

b. Heat loss and energy inefficiency

c. Food sticking to cooking surfaces, etc.

Challenges in convection-based methods

a. Energy consumption in large-scale processing

b. Poor air/fluid circulation can lead to uneven cooking

c. Moisture and nutrient Loss, etc.

Challenges in radiation-based methods

a. Risk of overcooking or undercooking

b. Health and safety concerns

c. Equipment costs and maintenance, etc.

General challenges in heat transfer application in food processing

a. Balancing food safety and nutrient retention

b. Environmental impact of heat-based processing

c. Technological and cost barriers in developing regions

d. Food safety risks from improper heat control, etc.

Effects of Heat on Food during Cooking

The application of heat to food results in a variety of physical and chemical changes, affecting its texture, flavour, nutritional content, and overall quality. The primary food constituents impacted by heat include proteins, carbohydrates, fats, vitamins and water.

a. Proteins: Heat denatures proteins, altering their structure and functionality. This process is essential in cooking as it affects the texture and digestibility of food. Denaturation causes proteins to unfold and form new bonds, which can result in coagulation as in eggs or tenderisation as in meat. In cooking meat, the heat causes

the muscle fibres to contract and proteins to coagulate, changing the texture and juiciness.

b. Carbohydrates: Carbohydrates in food undergo several transformations when heated. Starch gelatinization occurs when water and heat cause starch granules to swell and burst, thickening the food. Additionally, caramelization and the Maillard reaction can enhance flavour and colour. For instance, in baking bread, the starch gelatinization helps set the structure, while the Maillard reaction contributes to the crust's colour and flavour.

c. Fats: Heating fats can lead to melting and at higher temperatures to their breakdown and oxidation. This process can produce desirable flavours (e.g., browning of butter) or undesirable compounds if fats are overheated. For example, in sautéing vegetables, the melting of fats and oils facilitate heat transfer and enhances flavour.

d. Vitamins: Heat can degrade certain vitamins, especially those that are water-soluble (like vitamin C and B vitamins). The extent of nutrient loss depends on the temperature, cooking method and duration. For instance, boiling vegetables leads to prolonged exposure to heat which can lead to significant loss of vitamin C.

e. Water: Heating food often results in water evaporation, which can concentrate flavours but also cause food to become dry. Controlling water loss is very important in various cooking techniques to achieve the desired texture. For instance, roasting meat leads to controlled water loss, concentrates flavours and develops a desirable crust while maintaining internal moisture.

Learning Tasks

1. Discuss the effects of heat on the following nutrients.
   a. Protein
   a. Vitamins
   b. Fats and Oil
2. Explain the challenges in applying heat transfer principles to cooking methods.
   a. Conduction
   a. Convection
   b. Radiation

Pedagogical Exemplars

Talk for Learning /Collaborative Learning

a. In a whole class discussion, building on what others say, analyse the challenges of applying the various heat transfer principles in food preparation and processing.

b. Working in mixed groups, learners are to experiment on food items to study the changes that occur and the challenges this may have on food products after cooking. Groups present their findings for class discussion.

Key Assessment

DOK Level 2 Skills of conceptual understanding

Discuss the challenges of applying the various heat transfer principles in food preparation and processing.

DOK Level 3 Strategic reasoning

Explain the changes that occur and the challenges this may have on food products after cooking.

SECTION 3 REVIEW

This section aims to reinforce learners' understanding and highlights essential points from each focal area, emphasizing the need to engage learners in practical work. The learners are expected to understand and appreciate Food Additives and Condiments, Natural Colours from Natural Food Sources, Preparation/Production of Food Additives and Condiments, Types of Flour used in Flour Cookery, Basic Ingredients used in Flour Cookery, Experimenting with Flour Products and the Enrichment and Fortification of Flour Products as well as evaluating the quality of the flour product. The inclusion of practical exercises and interactive discussions significantly enhances the learning experience, ensuring that learners are not only theoretically informed but are also able to demonstrate various proficiency levels in applying what they have learned in food production.

APPENDIX H: Individual Project

TASK: "Exploring Heat Transfer Principles in Traditional and Modern Ghanaian Food Preparation"

Learning Indicators Covered

1. Relate the various principles of heat transfer to different methods of food preparation and processing.
2. Discuss the different methods of food preparation and processing to promote sustainable food safety practices.
3. Analyse the challenges of applying the various heat transfer principles in food preparation and processing.

Project Description

You will individually investigate **three methods** of food preparation or processing (e.g., boiling, grilling, frying, smoking, steaming, baking, etc.) used in Ghanaian communities. For each method:

- Identify the **heat transfer principle** involved (conduction, convection, radiation).
- Prepare or simulate preparation of a common Ghanaian food using that method.
- Document how food safety is considered in the method.
- Identify any **challenges** experienced or commonly faced when applying that method.
- Suggest ways to make the method **safer, more efficient, and sustainable.**

You are expected to work on this project over a period of **three weeks** and present your findings in a **simple report**(written or video-recorded), including diagrams or photos where possible.

Resources You Can Use (Low-Cost & Locally Available):

Resource	Purpose
Charcoal or firewood stove	Heat source for traditional cooking methods
Metal pot, saucepan, frying pan, earthenware bowl	Cooking vessels
Cooking thermometer (if available) or touch observation	Estimating temperature or heat effect
Plantain, yam, fish, cassava, rice, maize, beans, tomatoes, onion, palm oil, etc.	Common food items for preparation
Phone camera	To take pictures or videos of the cooking process
Notebook or A4 paper	For writing the report or drawing diagrams
Clean utensils and surfaces	Food hygiene practice

Old newspapers or online resources (local blogs, Ghanaian food websites)	Background research

Timeline (3 Weeks)

Week	Task
Week 1	Select 3 food preparation methods and identify associated heat transfer principles. Write a plan and gather materials.
Week 2	Carry out the food preparation (or simulate if needed). Take notes and photos. Focus on food safety and challenges observed.
Week 3	Compile findings in a written report (3–5 pages) or record a video (5–8 minutes). Submit by end of week.

Suggested Structure for the Report

1. **Cover Page:** Name, class, title
2. **Introduction:** What the project is about and why it is important
3. **Food Preparation Methods:**
   - Method 1: Name, food prepared, heat transfer principle, process, food safety measures, challenges, suggestions
   - Repeat for Method 2 and 3
4. **Conclusion:** Summary of findings and personal reflection
5. **References / Acknowledgements**
6. **Photos or drawings (optional)**

Scoring Rubric (Total: 20 marks)

Criteria	Excellent (5 pts)	Good (4 pts)	Satisfactory (3 pts)	Needs Improvement (2 or below)
Identification of Heat Transfer Principles	Accurately identifies and explains all heat transfer principles related to the selected methods with clear examples.	Correctly identifies principles for most methods with some explanation.	Basic identification; explanation is vague or partially accurate.	Incorrect or missing principles; lacks explanation.
Application and Description of Methods	Describes each method clearly, with accurate steps, tools, and foods used. Demonstrates deep understanding.	Describes most methods well; minor details may be missing.	Describes methods in general terms; some steps unclear.	Poor or missing description of food preparation methods.

Food Safety and Sustainability Practices	Thoroughly explains food safety measures and sustainable practices in all methods.	Mentions key safety and sustainability points but misses one or two.	Provides limited or vague discussion on food safety.	Lacks or incorrectly presents food safety practices.
Analysis of Challenges and Suggestions	Clearly analyses relevant challenges and suggests practical, thoughtful improvements.	Discusses some challenges with basic suggestions.	Limited analysis; suggestions are not well connected.	No clear analysis or unrealistic suggestions.
Presentation & Organization	Report/video is neat, well-structured, uses visuals/photos, and communicates ideas clearly.	Mostly organized; some small formatting or clarity issues.	Somewhat organized; lacks visuals or has unclear flow.	Disorganized and difficult to follow.

SECTION 4 FOOD ADDITIVES AND FLOUR COOKERY

STRAND: FOOD PRODUCTION

Sub-Strand: Food Processing Techniques

Learning Outcomes

1. *Apply scientific knowledge, principles and skills to produce natural food additives and condiments for exhibition.*
2. *Apply scientific knowledge, principles and skills to produce enriched flour products that meet nutritional needs*

Content Standards

1. Demonstrate knowledge, understanding and skills in development and use of food additives and condiments.
2. Demonstrate knowledge, understanding and skills in the application of scientific principles in flour cookery and enrichment.

INTRODUCTION AND SECTION SUMMARY

This section covers the focal areas of food additives and condiments, food colours from natural food sources, preparation/production of food additives and condiments, types of flour used in flour cookery, basic ingredients used in flour cookery, experimenting with flour products and the enrichment and fortification of flour products. The minimum competences required of a learner in this section include their ability to understand, appreciate and apply the knowledge in the various focal areas of the section, in addressing related challenges of the individual, the family and society. At the introductory part of every focal area, learners are exposed to the theoretical aspect of the concepts and be assigned to undertake individual and group practical exploration of these concepts for practical understanding, discussions and assessments.

The weeks covered by this section

Week 17 Food additives and condiments

Week 18 Natural food colours

Week 19 Prepare food additives and condiments

Week 20 Prepare food additives and condiments

Week 21 Scientific principles underlying flour cookery

Week 22 Basic ingredients in flour cookery

Week 23 Flour products, enrichment and modification

Week 24 Evaluation of flour product quality.

SUMMARY OF Pedagogical Exemplars

Teaching Foods and Nutrition effectively requires a clear understanding of the core concepts and their practical applications. This summary provides a pedagogical approach to food additives, condiments and flour cookery with a focus on engaging students and enhancing their theoretical and practical comprehension of the focal areas. The teacher should explore and adopt other appropriate pedagogies for each focal area and not limit themselves to what is captured here. As a guide, Pedagogical Exemplars such as Group Work and Collaborative Learning, Experiential Learning, Managing Talk for Learning Approaches, Project-Based Learning and Structured Talk for Learning are used in the manual. The teachers are encouraged to incorporate GESI, SEN, SEL, the 21st Century skills, Core National Values and ICT in the lesson delivery, to make it more interactive and learner focused.

ASSESSMENT SUMMARY

A Variety of assessments forms should be carried out to ascertain learners' performance on the concepts that will be taught under this section. Teachers are entreated to administer these assessments and record them for onward submission into the Student Transcript Portal (STP). The following assessment would be conducted and recorded for each learner:

Week 17: *Group Presentation* ***Week 21:*** *Poster Presentation*

Week 18: *Mid –semester examination* ***Week 22:*** *Experiment*

Week 19: *Practical* ***Week 23:*** *Experiment*

Week 20: *Practical* ***Week 24:*** *End of semester examination*

WEEK 17: FOOD ADDITIVES AND CONDIMENTS

Learning indicator: *Distinguish between food additives and condiments used in food production.*

FOCAL AREA: FOOD ADDITIVES AND CONDIMENTS

Key Concepts

The Concept of Food Additives in Food Processing

Definition of Food Additives: Food additives are substances added to food during processing, packaging or storage to improve their safety, freshness, taste, texture, appearance or nutritional value. These substances can be natural or synthetic and are often used in small quantities.

Types of Food Additives

1. Preservatives: Extend shelf life by preventing spoilage from microorganisms e.g., sodium benzoate, nitrates
2. Colourants: Enhance or restore colour e.g., caramel colour and artificial dyes
3. Flavour Enhancers: Boost the flavour of foods e.g., monosodium glutamate (MSG)
4. Emulsifiers: Help mix ingredients that typically do not combine well, like oil and water e.g., lecithin
5. Sweeteners: Provide sweetness with or without added calories e.g., sugar and aspartame.
6. Nutritional Additives: Fortify foods with essential nutrients e.g., vitamins and minerals

The Concept of Condiments in Food Processing

Definition of Condiments: Condiments are substances used to enhance the flavour, texture or appearance of food, often added at the table or during cooking. Unlike food additives, condiments are typically consumed as part of the food and can be used in larger quantities.

Types of Condiment

1. Spices and Herbs: Dried or fresh plant parts used to season food e.g., black mint, bay leaves, black pepper, cloves and cinnamon
2. Sauces and Pastes: Liquid or semi-liquid flavour enhancers e.g., soy sauce, ketchup and mustard
3. Fermented Condiments: Foods that have undergone fermentation, adding a distinct flavour e.g., vinegar, pickles and kimchi.

Differences between Food Additives and Condiments

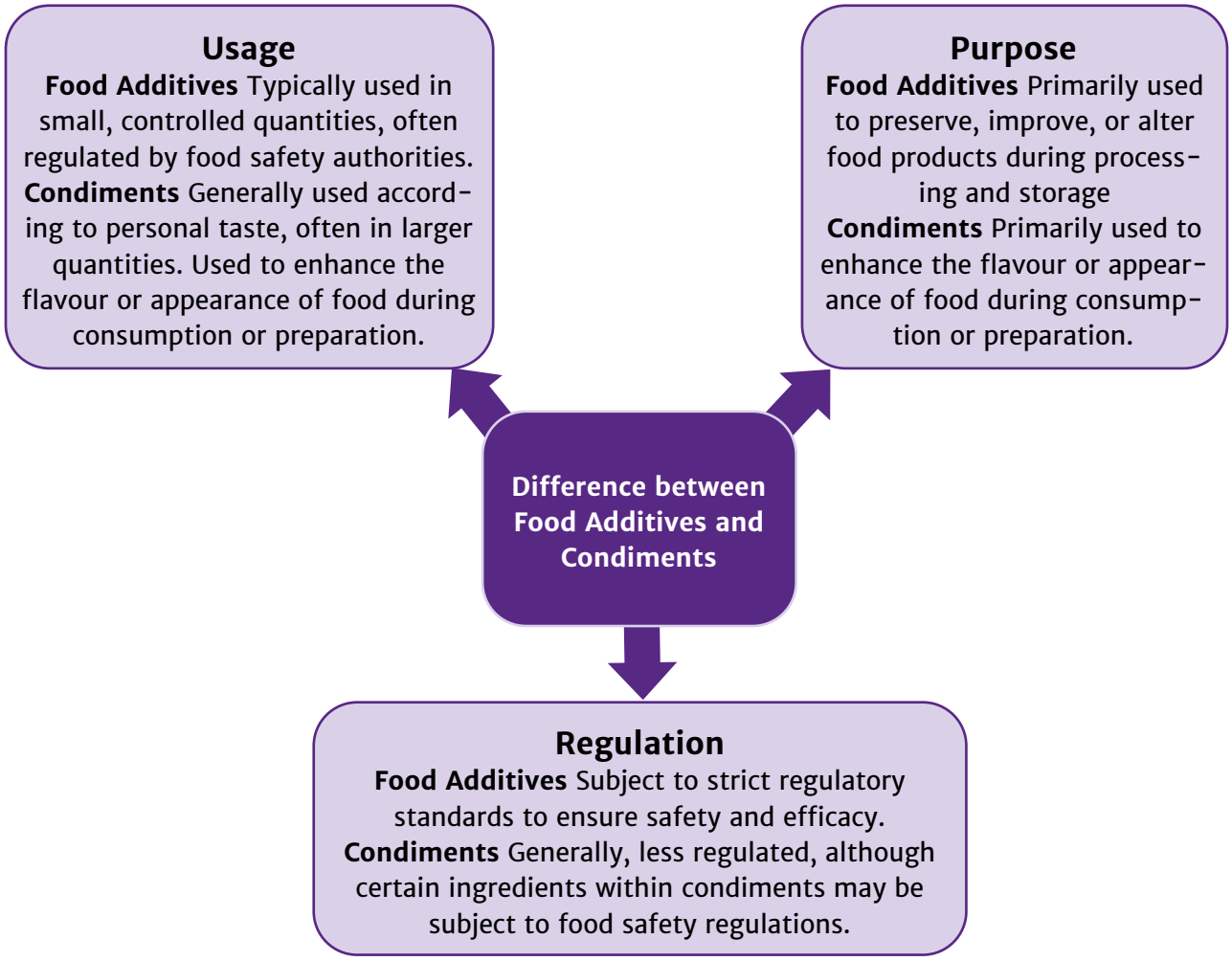


Fig. 10: *A concept map of differences between food additives and condiments*

Importance of food additives and condiments in food production

Food additives and condiments play very important roles in food preparation, processing, and consumption. Their importance can be understood in terms of enhancing food safety, improving sensory qualities, extending shelf life and contributing to culinary diversity. They are integral to modern culinary practices, offering a range of benefits from improving food safety and nutritional value to enhancing the sensory appeal of meals. While their use can be beneficial, it is also important to consider factors such as dietary balance, moderation and the potential health impacts of certain additives and condiments, particularly those high in sodium, sugar or artificial ingredients.

1. **Food Additives**

   a. Enhancing food safety and shelf life

   i. Preservatives: Additives such as sodium benzoate and nitrates help prevent spoilage by inhibiting the growth of bacteria, moulds, and yeast. This helps to extend the shelf life of food products and reduce the risk of foodborne illnesses.

   ii. Antioxidants: These prevent the oxidation of fats and oils, which can lead to rancidity. Common antioxidants include ascorbic acid (vitamin C) and tocopherols (vitamin E), which help maintain food quality and safety over time.

b. Improving sensory qualities

i. Colorants: Natural and artificial colorants enhance the visual appeal of food, making it more attractive and appetizing. They are especially important in processed foods, where natural colours may fade or change during processing.

ii. Flavour Enhancers: Additives like monosodium glutamate (MSG) intensify the existing flavours of food without significantly altering the nutritional content. This can enhance the eating experience, particularly in savoury dishes.

c. Nutritional Enhancement

i. Fortification: Food additives are often used to fortify foods with essential nutrients, such as vitamins and minerals, helping to address nutritional deficiencies in the population. For example, folic acid is added to cereals and flour to prevent neural tube defects.

d. Functional and Textural Benefits

i. Emulsifiers and Stabilisers: These additives help maintain the desired texture and consistency of foods, as in dairy products, sauces and dressings. They prevent separation of ingredients, ensuring a uniform product.

ii. Thickeners and Gelling Agents: Used in foods like soups, sauces, and desserts to provide the desired thickness or gel-like texture, improving the mouthfeel and stability of the product.

2. Condiments

a. Flavour Enhancement

i. Taste and Aromatic Qualities: Condiments such as spices, herbs, sauces and pastes significantly enhance the flavour, aroma and overall sensory experience of foods. They allow for creativity and personalization in cooking, catering to diverse tastes and preferences.

ii. Cultural Significance: Many condiments are deeply rooted in cultural and culinary traditions, offering unique flavours and experiences that reflect regional cuisines. This enriches the culinary landscape and promotes cultural exchange.

b. Nutritional Contributions

i. Micronutrient Content: Many spices and herbs are rich in vitamins, minerals, and antioxidants. For example, turmeric contains curcumin, which has anti-inflammatory properties, while garlic is known for its potential cardiovascular benefits.

ii. Health Benefits: Certain condiments like vinegar, ginger and hot peppers have been associated with various health benefits, including improved digestion, enhanced metabolism and anti-inflammatory effects.

c. Versatility and Convenience

i. Cooking and Preparation: Condiments provide a convenient way to quickly and easily enhance the flavour of dishes, making meal preparation more efficient. They can transform simple ingredients into flavourful and satisfying meals.

d. Preservation and Storage

ii. Many condiments, especially those that are fermented or pickled, have a long shelf life and can be used to preserve foods. This is particularly important in regions where refrigeration is limited

Learning Tasks

1. Search for information from the internet and other sources on food additives and condiments used in food processing to discuss the following:
   a. The concept of food additives and condiments
   b. Distinguish between food additives and condiments in relation to their importance.
   c. Discuss the historical evolution of food additives and condiments in food processing.

Pedagogical Exemplars

1. Problem based learning

a. In mixed groups, brainstorm the meaning of the concepts of additives and condiments.

2. Structuring talk for learning

a. Guide learners in mixed groups to observe pictures/realia /videos to identify the uses of food additives and condiments in food preparation.

3. Collaborative learning

a. In pairs, distinguish between food additives and condiments and report for whole class discussion.

b. In mixed groups discuss the various uses of food additives and condiments.

Note

Discuss the value of love, honesty, truthfulness in the use of additives. Do not use dyes for colouring food and adulterating groundnut paste with "konkonte" or "tombrown", or powdered pepper with ground cola nuts and pear seeds,

Key Assessment

DoK Level 2 Skills of conceptual understanding

a. Identify at least two types of food additives and condiments.

b. Explain at least two differences between food additives and condiments in relation to their importance in food processing.

DoK Level 3 Strategic reasoning

a. Conduct an interview to collect data from individuals, families and food vendors on the food additives and condiments used in food preparation and preservation.

b. Produce a report and present it for peer appraisal.

WEEK 18: NATURAL FOOD COLOURS

Learning Indicator: *Conduct experiments to develop natural colours from natural food sources.*

FOCAL AREA: EXPERIMENT ON NATURAL COLOURS FROM NATURAL FOOD SOURCES.

Key Concepts

Fig. 11: *Colour from natural foods*

a. Natural Colours from Natural Food Sources

Natural food colours are pigments derived from natural sources such as plants, fruits, vegetables, and minerals. Unlike synthetic food colours, which are made through chemical processes, natural food colours are extracted from edible substances found in nature. Natural food colours are often used in food and beverages to enhance their appearance, making the food more appealing to the consumers. The sources of natural food colours include:

i. ***Fruits and Vegetables:*** Many fruits and vegetables contain pigments that can be used as natural food colours. For instance, beets provide a deep red colour, while carrots are known for their vibrant orange hue. Spinach and other leafy greens can be used to obtain green pigments.

ii. ***Spices and Herbs:*** Spices such as turmeric and saffron are excellent sources of yellow and orange colours. Paprika can add a rich red colour to foods.

iii. ***Flowers:*** Some flowers, like hibiscus and butterfly pea, can be used to extract colours. Hibiscus can provide a deep red or pink colour, while butterfly pea flowers offer a striking blue colour.

iv. ***Minerals:*** Certain minerals can also be used as natural food colours. For example, calcium carbonate can create a white colour and iron oxide can provide a red or brown hue.

Table 10: Types of Natural Food Colours and their Sources

Type	Colour	Sources
Carotenoids: Ly-copene	Red	Tomatoes, watermelon beets, strawberries, paprika and hibiscus flowers
Beta-carotene	Orange	Carrots, sweet potatoes, and turmeric and pumpkins
Lutein	Yellow	Saffron, turmeric, and marigold flowers
Chlorophyll	Green	Spinach, matcha (green tea), and parsley
Anthocyanins	Blue	Blueberries and butterfly pea flowers
Betacyanin	Purple	Blackberries, purple sweet potatoes, and grapes
Caramel	Brown	Cocoa, coffee and caramelized Sugar
Betaxanthins	Yellow-orange	Calcium carbonate

b. Importance of Using Natural Food Colours in Food Preparation

i. Health Benefits: Natural food colours are often seen as healthier alternatives to artificial dyes, which have been linked to various health issues, including allergies and hyperactivity in children and adults.

ii. Nutritional Value: Many natural colorants come from nutrient-rich sources, adding some nutritional benefits to the food.

iii. Eco-friendly: Natural food colours are generally more environmentally friendly as they are biodegradable and produced through less harmful processes.

iv. Consumer Demand: There is a growing demand for clean-label products, and natural colours help to meet this demand by providing more transparent labelling.

v. Cultural and Traditional Significance: In many cultures, natural food colours have been used for centuries in traditional dishes and beverages, adding visual appeal and cultural value.

c. Methods of Extracting Natural Food Colours

i. Juicing and Pureeing: Simple methods like juicing or pureeing fruits and vegetables can yield natural colorants. For instance, beetroot juice can be used directly for its vibrant red colour.

ii. Infusion: Soaking plant materials in water, oil or alcohol to extract pigments. E.g., turmeric-infused oil.

iii. Drying and Powdering: Drying and powdering sources can also be used to produce food colours such as spinach or beetroot for use as colorants in various food products.

d. Practical application of food colours in meal preparation

To effectively incorporate natural food colours in food preparation and/or cooking the following procedures could be followed:

i. Add pureed vegetables to batter or dough for a natural colour boost.

ii. Infuse liquids like milk or cream with colourful ingredients for use in sauces or desserts.

iii. Use powdered forms of natural colorants in frostings, icings and dry mixes.

e. Experiment to produce natural food colours

Objective: To extract and use natural colours from various food sources.

Samples of Materials required

i. Fresh tomatoes, beetroot, spinach, turmeric and pumpkin

ii. Blender or juice maker

iii. Strainer or cheesecloth

iv. Small bowls

v. White frosting or plain yogurt (as a base for adding colours)

vi. Spoons and mixing bowls

Procedure

i. Extract colours

- Blend each food item separately with a small amount of water.
- Strain the mixture to obtain a smooth liquid colourant.

ii. Test colours

- Mix small amounts of the extracted colourants with white frosting or yogurt.
- Observe the intensity and hue of the colours.
- Compare the colours extracted from different sources.
- Discuss the potential uses of each natural colour in food preparation.

Learning Tasks

1. Conduct a survey in the local area on the sources of natural food colours
2. Conduct experiments to produce natural food colours

Pedagogical Exemplars

1. Experiential Learning

a. In mixed groups visit and conduct a survey at the local market in their community to identify different natural food colours or dye sources.

b. Guide learners to design templates to fill out their records during the survey for a whole class discussion.

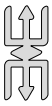
c. Ask learners to write a report and present it using different modes of presentation with the aid of pictures/photographs/ videos, realia/power point.

2. Experiential Learning/Project Based Learning

a. Put learners in small groups and provide videos or posters about producing natural food colours for them to share ideas and discuss. Encourage them to ask questions for clarification

b. Guide learners in mixed groups to use scientific knowledge, skills to conduct experiments using natural sources such as roots, leaves and seeds, to develop natural food colours.

c. Groups to write and present a report on their experiences and knowledge gained from the activities orally or in writing for whole class discussion.



Note

Use natural edible food to produce food colour. Encourage the value of love, honesty and truthfulness in the use of additives. Do not use dyes for colouring food. Do not adulterate powdered pepper with ground cola nut and avocado pear seeds.

Key Assessment

DoK Level 4 Extended critical thinking and reasoning

a. Research natural local food dye sources and produce a written report highlighting their uses and methods of creating food colours.

b. Using your research findings conduct experiments to develop natural food colours.

Hint

The recommended Mode of Assessment for week 18 is Mid – Semester Examination. Refer to ***Appendix I*** *for a sample Table of specification for Mid – Semester Examination. This should be recorded in the Students' Transcript Portal.*

WEEK 19: PREPARE FOOD ADDITIVES AND CONDIMENTS

Learning Indicator *Prepare food additives and condiments and label them.*

FOCAL AREA: PREPARE FOOD ADDITIVES AND CONDIMENTS (1)

Key Concepts

Fig. 12: *Picture of colour obtained from Food source*

Practical

Produce/prepare food additives and condiments from local food sources and label them.

a. Produce Homemade Ketchup

Materials

- **i.** 2 cups tomato paste
- **ii.** cup apple cider vinegar
- **iii.** cup honey or sugar
- **iv.** 1 teaspoon salt
- **v.** 1 teaspoon onion powder
- **vi.** teaspoon garlic powder
- **vii.** teaspoon allspice
- **viii.** cup water

Procedure

i. **Combine Ingredients:** In a medium saucepan, combine all the ingredients.

ii. **Simmer:** Bring the mixture to a simmer over medium heat, stirring frequently.

iii. **Reduce Heat:** Reduce the heat to low and let it simmer for about 20 minutes, stirring occasionally until it thickens to the desired consistency.

iv. **Cool:** Allow the ketchup to cool, then transfer it to a storage container.

v. **Store:** Store in the refrigerator.

b. Produce a Simple Food Preservative (Lemon Juice Preservative)

Materials

i. Lemons

ii. Water

iii. Squeezer

iv. Container

Procedure

i. **Preparation**: Wash the lemons thoroughly.

ii. **Juicing**: Cut the lemons in half. Use a squeezer to extract the juice from the lemons.

iii. **Dilution (optional)**: For some applications, you might want to dilute the lemon juice with water.

iv. **Storage**: Store the lemon juice in a clean, airtight container and refrigerate.

v. **Usage**: Use lemon juice as a natural preservative in salads, fruits, and other food items to prevent browning and spoilage.

c. Making Natural Flavour Enhancers (Herb and Spice Blends)

Materials

- Dried herbs (e.g., basil, oregano, thyme, rosemary)
- Spices (e.g., cinnamon, nutmeg, black pepper, cumin)
- Mortar and pestle or spice grinder
- Small containers or jars
- Labels

Procedure

i. **Select Herbs and Spices:**
   - Choose a combination of dried herbs and spices that complement each other.
   - Common blends include Italian seasoning, curry powder, and pumpkin spice.

ii. **Grind the Ingredients:**
   - If using whole spices, grind them in a mortar and pestle or spice grinder until they become a fine powder.

iii. Mix the Blends:

- Combine the ground spices and dried herbs in a bowl.
- Mix thoroughly to ensure an even distribution of flavours.

iv. Store the Blends:

- Transfer the spice blend into small containers or jars.
- Label the containers with the name of the blend and the date.
- Store in a cool, dry place for up to six months.

d. Creating Natural Preservatives (Pickling Vegetables)

Materials

i. Fresh vegetables (e.g., cucumbers, carrots, bell peppers)
ii. Knife and cutting board
iii. Vinegar (white or apple cider)
iv. Water
v. Salt
vi. Sugar (optional)
vii. Pickling spices (e.g., mustard seeds, dill, garlic)
viii. Glass jars with lids

Procedure

i. Prepare the Vegetables

- Wash and slice the vegetables into desired shapes (e.g., spears, slices).

ii. Prepare the Pickling Solution

- In a pot, combine equal parts vinegar and water.
- Add salt and sugar to taste (optional).
- Bring the mixture to a boil, then remove from heat.

iii. Pack the Jars

- Place the sliced vegetables into glass jars.
- Add pickling spices to each jar.

iv. Add the Pickling Solution

- Pour the hot pickling solution over the vegetables, leaving some space at the top.
- Seal the jars with lids.

v. Store the Pickles

- Let the jars cool to room temperature.
- Store in the refrigerator for at least one week before consuming to allow flavours to develop.

- Pickles can be stored in the refrigerator for up to several months.

NOTE

Teaching Safety Tips

i. Always supervise students while using sharp tools and heat sources.

ii. Ensure cleanliness of all equipment and work surfaces to prevent contamination.

iii. Encourage students to label all containers clearly to avoid mix-ups.

Learning Tasks

1. Conduct experiments to produce and package local food additives and condiments from local food sources.
2. Organise an exhibition to showcase your new food additives and condiment products for appraisal.
3. Reflect on feedback to improve your new food additives and condiment products.

Pedagogical Exemplars

Project based learning

1. Guide learners in mixed groups to prepare and package different food additives and condiments from local food sources. Support each group in the preparation and packaging of food additives and condiments.

2. Ask learners to take a gallery walk to observe each group's product and appraise their work.

Key Assessment

DoK Level 4 Strategic reasoning

Prepare and package at least **two** different food additives and condiments from local food sources.

WEEK 20: PREPARE FOOD ADDITIVES AND CONDIMENTS

Learning Indicator *Prepare food additives and condiments and label them.*

FOCAL AREA: PREPARE FOOD ADDITIVES AND CONDIMENTS (2)

Key Concepts

Fig. 13: *Picture of packed and labelled Additives*

Practical Produce and label food additives from natural food sources into a powder form to make them accessible/ available and convenient to use.

Food Ingredients

- **i.** Prekese - into prekese powder
- **ii.** Turkey berry – powder
- **iii.** Aniseeds and rosemary – powder
- **iv.** Karadafa leaves - powder etc.

The natural additives below can be used in different food recipes to enhance flavour, texture, and appearance.

The process

i. Clean and sort all the natural food items well

ii. Dry them

iii. Blend them into powder

iv. Keep them in clean containers with tight fitting lids and labels.

a. Natural Food Colouring: Turmeric Yellow

i. Ingredients

- 1 cup of turmeric roots
- 2 cups of water

ii. Instructions

- Boil the turmeric roots in water for 10-15 minutes.
- Strain the mixture and discard the solids.
- Use the turmeric yellow dye in recipes.

b. Natural Sweetener: Honey

i. Ingredients

- 1 cup of pure honey

ii. Instructions

- Use honey as a natural sweetener in recipes.
- Mix honey with water to create syrup for drinks and other foods

c. Natural Flavouring: Vanilla Extract

i. Ingredients

- 1 cup of vanilla beans
- 2 cups of vodka or glycerine

ii. Instructions

- Split the vanilla beans and soak them in vodka or glycerine.
- Let the mixture steep for 2-3 weeks.
- Strain the mixture and discard the solids.
- Use the vanilla extract in recipes.

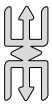
d. Natural Emulsifier: Egg Yolk

Ingredients

- 1 egg yolk

Instructions

- Beat the egg yolk with a fork.
- Use the egg yolk as an emulsifier in recipes.



Note

Teaching Safety Tips

i. Always supervise students while using sharp tools and heat sources.

ii. Ensure cleanliness of all equipment and work surfaces to prevent contamination.

iii. Encourage students to label all containers clearly to avoid mix-ups.

Learning Tasks

1. Conduct experiments to produce and package local food additives from local food sources.
2. Reflect on feedback from others to improve your new food additives.

Pedagogical Exemplars

Project based learning

1. Guide learners in mixed groups to prepare and package different food additives from local food sources. Support each group in the preparation and packaging of food additives.
2. Ask learners to take a gallery walk to observe each group's product and appraise their work.

Key Assessment

DoK Level 4 Strategic reasoning

Prepare and package **one** different food additive from local food sources.

WEEK 21: SCIENTIFIC PRINCIPLES UNDERLYING FLOUR COOKERY

Learning Indicator: *Explain the scientific principles underlying flour cookery, including gluten formation, gelatinization, and leavening.*

FOCAL AREA: SCIENTIFIC PRINCIPLES UNDERLYING FLOUR COOKERY

Key Concepts

Table 11: Types of Flour used in flour cookery

Type	Description	Characteristics	Uses
Wheat Flour	Wheat flour is made from grinding wheat grains and is the most common type of flour used in baking and cooking.	**All-Purpose Flour**: Versatile and suitable for most recipes. **Hard Flour**: Higher protein content for yeast breads. **Soft Flour**: Low protein content for tender cakes. **Composite flour**: has both high and low protein. Combination of wheat flour and any other non-wheat flour. **Self-rising flour**: flour that contains raising agent (baking powder)	Bread, cakes, pastries, pasta and general baking. Has gluten good for baking.
Cassava Flour	Made from the root of the cassava plant, also known as yuca or manioc. It is gluten-free and has a neutral flavour	Light texture, absorbs more liquid than wheat flour, and can be used in a 1:1 ratio as a substitute for wheat flour in some recipes.	Gluten-free baking, thickening soups and sauces, and making traditional dishes like Brazilian cheese bread (pão de queijo).
Corn Flour	Made by grinding whole corn kernels into a fine powder. Not to be confused with cornstarch, which is made from the starchy part of the corn kernel.	**Yellow Corn Flour**: Made from yellow corn, commonly used in baking. **White Corn Flour**: Made from white corn, often used in tortillas and tamales	Cornbread, tortillas, tamales, and as a thickening agent in soups and sauces, gluten free
Rice Flour	Made from finely milled rice, available in white and brown varieties	**White Rice Flour**: Made from white rice, has a fine texture and neutral flavour. **Brown Rice Flour**: Made from whole grain brown rice, has a slightly nutty flavour and more nutrients.	Gluten-free baking, rice noodles, as a thickening agent in soups and sauces, and in Asian cooking

Bean Flour	Made from dried and ground beans, such as chickpeas, lentils, or black beans. Bean flour is high in protein and fibre.	**Chickpea Flour (Gram Flour)**: Made from chickpeas, commonly used in Indian and Middle Eastern cuisine. **Black Bean Flour**: Made from black beans, used in savoury dishes and gluten-free baking.	Gluten-free baking, thickening soups and stews, making tortillas, and as a protein boost in various recipes.

Learning Tasks

1. Discuss the types of flour used in flour cookery: Wheat, Cassava, Flour, Corn, Rice, Beans.
2. Identify the sources and how they are prepared: Root; Grains/cereals Legumes; Plantain.
3. Classify wheat flours according to their characteristics and usage in flour products.

Pedagogical Exemplars

1. Structuring Talk for Learning

In mixed groups, watch videos, charts/picture or realia discuss the different types of flour used in flour cookery.

E.g.,

a. Wheat flour

b. Cassava flour

c. Corn flour

d. Rice flour

e. Beans flour

2. Talk for Learning/collaborative

a. In mixed groups, use pyramid discussion to classify the flours according to their sources: Root; Grains/cereals; Legumes; Plantain

b. In mixed groups classify wheat flours according to their usage in flour products

E.g.,

a. Soft Flour

b. Hard/strong flour

c. All-purpose flour

d. Composite flour

e. Self-rising flour

3. Experiential Learning/Project-Based Learning

a. In groups observe experts of flour cookery to explain how gluten formation affects the texture of baked goods.

b. Conduct an experiment on gluten formation and gelatinization to demonstrate the effect of different types of flour on product quality.

E.g.,

a. Whole wheat

b. Refined flour

c. Soft Flour

d. Hard/strong flour, etc.

Key Assessment

DoK Level 3: Strategic reasoning

a. Describe at least **two** types of flour used in cookery and their sources.

b. Compare at least **two** types of flour and indicate the flour-based products they can be used to prepare.

WEEK 22: BASIC INGREDIENTS USED IN FLOUR COOKERY

Learning Indicator: *Discuss the basic ingredients used in flour cookery*

FOCAL AREA 1 BASIC INGREDIENTS USED IN FLOUR COOKERY

Basic ingredients used in flour cookery

Flour cookery involves using flour as a primary ingredient to create a wide range of products, including bread, cakes, pastries, pasta, and more. The basic ingredients used in flour cookery typically include flour, water or milk, fat, sugar, salt, and leavening agents. Examples of these ingredients and their function when combined with flour are provided below:

a. Flour

- Types: All-purpose, bread, cake, pastry, whole wheat, and gluten-free flour
- Function: Provides structure and body to the product

b. Leavening Agents

- Types: Baking powder, baking soda, yeast.
- Function: Cause dough or batter to rise, creating a light and airy texture.

c. Liquids

- Types: Water, milk, buttermilk, cream, fruit juices.
- Function: Hydrate flour to form gluten, dissolve ingredients, and contribute to the texture and flavour.

d. Fats

- Types: Butter, margarine, shortening, oil.
- Function: Add tenderness, richness, and moisture to the product.

e. Sweeteners

- Types: Granulated sugar, brown sugar, honey, molasses, syrups.
- Function: Sweeten the product and contribute to browning and moisture retention.

f. Eggs

- Function: Provide structure, moisture and richness
- Act as a leavening agent and emulsifier.

g. Salt

- Function: Enhance flavour
- Strengthen gluten structure

h. Flavourings and Additives

- Types: Vanilla extract, spices, nuts, chocolate, fruits.
- Function: Add flavour and variety to the product.

Learning Task

Discuss the basic ingredients used in flour cookery.

Pedagogical Exemplars

1. Structuring Talk for Learning

a. In mixed groups, watch pictures/realia and discuss the basic ingredients used in flour cookery.

b. Surf the internet and find out from other sources, basic ingredients used in flour cookery and report in class.

E.g.,

i. Flour - forms the structure of the product

ii. Fat - adds colour, flavour and makes the product tender

iii. Sugar – sweetens, adds colour and preserve foods

iv. Eggs – add nutritive value, add colour, as a raising agent.

v. Raising agents - Substances introduced into flour mixtures to make them light, porous and increased in volume.

Key Assessment

DoK Level 2 Skills of conceptual understanding

List **five** flour cookery ingredients and their functions.

FOCAL AREA 2: PRODUCTS MADE FROM FLOUR

Key Concepts

a. Basic Products Made from Flour

Conduct practical activities to support learners' appreciation of preparation, process, production and serving of basic flour products such as bread, cakes, pastries, cookies, pasta, pies and tarts, pancakes and waffles as well as muffins and quick breads including local products such as Koose, Koko, Maasa, Ayigbe and Poolo.

b. Basic Recipes in Flour Cookery

Flour is a major ingredient in preparing many dishes in Ghana and the world at large. Learners will be encouraged to explore different ways of using flour across different cultures within their communities using local and modern technology. The following recipes can serve as a guide for learners.

i. Wheat Flour: Homemade Bread

Ingredients

- cups of bread flour
- teaspoons salt
- teaspoons sugar
- 2 teaspoons of active dry yeast
- cups warm water
- 2 tablespoons of olive oil

Instructions

- In a large bowl, combine flour, salt, and sugar.
- Dissolve yeast in warm water and let it sit for about 5 minutes, until it becomes frothy.
- Add the yeast mixture and olive oil to the flour mixture.
- Mix until a dough forms, then knead on a floured surface for about 10 minutes, until smooth and elastic.
- Place the dough in a greased bowl, cover with a damp cloth, and let it rise in a warm place for 1-2 hours, until double in size.
- Preheat the oven to 375°F (190°C).
- Punch down the dough, shape it into a loaf, and place it in a greased loaf pan.
- Let it rise for another 30 minutes.
- Bake for 30-35 minutes, until golden brown and the bread sounds hollow when tapped.
- Let it cool before slicing.

ii. Cassava Flour: Brazilian Cheese Bread

Ingredients

- 1 cup cassava flour
- 1 cup milk
- cup of water
- cup olive oil
- 1 teaspoon salt
- cups grated Parmesan cheese
- 2 beaten eggs

Instructions

- Preheat the oven to 375°F (190°C).
- In a saucepan, combine milk, water, olive oil, and salt. Bring to a boil.
- Remove from heat and add the cassava flour, stirring until smooth.
- Let the mixture cool slightly, then stir in the Parmesan cheese and eggs until well combined.

- Scoop the batter into a greased mini muffin tin.
- Bake for 15-20 minutes, until golden brown.
- Serve warm.

iii. Corn Flour: Cornbread

Ingredients

- 1 cup corn flour
- 1 cup all-purpose flour
- cup of sugar
- 1 tablespoon baking powder
- teaspoon salt
- 1 cup milk
- 2 eggs
- cup of melted butter

Instructions

- Preheat the oven to 400°F (200°C).
- In a large bowl, mix corn flour, all-purpose flour, sugar, baking powder, and salt.
- In another bowl, whisk together milk, eggs, and melted butter.
- Pour the wet ingredients into the dry ingredients and mix until just combined.
- Pour the batter into a greased 9-inch baking dish.
- Bake for 20-25 minutes, until a toothpick inserted into the centre comes out clean.
- Let cool slightly before serving.

iv. Rice Flour: Gluten-Free Pancakes

Ingredients

- 1 cup of rice flour
- 1 tablespoon sugar
- 1 tablespoon baking powder
- teaspoon salt
- 1 cup milk
- 1 egg
- 2 tablespoons of melted butter

Instructions

- In a large bowl, combine rice flour, sugar, baking powder, and salt.
- In another bowl, whisk together milk, egg, and melted butter.
- Pour the wet ingredients into the dry ingredients and mix until just combined.
- Heat a lightly greased skillet over medium heat.

- Pour 1/4 cup of batter onto the skillet for each pancake.
- Cook until bubbles form on the surface, then flip and cook until golden brown.
- Serve with syrup or your favourite toppings.

v. Bean Flour: Cowpea flour cake (Koose)

Ingredients

- 1 cup cowpea flour
- teaspoon salt
- teaspoon cumin
- teaspoon of turmeric
- cup of water
- 1 small onion, finely chopped
- 1 small carrot, grated
- cup chopped cilantro
- Oil for frying

Instructions

- In a bowl, combine cowpea flour, salt, cumin, and turmeric.
- Gradually add water, whisking until smooth.
- Stir in the onion, carrot and green pepper.
- Heat oil in a skillet over medium heat.
- Drop spoonful of the batter into the hot oil, flattening slightly.
- Fry until golden brown on both sides, about 2-3 minutes per side.
- Drain on paper towels and serve warm with porridge.

Learning Tasks

1. Conduct an experiment on the role of leavening agents in flour mixtures.
2. Conduct practical activities to make flour products.

Pedagogical Exemplars

Experiential Learning/Collaborative Learning

a. In mixed groups observe a demonstration by resource persons or videos to identify how the basic ingredients are used in flour mixtures and their functions in producing quality flour products.

b. In your groups, conduct an experiment on the role of leavening agents in flour mixtures.

c. Engage learners in a practical session to exhibit their knowledge, understanding and skills in flour cookery and its importance in meals.

E.g.,

i. Yeast,
ii. Baking powder
iii. Baking soda, etc.

Key Assessment

DoK Level 2: Skills of conceptual understanding

Describe **two** products made with flour and identify the other ingredients required to be added.

DoK Level 4: Extended critical thinking and reasoning

Conduct a simple experiment to test for gluten in wheat flour.

WEEK 23: FLOUR PRODUCTS AND ENRICHMENT

Learning Indicator: *Apply appropriate techniques to improve the texture and nutritional value of flour-based products through enrichment and fortification.*

FOCAL AREA 1 FLOUR PRODUCTS AND WAYS TO ENRICH/ FORTIFY THEM

The concept of food enrichment and fortification in food processes

Enriching or fortifying food involves adding essential nutrients to enhance its nutritional value. This process is commonly used to address specific nutrient deficiencies in populations. The methods of food enrichment and fortification include:

a. Fortification with Vitamins and Minerals

- **i.** Iron Fortification: Adding iron to foods like flour, rice, and cereals to prevent anaemia. For example, iron can be added in the form of ferrous sulphate or ferric pyrophosphate.
- **ii.** Vitamin D Fortification: Commonly added to dairy products like milk and yogurt, as well as plant-based milk alternatives, to help with bone health.
- **iii.** Iodine Fortification: Iodine is often added to table salt to prevent iodine deficiency and related thyroid issues.
- **iv.** Calcium Fortification: Adding calcium to products such as orange juice, cereals, and plant-based milk to support bone health.
- **v.** Folic Acid Fortification: Added to flour and cereals to reduce the risk of neural tube defects during pregnancy.

b. Biofortification

- **i.** Genetic Engineering: Developing crop varieties with enhanced nutrient content. For example, Golden Rice is genetically modified to produce beta-carotene, a precursor of vitamin A.
- **ii.** Conventional Breeding: Selecting and breeding plants with naturally higher nutrient levels. For example, iron-rich beans or zinc-enriched wheat varieties.

c. Use of Natural Ingredients

- **i.** Spirulina: A type of blue-green algae that can be added to smoothies, baked goods, and snacks to increase protein, iron, and other nutrients.
- **ii.** Nutritional Yeast: Often used as a cheese substitute in vegan diets, it is rich in B vitamins, including B12.
- **iii.** Flaxseeds and Chia Seeds: Added to bread, cereals, and smoothies to increase omega-3 fatty acids, fibre, and protein content.

d. Fortification with Probiotics and Prebiotics

- **i.** Probiotics: Live beneficial bacteria added to yogurt, kefir and fermented foods to improve gut health.

ii. Prebiotics: Non-digestible fibres that feed beneficial gut bacteria. Added to foods like cereals, bars, and dairy products.

e. Protein Fortification

i. Whey Protein: Added to beverages, snacks and meal replacements to increase protein content.

ii. Plant Proteins: Soy protein, pea protein and rice protein are added to various food products to enhance protein intake, especially in vegetarian and vegan diets.

f. Enrichment with Healthy Fats

i. Omega-3 Fatty Acids: Adding omega-3-rich oils like fish oil or flaxseed oil to products such as margarine, milk, and eggs.

ii. Medium-Chain Triglycerides (MCTs): Adding MCT oil to beverages, snacks, and supplements for quick energy and potential cognitive benefits.

g. Fibre Fortification

i. Inulin and Oligofructose: Soluble fibres added to foods to improve digestive health and increase fibre intake without affecting taste or texture.

ii. Resistant Starch: Is added to baked goods, pasta, and cereals to increase fibre content and improve gut health.

h. Enrichment with Antioxidants

i. Natural Extracts: Adding extracts from fruits like blueberries, pomegranates and acai berries to foods to increase their antioxidant content.

ii. Synthetic Antioxidants: Adding compounds like ascorbic acid (vitamin C) and tocopherols (vitamin E) to preserve food and enhance its nutritional profile.

Key Differences between Food Enrichment and Fortification

Objective: Enrichment focuses on restoring lost nutrients, while fortification aims to add new nutrients to prevent deficiencies or enhance the food's nutritional profile.

Context of Use: Enrichment is often used when nutrients are lost during processing (refining grains), whereas fortification is used to address public health needs (preventing rickets with vitamin D).

Table 12: Visual Comparison

S/N	Aspect	Enrichment	Fortification
1	Definition	Adding back lost nutrients	Adding nutrients not originally present or in higher amounts.
2	Purpose	Restore original nutrient levels e.g., Enriched flour, enriched rice	Prevent deficiencies, enhance nutrition e.g., Iodized salt, fortified milk
3	Application	After nutrient loss in processing	To address public health issues

Learning Tasks

1. Discuss the concept of food enrichment and fortification in food processes.
2. Identify key differences between food enrichment and fortification.

Pedagogical Exemplars

Experiential Learning/Project-based learning

a. **Visit a bakery or enterprises that produce/make flour goods/products and enquire how to enrich/**fortify them using different ingredients/ raising agents

b. Write a report on findings to be shared in class.

Key Assessment

DoK Level 4: Extended critical thinking and reasoning

a. Explain the key differences between enrichment and fortification

b. Describe two methods of food enrichment and fortification

FOCAL AREA 2: WAYS OF PREPARING FLOUR PRODUCTS TO ENRICH/FORTIFY THEM

Steps in Food Enrichment and Fortification

The processes of food enrichment and fortification involve multiple steps to ensure that the added nutrients are effective, safe and well-integrated into the food products.

a. **Food Enrichment Steps**

i. Identification of Nutrient Loss
- Determine which nutrients have been lost during the food processing.
- Conduct nutrient analysis to quantify the loss.

ii. Selection of Nutrient Sources
- Choose appropriate nutrient forms to be added back to the food.
- Ensure the selected nutrients are bioavailable and compatible with the food matrix.

iii. Formulation
- Develop a formulation that specifies the amount of each nutrient to be added.
- Consider the stability of nutrients during processing and storage.

iv. Testing and Quality Control
- Conduct trials to test the stability, taste, and texture of the enriched food.
- Perform nutrient analysis to confirm that the enrichment levels meet regulatory standards.

v. Regulatory Approval
- Ensure compliance with local and international food regulations.
- Obtain necessary approvals from food safety authorities.

vi. Production and Monitoring
- Integrate the enrichment process into the food production line.
- Continuously monitor nutrient levels and product quality during production.

b. Food Fortification Steps

i. Assessment of Nutritional Needs
- Identify the specific nutrient deficiencies in the target population.
- Assess dietary patterns to determine which foods are suitable for fortification.

i. Selection of Fortificant
- Choose suitable fortificants (nutrient compounds) that are bioavailable and stable in the food product.
- Ensure compatibility with the food matrix to avoid adverse sensory changes.

ii. Dosage Determination
- Determine the appropriate levels of nutrients to be added to achieve the desired health outcomes.
- Consider factors such as bioavailability, dietary intake, and potential toxicity.

iii. Formulation and Integration
- Develop a formulation that integrates the fortificant into the food product without altering its taste, texture, or appearance.

c. Use appropriate technology to mix and distribute the nutrients evenly

i. Testing and Quality Control
- Conduct stability tests to ensure the nutrients remain effective throughout the product's shelf life.
- Perform sensory evaluations to ensure consumer acceptance.

ii. Regulatory Compliance
- Ensure the fortification process meets national and international food safety and labelling regulations.
- Obtain necessary regulatory approvals.

iii. Pilot Testing
- Implement pilot production runs to test the fortification process on a smaller scale.
- Collect data on nutrient retention, product quality, and consumer feedback.

iv. Scale-up and Production

- Scale up the fortification process for mass production.
- Continuously monitor the nutrient content and quality of the fortified food during production.

v. Consumer Education

- Educate consumers about the benefits of the fortified food to encourage acceptance and consumption.
- Provide information on the packaging about the added nutrients and their health benefits.

vi. Monitoring and Evaluation

- Conduct post-market surveillance to monitor the effectiveness and safety of the fortified food.
- Adjust the fortification levels, if necessary, based on ongoing research and population health data.

Four ways of preparing flour products and enriching them

1. Creaming - rich cake – carrot/ coconut/moringa rich cake
2. Rubbing in – rock cake - oat/wheat/garlic/moringa pastries
3. Melted fat method – gingerbread – coconut gingerbread/biscuit, dandelion pastries
4. Whisking method – sponge cake, swiss roll – soya swiss roll, oat swiss roll

Other Fortified flour products with natural ingredients

bread – moringa bread, cake – soya cake, carrot - rock buns, oat - turn overs, garlic - chips, egg – vegetables - koose, coconut - puff loaf, beans - maasa, soya- ayigbe biscuit, groundnut poolo, etc

Learning Tasks

1. Discuss the concept of food enrichment and fortification in food processing.
2. Identify the key differences between food enrichment and fortification.
3. Prepare flour products and enrich them.

Pedagogical Exemplars

1. Project Based Learning/ Experiential Learning

In mixed groups, experiment with flour products and ways to enrich/fortify them

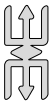
2. Experiential Learning/Project-based learning

a. In groups, research ways that food can be enriched and use the knowledge and skills to enrich/fortify the flour products produced.

Or

b. Visit a bakery or enterprises that produce/make flour goods/products and enquire how to enrich/fortify them using different ingredients/ raising agents and report in class.

c. Write a report on findings



Note

Instil honesty in the learners by letting them use the appropriate filling for pastries. They should not colour koko with charcoal.

Key Assessment

DoK Level 4: Extended critical thinking and reasoning

a. Explain the key differences between enrichment and fortification

b. Describe two methods of food enrichment and fortification

c. Identify any flour product of your choice and apply the steps of enriching and or fortifying food to improve their nutritional values.

d. Write a report on the process and experiences of the enrichment/fortification activity

WEEK 24: EVALUATION OF FLOUR PRODUCTS QUALITY

Learning Indicator: *Evaluate the quality of different flour products based on texture, appearance and nutritional composition*

FOCAL AREA: QUALITY OF FLOUR PRODUCTS

Key Concepts

Evaluate the quality of flour products including assessing their texture, appearance, taste and nutritional composition. A comprehensive evaluation is based on:

i. Texture

ii. Appearance

iii. Taste

iv. Nutritional composition

a. Texture

i. Softness: Measure the softness of the flour product by a simple touch test.

ii. Crumbliness: Test for the crumbliness of the product, such as biscuits or cookies by breaking.

iii. Density: Evaluate the density of the product, such as bread or cakes by pressing to check its resiliency.

b. Appearance

i. Colour: check the colour of the product, considering evenly distribution of colour and intensity.

ii. Shape: Evaluate the shape of the product, checking its uniformity and appeal.

iii. Crust and Crumb: Evaluate the crust and crumb texture of bread products.

c. Nutritional Composition

i. To determine the nutritional composition, the product must go through food laboratory testing. The extra ingredients added to the flour product give it more nutritional content. e.g., the addition of oat or wheat to a flour product gives it more fibre, eggs give protein, milk gives protein & minerals.

ii. Fibre content: Evaluate the fibre content of the product using techniques like enzymatic digestion or gravimetric analysis.

iii. Micronutrient content: Measure the content of essential micronutrients like iron, zinc, or B vitamins.

Learning Task

1. Prepare flour products
2. Evaluate the quality of flour products

Pedagogical Exemplars

Experiential Learning

1. Organise an exhibition for learners to display their flour products and evaluate the quality of different flour products based on:
   - **a.** Texture
   - **b.** Appearance
   - **c.** Taste
   - **d.** Nutritional composition
2. Reflect on feedback from the exhibition to improve the quality of your flour product.

Key Assessment

DOK Level 3: Strategic Reasoning

Describe what to look out for when assessing the quality of a flour product based on

- **i.** Texture
- **ii.** Appearance
- **iii.** Taste

DOK Level 4: Extended critical thinking and reasoning

Exhibit flour products and evaluate its qualities based on texture, appearance, taste.

Hint

*The recommended Mode of Assessment for week 24 is End of Semester Examination. Refer to **Appendix J** of this section for a sample Table of Specification and the Teacher Assessment Manual and Toolkit pages (pages 11 – 13) for more information on summative assessment strategies. This should be recorded in the Students' Transcript Portal.*

SECTION 4 REVIEW

This section aims to reinforce learners' understanding and highlights essential points from each focal area, emphasising the need to engage learners in practical work. The learners are expected to understand and appreciate Food Additives and Condiments, Natural Colours from Natural Food Sources, Preparation/Production of Food Additives and Condiments, Types of Flour used in Flour Cookery, Basic Ingredients used in Flour Cookery, Experimenting with Flour Products and the Enrichment and Fortification of Flour Products and then evaluating the quality of the flour product. The inclusion of practical exercises, and interactive discussions significantly enhances the learning experience, ensuring that learners are not only theoretically informed but are also able to demonstrate various proficiency levels in applying what they have learned in cooking.

APPENDIX I: Sample Table of Specification for Mid-semester Examination

(2nd Semester)

WEEK	FOCAL AREA	TYPE OF QUESTIONS	DOK LEVELS				TOTALS
			1	2	3	4	
13	The Methods of Food Preparation and Processing that Apply Principles of Heat Transfer	Multiple choice	1	1			2
		Essay		1			1
14	Principles of Heat Transfer to Different Methods of Food Preparation	Multiple choice	1	1	2	-	4
		Essay		1			1
		Practical				1	1
15	Different Methods of Food Preparation and Processing	Multiple Choice	2	2	2	-	6
		Essay	-	1	-	-	1
		Practical	-	-	-	-	-
16	challenges in applying the various heat transfer principles in food preparation and processing	Multiple	1	1	1	1	4
		Essay	-	-	1	-	1
		Practical					
17	Food Additives and Condiments	Multiple choice	1	1	1	1	4
		Essay			1		1

Total Number of Questions

Multiple Choice questions	20
Essay	5

APPENDIX J: Sample Table of Specification for End of 2nd Semester Examination

STRUCTURE OF THE EXAMS

PART 1- OBJECTIVES 40 MARKS. 1 MARK EACH

PART 2 – 6 ESSAY QUESTIONS. ANSWER 3 FOR 60 MARKS, 20 MARKS EACH.

TOTAL – 100 MARKS

WEEK	FOCAL AREA	TYPE OF QUESTIONS	DOK LEVELS				TOTALS
			1	2	3	4	
13	The Methods of Food Preparation and Processing that Apply Principles of Heat Transfer	Multiple choice	1	1	1		3
		Essay	–	–	–	–	–
14	Principles of Heat Transfer to Different Methods of Food Preparation	Multiple choice	1	1	1	–	3
		Essay	–	1	–	–	1
		Practical					
15	Different Methods of Food Preparation and Processing	Multiple Choice	1	1	1	–	3
		Essay	–		–	–	–
		Practical	–	–	–	–	–
16	challenges in applying the various heat transfer principles in food preparation and processing	Multiple	1	1	1	–	3
		Essay	–	–	1	–	1
		Practical	–	–	–	–	–
17	Food Additives and Condiments	Multiple choice	–	2	1	1	4
		Essay	–	–	–	–	–
18	Experiment on Natural Colours from Food Source.	Multiple choice	1	1	1	1	4
		Essay	–	–	1	–	1
		Practical	–	–	–	–	–
19	Practical on Food Additives and Condiments (1)	Multiple choice	1	1	1	1	4
		Essay	–	1	–	–	1
		Practical	–	–	–	–	–
20	Practical on Food Additives and Condiments (1)	Multiple choice	–	2	2	–	4
		Essay	–	–	1	–	1
		Practical	–	–	–	–	–

21	Scientific Principles Underlying Flour Cookery	Multiple Choice	1	1	1	1	4
		Essay	–	1	–	–	1
		Practical	–	–	–	–	–
22	Basic Ingredients used in Flour Cookery	Multiple choice	1	–	2	1	4
	Products Made from Flour	Essay	–	–	–	1	1
23	Flour Products and Ways to Enrich/ Fortify Them.	Multiple choice	–	1	–	1	2
		Essay					
	Ways of Preparing Flour Products and to Enrich/Fortify them	Multiple Choice	–	–	2	–	2

Total Number of Questions

Multiple Choice questions	40
Essay	6

TEACHING AND LEARNING RESOURCES

- Baking sheets
- Charts/pictures/posters
- Computers/projectors/Cameras/ smart phones
- Cooking oil
- Cooking utensils
- Cruets
- Cutlery
- Fat
- Flavourings
- Flowers
- Glasses, etc.
- ICT tools - Pictures of basic ingredients used in flour cookery. Presentations in different modes
- Internet services
- Large tables
- Mixing bowls
- Note pad and pens
- Oven
- powder/baking soda
- Ranges
- Realia of food
- Realia of table appointments
- Recipe books
- Rolling board and pin, Palate knife, Pictures of flour products
- Sample food commodities
- Samples of flours
- Samples of preserves
- Sugar
- Table linen
- Videos

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