

General Science & Ability

Test - 1

Q.No. 1

(a)

Food Adulteration:

Definition:

The intentional addition of harmful substances or inferior quality material to food to increase quantity or profit. It done deliberately for economic gain. It leads to chronic diseases, such as cancer or organ damage, over time. It requires chemical or laboratory tests.

Examples:

Adding water to milk, coloring agents in spices or starch in honey.

Food Contamination:

Definition:

The accidental presence of

harmful microorganisms, chemicals, or foreign matter in food. It occurs unintentionally due to poor hygiene, handling, or environmental factors. It can cause immediate health issues like food poisoning or infections. It is detected visually, through smell, or by foodborne illness symptoms.

Examples:

Presence of bacteria, pesticides, or dirt in food items.

Controlling Measures for Food Adulteration

1. Consumer Awareness:

One of the most effective measure is educating consumers about food adulteration and teaching them simple detection techniques. Awareness campaigns can inform people about common adulterants in food and their potential health hazards.

2. Strict Regulations and Enforcement:

Governments must implement strict food safety laws to combat adulteration.

Regular inspections by food safety authorities can ensure compliance with quality standards.

3. Penalties for Offenders:

To deter deliberate adulteration, heavy fines and legal actions should be imposed on offenders. Publicizing such penalties can serve as a warning to others and promote accountability in the food industry.

4. Promoting Hygiene in Production:

Ensuring hygienic practices during food production, processing, and packaging is vital to prevent contamination and adulteration. Food producers should maintain clean environments and train their workers in proper handling techniques to maintain food safety.

Q No. 1

(b)

Food Preservation:

Food preservation is the process of treating and handling food to

prevent spoilage, extend its shelf life, and maintain its nutritional value, texture and flavor.

Methods of Food Preservation

I. Refrigeration and Freezing:

This method slows down the growth of microorganisms by keeping food at low temperatures. Refrigeration is typically done at 0°C to -4°C , while freezing occurs below -18°C , stopping bacterial activity.

Examples:

Storing milk, fruits and vegetables.

Preserving meat, fish and frozen vegetables like peas.

II. Drying (Dehydration):

Moisture is removed from food to inhibit the growth of bacteria, yeast and molds. This can be achieved through air drying, sun drying, or using specialized equipment like dehydrators.

Examples:

- Dried fruits (e.g., raisins, apricots)
- Dehydrated meat
- Powdered milk and spices like chilli powder.

III. Canning.

Food is heated to destroy microorganisms and then sealed in airtight containers to prevent contamination. The lack of oxygen inside the can inhibits bacterial growth.

Examples:

- Canned vegetables - Canned fruits
- Ready-to-eat meals

IV. Pickling:

It involves immersing food in a solution of vinegar, salt or brine, creating an acidic environment that prevents microbial growth. Spices can also be added for flavor.

Examples:

- Pickled cucumbers, onions and carrots. - Pickled fish
- Pickled eggs.

7. Pasteurization:

A process of heating food to a specific temperature for a set period to kill harmful microorganisms without altering the food's quality significantly. It is commonly used for liquids.

Examples:

- Pasteurized milk and juices.
- Beer and wine
- Liquid eggs used in food production

Q No. 1

(C)

Temperature:

Definition

Temperature measures how hot or cold the atmosphere is, usually expressed in degrees Celsius, or Fahrenheit. It is influenced by solar radiation, geographic location, altitude and time of day.

Temperature affects weather patterns, human

activities and the behavior of plants and animals.

Example:

Higher temperatures in summer cause heatwaves, while low temperatures in winter lead to frost and snow.

Pressure.

Definition:

Atmospheric pressure is the force exerted by the weight of air above a certain point, measured in units like hectopascals (hPa) or millibars (mb).

Pressure variations lead to weather changes. High pressure areas typically bring clear skies, while low-pressure areas result in clouds and precipitation.

Example:

A falling pressure reading often indicates an approaching storm, while rising pressure suggests fair weather.

Humidity:

Definition:

Humidity refers to the amount of

water vapor present in the air, often expressed as a percentage of the maximum water vapor the air can hold at a given temperature. High humidity levels can make temperatures feel hotter and lead to precipitation, while low humidity can cause dryness and discomfort.

Examples:

High humidity in tropical regions contributes to frequent rain, while low humidity in deserts leads to dry conditions.

Q No. 1

(d)

Earthquakes

An earthquake is the sudden shaking or trembling of the Earth's surface caused by the rapid release of energy stored in the Earth's crust. This energy release generates seismic waves that propagate through the Earth, resulting in ground motion. It is measured by the Richter scale.

Causes of Earthquakes

I. Tectonic Plate Movements:

The Earth's crust is divided into large pieces called tectonic plates. These plates move due to mantle's convection currents. When plates collide, slide past each other, or move apart stress build up at their boundaries. When the stress exceeds the strength of the rocks, they break or slip, releasing energy in the form of seismic waves.

II. Volcanic Activity:

Earthquakes can occur due to the movement of magma within a volcano. These are often precursors to volcanic eruptions.

III. Human Activities:

Activities like mining, reservoirs induced seismicity, and nuclear explosions can also cause minor earthquakes.

Types of Earthquake Waves

I. Primary (P) Waves:

These are fastest seismic waves. They travel through solid, liquid, and gases. They compress and expand materials as they pass.

II. Secondary (S) Waves:

These are slower than P waves. They can travel only through solids. They move perpendicular to their direction of travel.

III. Surface Waves:

They travel along the Earth's surface and are slower than P and S waves.

Effects of Earthquakes

It causes damage to buildings, bridges, and infrastructure. It cracks and displacement along fault lines. It also affects on the human life such as loss of life, injuries and economic damage.

Q No. 2

(a)

Renewable Energy Resources

Renewable energy resources are naturally replenished energy sources such as solar, wind, water, biomass, and geothermal, that provide sustainable and eco-friendly energy without depleting Earth's resources.

Importance of renewable energy resources with respect to the environment

I. Reduction of Greenhouse Gas Emissions

Renewable energy sources produce little to no greenhouse gases, reducing the impact of climate change compared to fossil fuels.

II. Minimization of Air and water Pollution

Unlike coal or oil, renewables do not release harmful pollutants like

sulfur dioxide or nitrogen oxides, improving air and water quality.

III. Conservation of Natural Resources

These resources are sustainable and replenishable, ensuring the preservation of finite resources such as coal and oil for future generations.

IV. Reduction in Habitat Destruction

Renewable energy projects typically require less extensive land disruption than mining for fossil fuels, preserving ecosystems and biodiversity.

V. Energy Independence and Sustainability

Renewables provide a long-term solution to meet energy demands without depleting Earth's resources or causing environmental harm.

Solar Energy

Solar energy is the energy harnessed from the sun's radiation and converted into usable forms such as electricity or heat.

How It works

Solar panels contain PV cells that convert sunlight directly into electricity. These systems use mirrors or lenses to concentrate sunlight and produce heat, which is then used for heating or generating electricity.

Benefits of Solar Energy

I. Eco-Friendly

Solar energy is clean, producing no greenhouse gases or pollutants during operation.

II. Abundant and Sustainable

The sun provides an inexhaustible source of energy, available worldwide.

III. Reduces Energy Costs

Solar systems reduce dependency on grid electricity, lowering utility bills.

IV. Diverse Applications

It can be used for residential, commercial and industrial

purposes, including powering homes, street lights and water heaters.

Q No: 2

(b)

Rocks:

Rocks are naturally occurring solid materials composed of one or more minerals or mineraloids. They form the Earth's crust and come in various compositions, textures and appearances depending on their formation process. Rocks are classified into three main types based on their origin: igneous, sedimentary, and metamorphic rocks.

Types of Rocks

I. Igneous Rocks

It is formed from the cooling and solidification of molten magma or lava. It is often hard and durable, with interlocking mineral crystals.

Examples:

Granite and Basalt

II. Sedimentary Rocks

It is formed by the compaction and cementation of sediments like sand, silt, and clay over time. It is often layered and may contain fossils, representing past environments.

Examples:

Sandstone, limestone and shale

III. Metamorphic Rocks

It is formed when existing rocks are subjected to intense heat and pressure, causing physical and chemical changes. They have a foliated or non-foliated structure and are denser than their original forms.

Examples:

Marble and slate

The Rock Cycle

The rock cycle is a continuous process through which rocks transform from one type to another due to various geological processes. This cycle illustrates how Earth's

materials are constantly recycled and reshaped over time

I. Formation of Igneous Rocks

Magma from beneath the Earth's crust cools and solidifies to form igneous rocks. If this happens below the surface, intrusive rocks are formed; if on the surface, extrusive rocks are formed.

II. Weathering and Erosion

Igneous rocks are broken down into smaller particles by weathering and transported by erosion to form sediments.

III. Formation of Sedimentary Rocks

These sediments accumulate in layers and over time are compressed and ~~compact~~ cemented to form sedimentary rocks.

IV. Metamorphism

Sedimentary or Igneous rocks subjected to high pressure and temperature within the Earth's crust undergo metamorphism, forming metamorphic rocks.

V. Melting

Metamorphic rocks may melt due to extreme heat turning into magma and restarting the cycle.

Q No. 2
(C)

Saturated Fats

Fats with no double bonds between carbon atoms in their fatty acid chains. They are solid at room temperature. They are found in animal products and tropical oils. Excess consumption may increase LDL and risk of heart diseases.

Unsaturated Fats

Fats with one or more double bonds in their fatty acid chains. They are liquid at room temperature. They are found in plant based oils, nuts, seeds and fatty fish. They help reduce LDL and increase HDL, promoting heart health.

Importance of Fats

I. Saturated Fats

1. They provide energy and support cell membrane structure.
2. They aid in the absorption of fat-soluble vitamins (A, D, E, K).
3. They should be consumed in moderation to avoid health risks.

II. Unsaturated Fats

They improve heart health by reducing bad cholesterol levels.

They provide essential fatty acids (omega-3 and omega-6) crucial for brain function and cell growth.

They support hormonal balance and inflammation regulation.

Q No. 2

(d)

Water - Soluble Vitamins

Water-soluble vitamins are a group of vitamins that dissolve in water and are not stored in the body for long periods. They need to be consumed regularly through diet as any excess is excreted in urine. These vitamins play essential roles in energy production, metabolism, and maintaining overall health.

Types and Functions

1 - Vitamin B complex

The B vitamins are a group of eight vitamins that work together to support various bodily functions.

I. Vitamin B1:

It helps convert carbohydrates into energy and supports nerve function.

Sources:

Whole grains, nuts, seeds, pork

II. Vitamin B2

It supports energy production and healthy skin and eyes.

Sources:

Dairy products, eggs, leafy greens.

III. Vitamin B3

It aids in metabolism and maintaining healthy skin.

Sources:

Meat, fish, peanuts

IV. Vitamin B5

It essential for synthesizing coenzyme A, which helps break down fats and carbohydrates.

Sources:

Avocados, broccoli, eggs

V. Vitamin B6

It supports brain development and helps produce neurotransmitters.

Sources: Bananas, poultry, potatoes

VI. Vitamin B7

It supports hair, skin and nail health and energy metabolism.

Sources: Eggs, nuts, seeds

VII. Vitamin B9

It is crucial for cell division and DNA synthesis, especially during pregnancy.

Sources: Leafy greens, legumes, fortified cereals

VIII. Vitamin B12

It is important for nerve health, red blood cell production, and DNA synthesis.

Sources: meat, dairy, eggs

2. Vitamin C

It is an antioxidant that supports the immune system, aids in collagen production, and enhances iron absorption.

Sources:

Citrus fruits, berries, bell peppers, broccoli

Importance of Water-soluble Vitamins

I. Energy Production:

B vitamins are coenzymes

in metabolic pathways that produce energy.

II. Immune Support

Vitamin C enhances immune function and protects cells from damage.

III. Nervous System Health

B vitamins support nerve function and neurotransmitter production.

IV. Cell Growth and Repair

Folate is essential for DNA synthesis, especially during pregnancy.