

Question-2

(a)

Traditional food Preservation methods

Some of the main traditional food preservation methods are:

Drying

Drying of fruits, vegetables in sunlight slows down growth of microbes

Salting

Salt over fish/meat takes out moisture and prevent microbial growth

Traditional methodsPickling

Adding citric acid or vinegar acidifies pH of the food and reduce growth of bacteria

Pasteurization

Boiling liquids or solid food at high temperature for longer time kills micro-organisms and increase their life of food

Advantages:

- (1) Traditional methods are more economical and don't require large machinery
- (2) They are easy ^{methods} to preserve food in rural areas
- (3) As they don't require large machinery, so environmental impact of these method is low

(ii) Modern Food Preservation Methods

As the time passed, world shifted from traditional methods to modern preservation methods. They are more efficient and increase lifespan of food for ever long time.

Freezing/Refridgeration

Freezing food below 0°C drastically reduce bacterial growth

Vacuum packing

In this method, air is completely removed and then food is packed without oxygen, most of organisms can't grow, preserving food for longer

Canning

Preserving food (fruits, juices) in cannes that are air tight create less suitable environment for bacterial growth.

Modern
Food
preservation

chemical Preservation

Chemical preservatives like sodium benzoate, citric acid are commonly used. They are added in food to enhance their storage life

Irradiation

Exposing food to ionizing radiations kills insects and microorganisms and increase their shelf life

Advantages

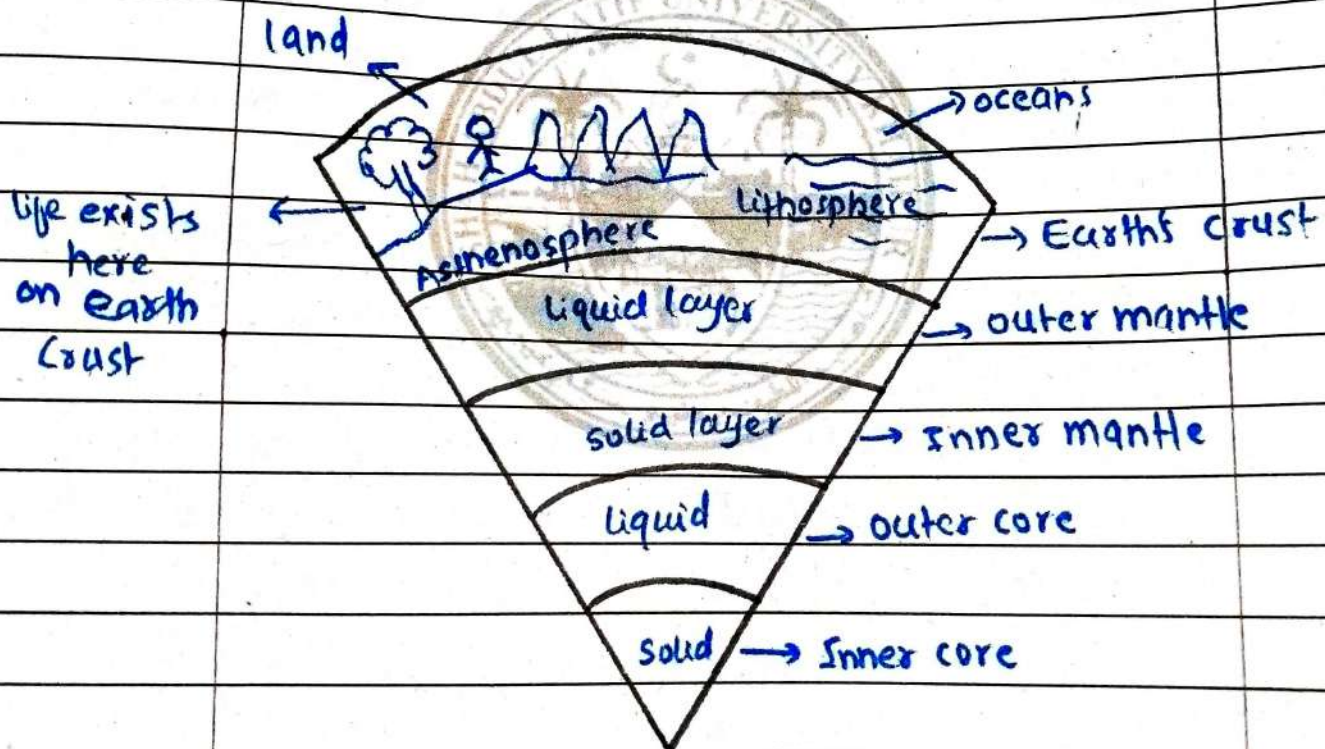
- (1) These food preservation methods are more effective and reliable ones.
- (2) They increase ~~shelf~~ life of food even longer as compared to traditional methods.
- (3) Modern methods are reliable ways to preserve and store large quantity of food.

Disadvantages

- (1) Methods, such as ~~can~~ pickling, or harsh ways may reduce quality of food.
 - (2) Modern methods of preservation require machinery and more resources as compared to traditional ways.
 - (3) They are costly as compared to traditional methods.
 - (4) They may require ~~exa~~ energy use, electricity, causing air pollution.
- The example is refrigeration that emits harmful gases.

(b) Internal Structure of Earth

Earth is one of the terrestrial planets, revolving around the sun. It is the only life supporting planet. Earth's internal structure is composed of different layers according to their temperature, pressure and composition. It is divided into three main components.



Earth's Internal Structure

Inner core: It is the deepest, inner most part of earth. It is the hottest area with temperature upto 5500°C . It is composed mainly of Iron and Nickel. The inner

core of earth is solid with highest density.

Outer core: Outer core of earth is present immediately after inner core. It is a liquid layer with slightly lower temperature in contrast to inner core. It is almost 3500°C - 4500°C . It is also composed of Iron, Nickel

Inner mantle: It is a ~~liquid~~ solid layer composed of Iron, Magnesium, oxygen and iron oxides.

Outer mantle: Outer mantle is a liquid component of internal structure of earth. It consists of pocket of magma that emanate as ~~to~~ in the form of lava during volcanic eruption. It is also composed of Iron oxides, magnesium, and Nickel.

Earth's crust:

Earth's crust is the outer most layer of Earth. It is composed of silica (SiO_2) or sand - It contains 70% water in the form of oceans, seas, and rivers. Almost 30% ~~of~~ ^{the} crust is land, having continents.

(i) Electromagnetic Radiations

These are the energy radiations having oscillatory electric and magnetic fields and travel even in space.

These radiation are divided into ionizing and non-ionizing radiations on the basis of their properties. These types are discussed below:

(i) Non-ionizing Radiations

They can't ionize gases because of lower energy. These radiations include:

(a) Radio waves: These are the electromagnetic radiations with longest wavelength and shortest frequency.

Properties: They are less harmful if exposed to humans.

Uses:

- (1) Radio waves are used in T.V, radios, satellites for communication purposes.
- (2) Mobile phones emit radio waves to make phone call.

(b) Microwaves: These are also electromagnetic waves with wavelength range between

radiowaves and infrared.

Uses:

- (1) Microwaves are used in microwave oven for heating food or cooking.
- (2) They are also used in wifi, bluetooth devices.
- (3) Microwaves are also used in larger bandwidth communication, radars and wireless communication.

(c) Infrared rays;

They have wavelength ^{length more} less than ultraviolet but lesser than microwaves.

Uses

- (1) Treatment of autoimmune diseases
- (2) Muscle therapy
- (3) Wound healing
- (4) Night time vision camera

(d) Visible rays;

These are electromagnetic radiation with visible range of wavelength and frequency. They are emitted from LED, hot objects, sun and bulbs.

Uses:

(d) Help in visibility

(e) Ultraviolet rays;

They are mainly emitted from sunlight having wavelength larger than visible rays

Uses:

- (1) Prevention of vitamin D deficiency in human
- (2) UV-radiation therapy for skin diseases like psoriasis
- (3) Mercury vapour lamp

(ii) Ionizing Radiations

They ionize the matter because of higher energy.

(a) X-rays; X-rays are produced when high energy radiation ~~em~~ hit the atom.

Uses:

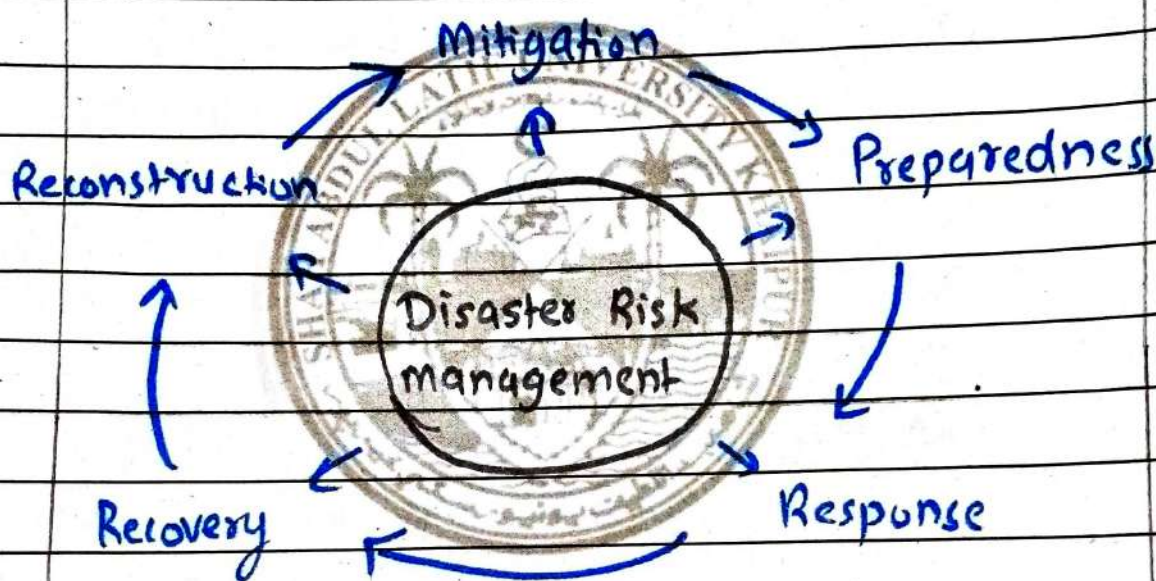
- (1) ~~th~~ Imaging of body (bones, stones)
- (2) Treatment of cancers to kill cancer cells

(b) Gamma rays: They have shortest wavelength and longest frequency.

Uses: (1) Sterilization of medical equipments
(2) PET scan (Positron Emission Tomography)

(d) Disaster Risk Management (DRM)

Disaster risk management is a procedural way to reduce impact of disasters, manage effectively and save maximum human life and infrastructure. It consists of following steps:



(i) Mitigation

It includes risk mapping, building regulations, building codes, raising awareness about disaster. Mitigation starts before disasters to reduce their impacts on life and infrastructure.

(ii) Preparedness

Before coming of disaster, preparedness is an important step. It includes efficient

communication channels, evacuation planning, and displacement of people from risky areas. Additionally, logistical planning and machinery use also ensured during this phase.

2) Response

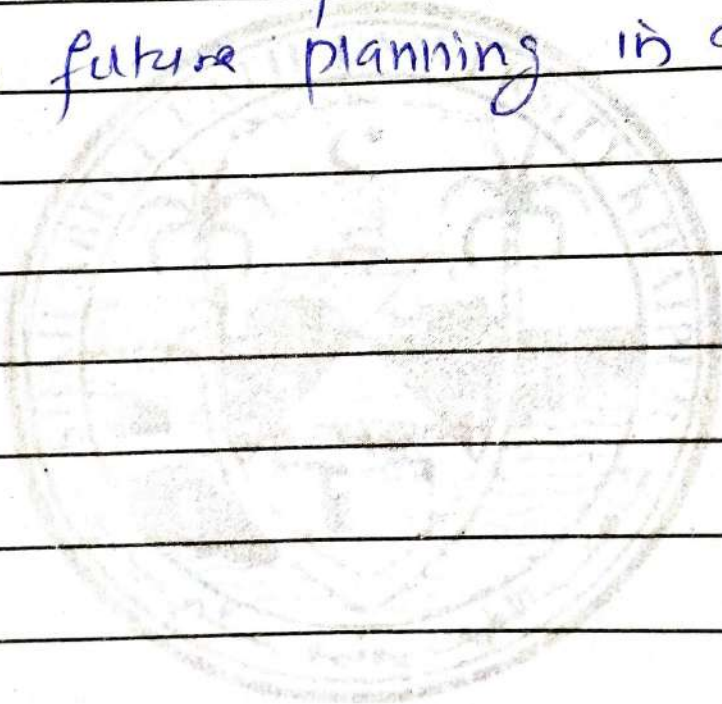
Response phase starts with the advent of disaster. It consists of maximum support to people. Evaluation of people and providing them food, clean water, temporary residence, medicine and health care.

3) Recovery

It is a step after the end of disaster. In recovery phase, people restore their normal life. Infrastructural losses are assessed and recovered. Temporary or semi-permanent residence provided to people. In this phase, destruction is assessed, and government devises short-term and long-term plans for reconstruction.

Importance of Risk assessment in DRM

Risk Assessment is overhauling of policies, risky areas and mapping to minimize havoc of natural disasters. It includes vulnerability assessment and strict regulations to avoid major losses. It is a critical component of DRM that observes impact of disasters and help in future planning in a sustainable way.



Question 3

(a)

Chemical Bonding

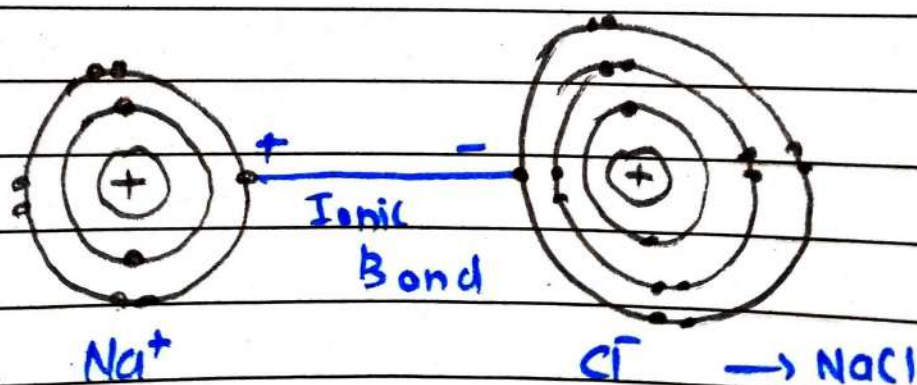
It is interaction of two or more atoms where they share or transfer electrons and form chemical bond.

Types of Chemical Bonding

(i) Ionic bond :

Ionic bond is formed between a metal and non-metal. In this bond electron is transferred from metal to non-metal forming positive and negative ions.

Example NaCl (sodium chloride)



In the above example, sodium loses electron and chlorine accepts it, resulting in formation of ionic bond.

(2) Covalent Bond

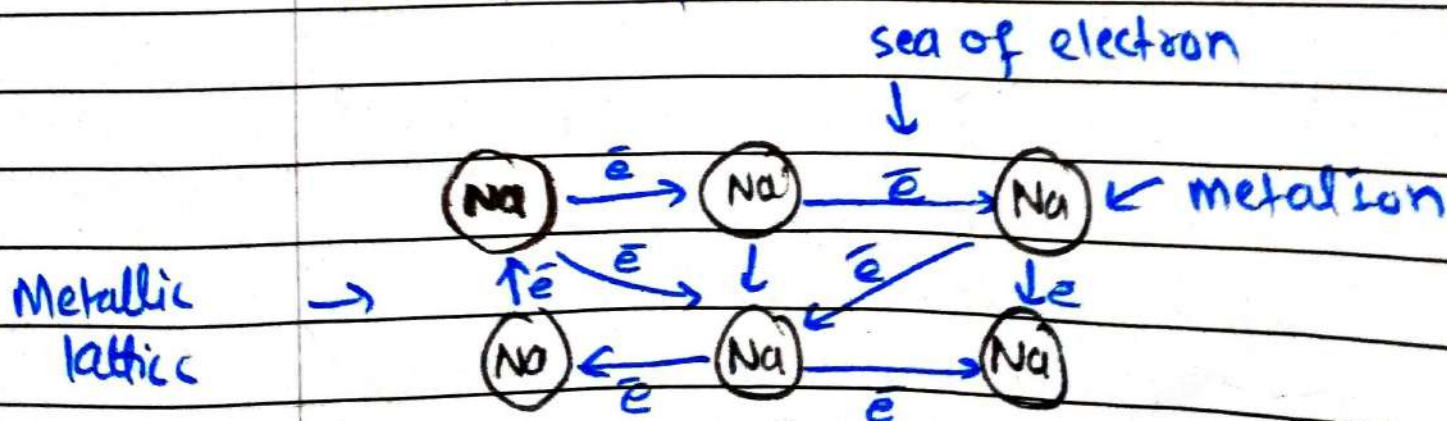
It is formed by mutual sharing of electron between two non-metal atoms.

Example: Cl_2 (chlorine molecule)



(3) Metallic Bond

It is formed in metals where sea of electrons move and resulting in conduction property. It is an electrostatic attraction between positively charged metal ion and sea of electrons.



Metallic Bonding

(b) Cause of Floods in Pakistan

Pakistan is one of top countries that is exposed to natural disasters mainly floods. Following are enlisted some of the causes of floods in Pakistan.

- (1) Climate change
- (2) Global warming
- (3) Glacial lake outburst (GLO)
- (4) Excessive melting of glaciers
- (5) Deforestation at massive level
- (6) Illegal encroachments at riverbeds
- (7) Disturbing of natural pathway of river flow
- (8) Uncontrolled urbanization
- (9) Excessive burning of fossil fuels
- (10) Abdurance of India in coordination and timely information
- (11) Lack of urban planning
- (12) Outdated drainage system
- (13) Lack of adequate dams and water storage facilities
- (14) Weak Governance and ineffective management further increase intensity of floods in Pakistan.

Suggestive measures to cope with floods

- (1) Early warning system
- (2) Risk Mapping and assessment of vulnerability
- (3) Building regulations and codes
- (4) Efficient drainage system
- (5) Porous pavements, water reservoirs, greenery to filter amount of water
- (6) Building dams and water storage areas
- (7) Awareness among population about floods and safety measures
- (8) Logistic planning and Training of disaster management employees
- (9) Coordination of NDMA, PDMA and DDMA
- (10) Effective fund use to mitigate future hazards
- (11) Allocation of ^{specific} tasks to all stakeholders to effectively manage this havoc
- (12) Measure to reduce climate change like reforestation, regulated urbanization and shift to renewable energy.

(d) Big Bang Theory

It is one of the most widely accepted theory about evolution of galaxies. According to big bang theory, life is evolved from a singularity, extremely dense, tiny point in the universe. About 4-8 billion years ago, an explosion occurred in the singularity and it expanded into the whole universe. During initial phase atoms and quarks were formed. Subsequently, they evolved into molecules, stars, galaxies and universe.

Evidence to support big Bang Theory

1) Redshift of universe

Redshift means wavelength of ~~get~~ light ~~becom~~ becoming redder and larger. It happened when objects move away from earth. This gradual redshift of the universe indicate that universe is expanding. Hence, it support Big Bang theory.

(2) Cosmic Microwave Background

Initially, temperature of Earth of 10 billion. This ~~very~~ intense temperature ~~releaser~~ released huge amount of energy. This energy is still visible in space in the form of cosmic microwaves, supporting truthfulness of Big Bang theories.

*) Presence of mixture of elements

Initially, after big Bang, sub-atomic particles were formed. Then atoms like He, and H₂ were emerged. The presence of these elements also support Big Bang Theory.