SEMESTER – 1

COURSE CODE: BPVC-101

COURSE TITLE: FOOD SCIENCE AND FOOD SAFETY

Attempt both parts of the assignment. **Maximum Marks: 100**

PART – A: ASSIGNMENTS

Attempt all questions. All questions carry equal marks. Write your answers in about 500 words. **Marks: 5x10=50**

1. Explain the major nutrients, functional components, and physical, thermal, rheological, mass-transfer and electrical properties of foods, and relate them to food processing and quality. 10

2. Describe the major anti-nutritional factors, phytotoxins, marine toxins, mycotoxins and process/industrial contaminants in foods, analyze their sources, health effects and methods of risk reduction. 10

3. Discuss how food attributes influence consumer perception and food choice, and assess the importance of sensory quality, food structure, texture, flavour and keeping quality. 10

4. Explain how harvesting, handling, storage, transportation and processing affect the nutritional quality and sensory characteristics of food, and predict possible changes in carbohydrates, proteins, fats, vitamins, minerals and pigments. 10

5. A food product is found to be unsafe during storage or handling. Identify the possible food hazards and their likely sources, and propose suitable preventive and control measures to solve the problem. 10

PART – B: ACTIVITIES

Perform all activities. Submit the evidence (activities notebook, charts etc.) of any FIVE Activities. For details, kindly refer to Block 5: Activities Manual. **Marks: 5x10=50**

Activity 1: Prepare a chart of the Food Pyramid.

Activity 2: Visit to a local market to identify any Ten functional foods and their nutritional value.

Activity 3: Tabulating nutritional information on packed food products.

Activity 4: Assessment of your own dietary pattern and comparison with a reference balanced diet.

Activity 5: Prepare a pictorial chart of the disorders caused by the excess or deficiency of one macronutrient and one micronutrient.

Activity 6: Prepare a chart showing the process of digestion of food, absorption and transportation of nutrients.

Activity 7: Visit a food retail store or market to gather information on organic and traditional food products.

Activity 8: Calculate the Body Mass Index (BMI) and compare with the WHO standards.

NOTE:

For the assignment questions of other generic courses you have opted for in the 1st semester i.e. **Minor Vocational Course, Skill Enhancement Course (SEC) and Interdisciplinary Course (IDC)**, kindly download them (search course codes in the format e.g. BCOS-185, select the correct session and download them) from the assignment section of the IGNOU website

(https://www.ignou.ac.in/studentService/download/assignments).

1. Explain the major nutrients, functional components, and physical, thermal, rheological, mass-transfer and electrical properties of foods, and relate them to food processing and quality. 10

Answer

Food contains nutrients that support growth and health, along with other substances that influence colour, flavour, texture and processing behaviour. The major nutrients are carbohydrates, proteins, fats, vitamins, minerals and water. Carbohydrates supply energy and occur as sugars, starch and dietary fibre. Starch absorbs water and gelatinises during cooking, making rice and other cereals softer. Proteins build and repair tissues. In foods they can form foams, gels and elastic structures, as seen in whipped egg, curd and wheat dough. Fats supply concentrated energy, carry fat-soluble vitamins and contribute tenderness, richness and mouthfeel.

Vitamins and minerals are required in small quantities but have important functions. Vitamin C supports collagen formation and iron absorption, while calcium is essential for bones and muscle action. Water dissolves many food components, transfers heat and affects microbial growth. The amount of available water, called water activity, is especially important for safety and shelf life. Dried foods are usually more stable because microorganisms have less available water, although some spoilage reactions can still occur.

Foods also contain functional components such as dietary fibre, polyphenols, carotenoids, probiotics and prebiotics. These may support digestive or other normal body functions as part of a balanced diet. Fibre helps bowel movement and can slow glucose absorption. Plant pigments contribute appealing colour and may have antioxidant properties. Processing can reduce, preserve or sometimes improve the availability of such substances; for instance, heating tomatoes can make some lycopene more accessible while destroying part of their vitamin C.

Physical and thermal properties

Physical properties include size, shape, density, porosity, surface area and colour. Particle size affects mixing, grinding and dissolution. A porous biscuit absorbs moisture quickly, while the density of grains can help in separation and sorting. Thermal properties include specific heat, thermal conductivity, thermal diffusivity, freezing point and boiling behaviour. High-moisture foods generally need more energy for heating than low-moisture foods. Heat must penetrate to the coldest part of a packed product during pasteurisation or sterilisation; otherwise harmful microorganisms may survive.