

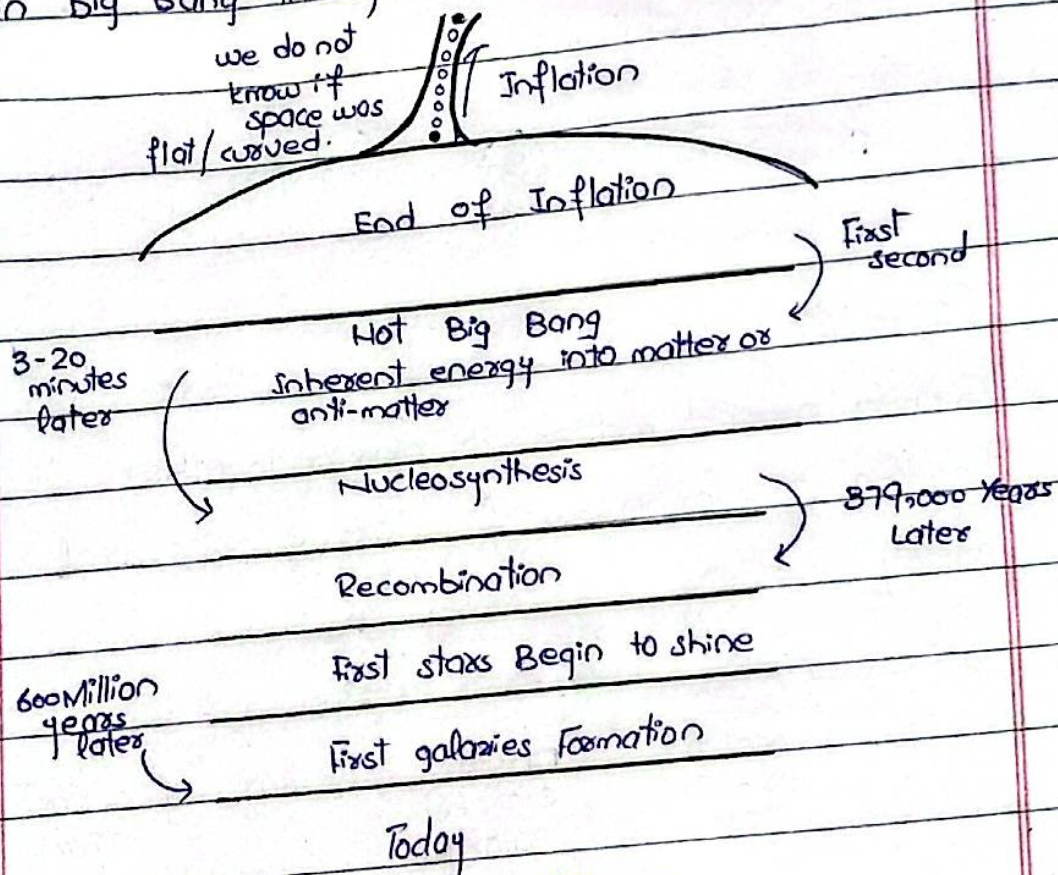
GSA Mock Exam

Q No 2:

Big Bang Theory:

Big Bang theory is the prevailing cosmological model explaining the origin, evolution, and large-scale structure of the universe.

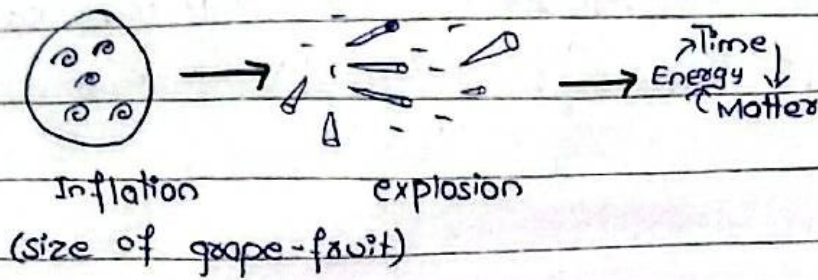
Edwin Hubble described the structure of universe in big bang theory as:



Structure Explanation:

Origin of the universe: According to big bang theory, the universe originated about

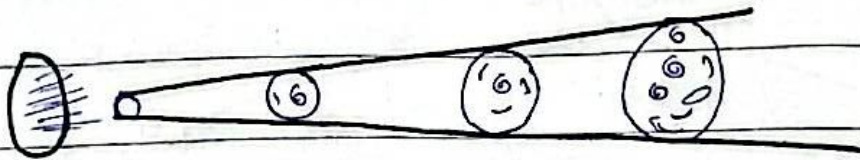
13.8 billion years ago from an extremely dense point called a singularity.



Expansion of the Universe:

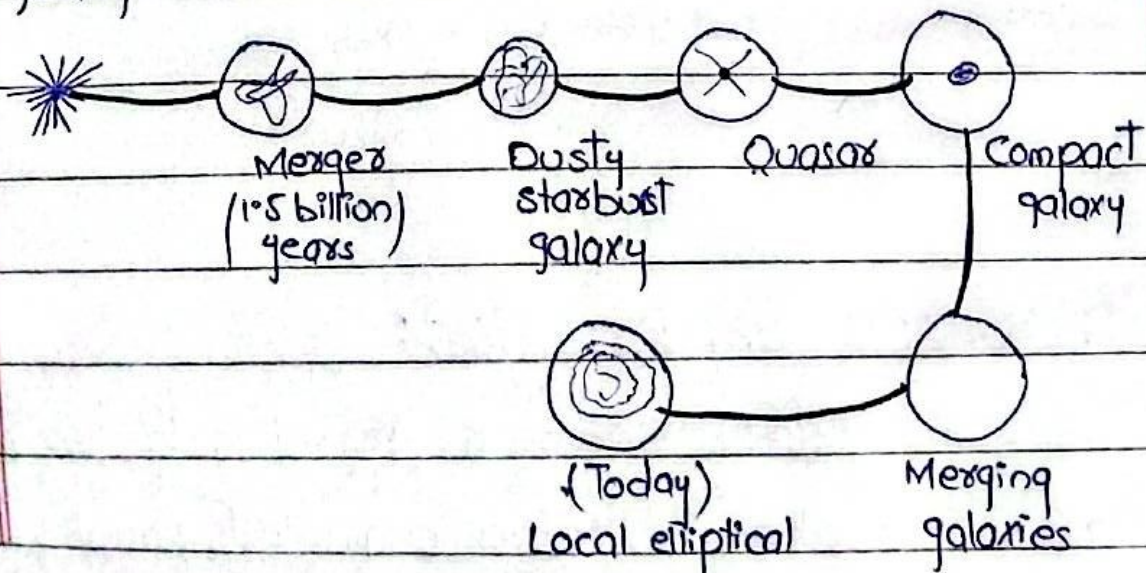
After big bang, universe expand continuously.

Galaxies are still moving away from each other.



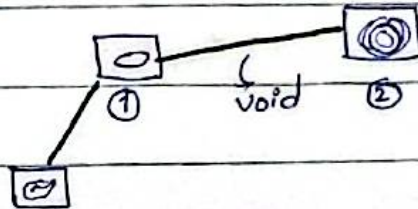
Formation of Stars and Galaxies:

Gravity caused matter to clump together, leading to formation of stars, galaxies, and galaxy clusters.



Large-Scale Structure of the Universe:

The universe is structured into galaxies, galaxy clusters, super-clusters, and cosmic filaments, separated by vast empty spaces called voids.



Present Structure of Universe:

Today, the universe consists of billions of galaxies, each containing billions of stars, planets, gas, and dust. It continues to expand and evolve over time.

Ultimate Fate of Universe:

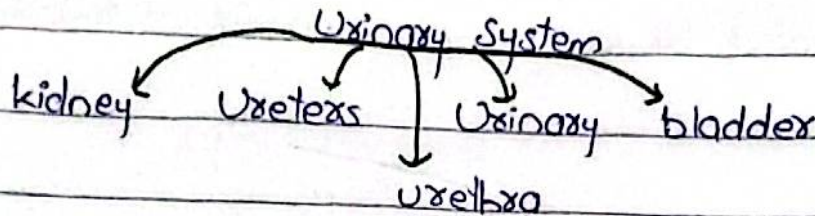
If expansion continues, the universe may reach a state known as "heat death," where galaxies are isolated and energy is evenly spread.

(b)

Define Urinary System.

The urinary system in a body is responsible for removing metabolic wastes, maintaining

water and electrolyte balance. It regulates blood pH and volume. It consists of following organs/structures:

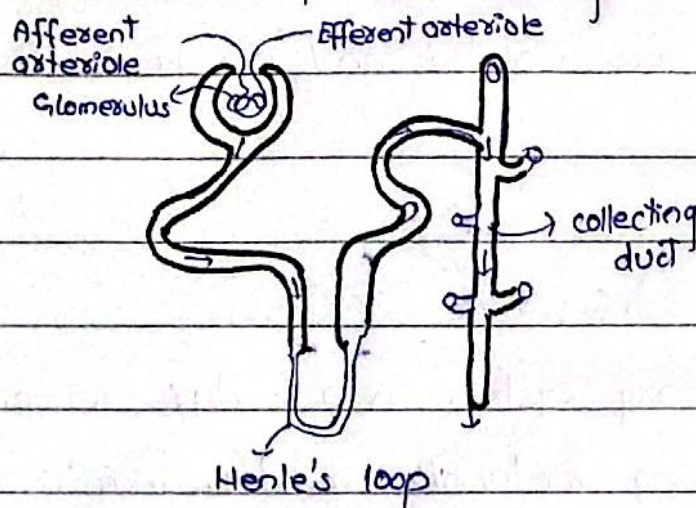


Function of Urinary System:

- It maintains homeostasis of the internal body environment.
- It regulates blood volume, pH, and water balance in the body.
- It helps in formation and excretion of urine.

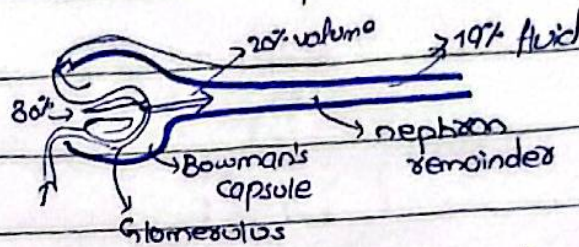
Working of Nephron:

A nephron is the microscopic structural and functional unit of the kidney.



Glomerular Filtration:

Glomerulus is a network of capillaries. Here, water, amino acid, salt, glucose, and urea are filtered into Bowman's capsule.



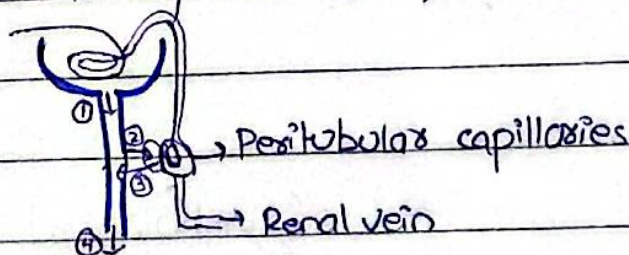
Plasma volume enters 100% into afferent arteriole.

Tubular Reabsorption:

As filtrate passes through the proximal convoluted tubule (PCT), loop of Henle, and distal convoluted tubule (DCT), useful substances are reabsorbed back into the blood.

Tubular Selection/Secretion:

In this stage, additional waste substances like hydrogen ions, potassium ions, and certain drugs are actively secreted from blood.



Excretion = Filtration - Reabsorption + Secretion.

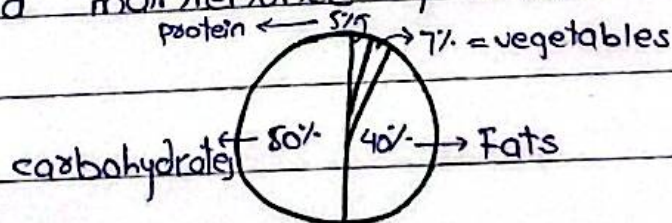
Urine Formation and Collection:

The remaining fluid becomes urine, which passes through the tubes into collecting duct, then into renal pelvis, ureter, urinary bladder, and finally expelled through urethra.



Un-balanced Diet:

An unbalanced Diet is a diet that does not provide all essential nutrients - such as proteins, carbohydrates, fats, vitamins, minerals, fiber, and water - in the right proportions needed by the body for normal growth, energy, and maintenance of health.



Imbalance Diet.

Effects of Un-balanced Diet:

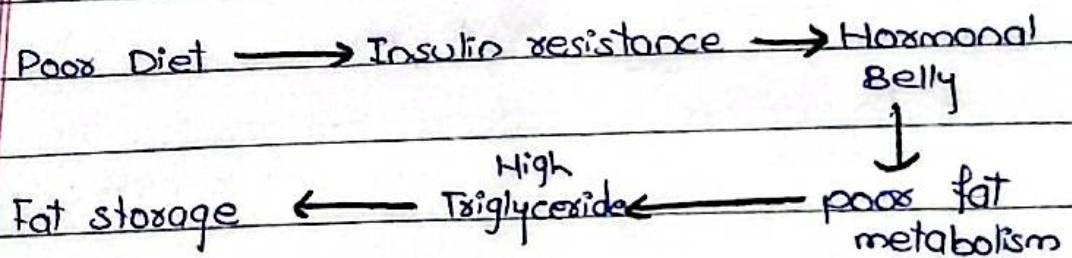
Depression:

Lack of awareness of unbalanced diet caused hormonal imbalance in the body. It can lead to state of depression - about 5-7%.

of adults worldwide suffer from depression.

Weight Gain / Obesity:

Hormonal imbalance is the root cause of many body related problems. Unbalanced diet causes imbalance in hormones due to unequal calories distribution. It causes weight gain or obesity problem in men as well as women.



Type 2 Diabetes:

Over 800 million people live with diabetes globally that is majorly caused by unbalanced diet.

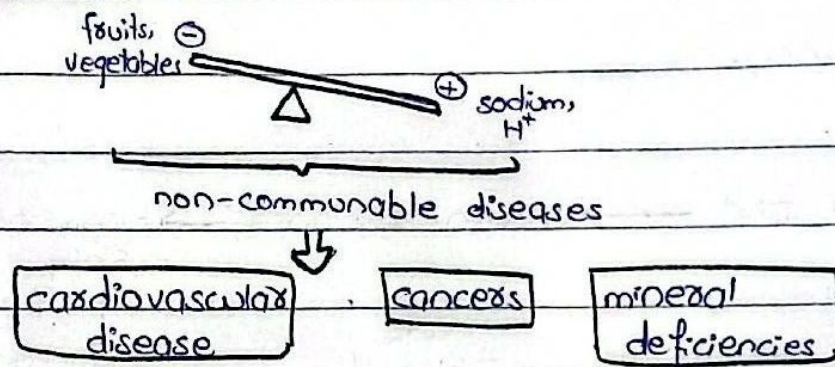
Digestive problems:

Digestion system of the body is an essential channel through which food is breakdown into pieces and release energy. Un-balanced

diet causes bloating, abdominal discomfort, belching, nausea, and changes in bowel movements.

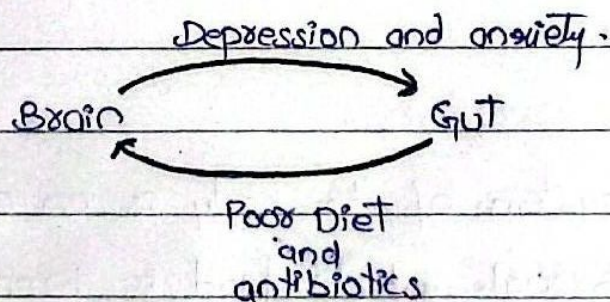
Deficiency Diseases:

Lack of essential vitamins causes deficiency diseases like anemia, rickets, bleeding gums, weakness.



Poor Brain Functions:

Un-balanced diet affects gut health so that brain functions. What we eat, brain thinks the same manner.

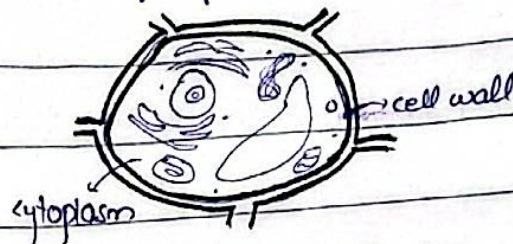




Cell wall:

Cell wall is a strong, protective structure that surrounds a plant/animal cell.

Structure of plant cell:



The structure of cell-wall is:

- Rigid and non-living in nature,
- Made mainly of cellulose,
- Freely permeable
- present only in plant cells.

Functions:

Provides shape and rigidity to the cell

Protects cell from mechanical injury

Maintains turgidity in plant cells

Prevents excessive water entry and cell bursting.

Cell Membrane:

Structure:

- Cell membrane is thin, flexible, and living membrane,
- Selectively permeable,

composed of phospholipids and proteins



cell membrane

Functions of Cell Membrane:

Cell membrane:

- controls movement of substances into and out of the cell.
- Provides protection and support
- Helps in cell communication
- Maintains internal environment of the cell

Cytoplasm:

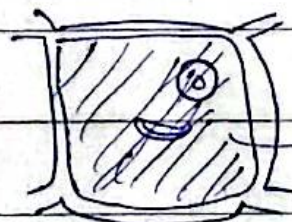
Structure:

- Jellylike, semi-fluid substance inside the cell.
- Composed mainly of water, proteins, salts, and enzymes.
- Contains all cell organelles.



cytoplasm

(Animal cell)



cytoplasm

(plant cell)

Functions:

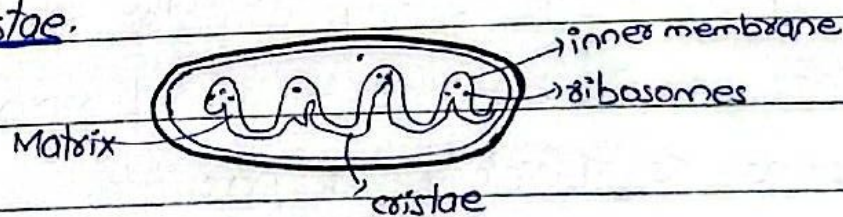
It functions as the:

- site of most metabolic reactions.
- holds organelles in place
- helps maintain the shape of the cell.
- facilitates transport of materials within the cell.

Mitochondria:

Structure:

- Oval or rod-shaped organelle
- surrounded by double membrane
- contains its own DNA and ribosomes
- Inner membrane forms folds called cristae.



Functions:

It functions as the:

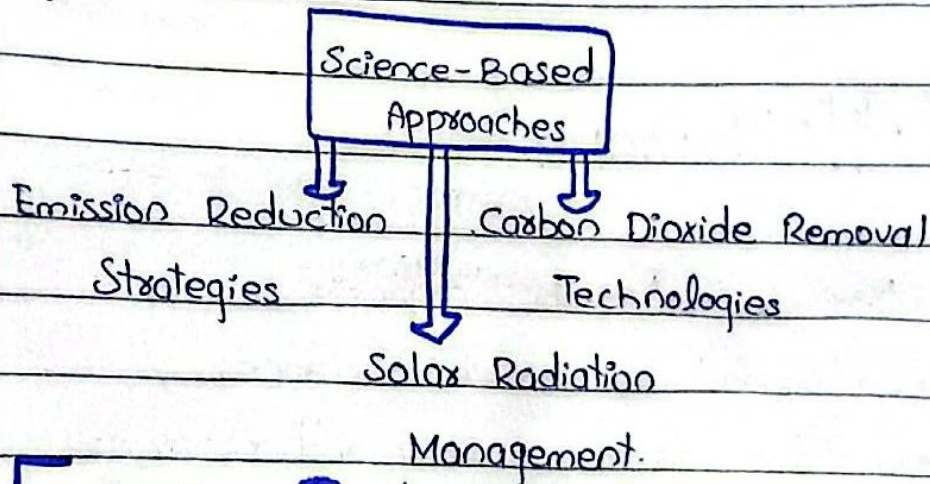
- site of cellular respiration
- produces energy ATP for cell activities.
- Regulates apoptosis.

Q No 3:

④

Global Warming Reverse:

Global warming can be reversed gradually by reducing gas emissions restoring natural system.

**Emission Reduction Strategies:**

The foundation of any climate reversal strategy must be reaching net-zero emissions as quickly as possible.

*** Renewable Energy Transition:**

Renewable energy sources such as wind and solar power plants, wind turbines represents one of the most critical pathways for achieving the emission reduction.

*Transportation and Industrial Decarbonization:

Electrifying transportation and industrial processes, powered by clean electricity, is the fastest path to emission reductions.

Carbon Dioxide Removal (CDR):

Carbon removal is essential for climate reversal.

*Natural Climate Solutions:

- Tropical forest Restoration
- Soil Carbon and Regenerative Agriculture
- Wetland Restoration.

*Technological Carbon Removal

- Direct Air Capture and Storage
- Bioenergy with Carbon Capture and Storage (BECCS)
- Enhanced weathering.

Solar Radiation Management:

Reflecting sunlight away from planet Earth to cool the planet while carbon removal

efforts scale-up. This strategy is somehow controversial among scientists due to unpredictable consequences.

(b)

Ceramics:

Ceramics are non-metallic, inorganic solids made by heating natural or synthesis material at high temperatures.

Example: For instance, bricks, glass, and porcelain

Properties:

1. Brittle and Hard:

Ceramics are hard and brittle and very low fracture toughness.

2. Good Insulators:

They are good electrical and thermal insulators.

3. Compressive Strength:

They have high compressive strengths and creep occurs at high temperature than metal.

4. High Melting point:

They have high melting point. Most ceramics do not have a single melting point.

5. Density:

In general, ceramics are lighter than metals and heavier than polymers.

Application of Ceramics:

1. Glasses Usage:

Ceramics used in smartphone screens, camera lenses and bottles etc. They have unique response to heating.

2. Clay Products:

Roof tiles, bathroom, dinnerware made from abundant clay material of ceramics.

3. Cement Industries:

Ceramics used in cement industries like in mortar, plaster of paris, and concrete.

4. Abrasive Ceramics:

Grinding wheels, sandpaper, cutting tools

Day: _____

Date: _____

are made up of ceramics.

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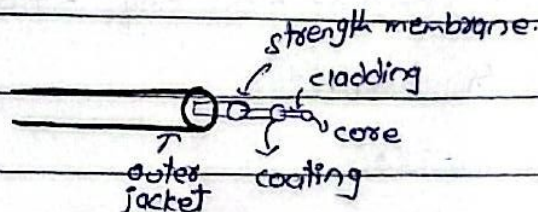
Working of Optical fibers:

Optical fibers work on a principle of total internal reflection.

Light signals travel through a thin glass or plastic fiber.

Light reflects continuously inside the fiber core.

Information is transmitted as light pulses.

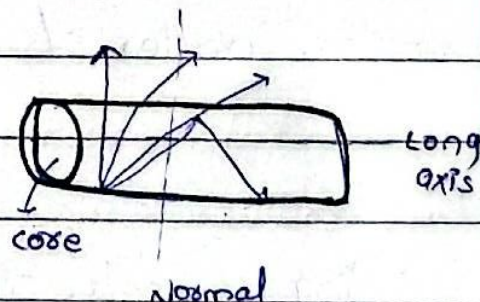


Application:

It is used for high-speed data and communication.

Devices like TV, Internet, and medical endoscopy.

Total Internal Reflection:



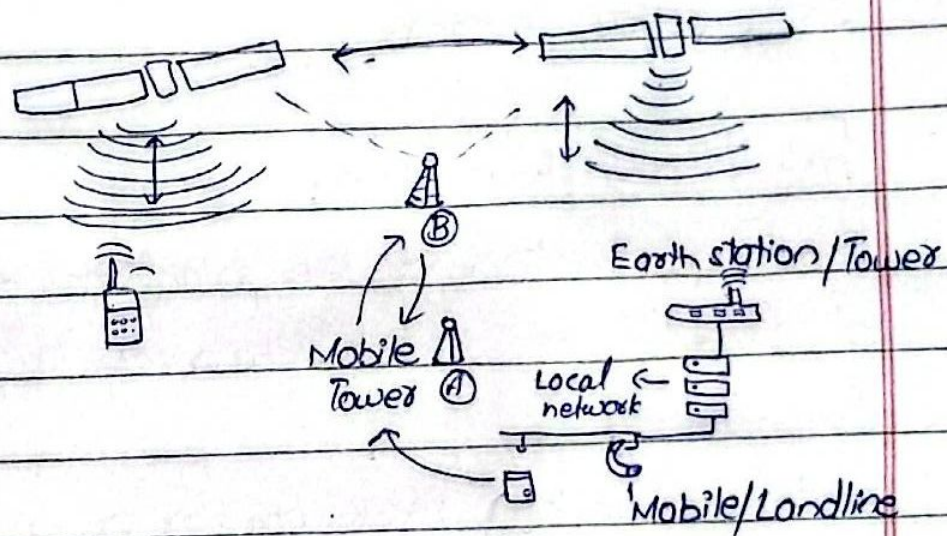
Working of Mobile Phone:

Mobile phone communicate using radio waves.

The phone sends signals to the nearest cell tower.

Signals are converted into digital form.

Data is routed through networks to the receiver.



Application:

Voice, text, and internet data are transmitted wirelessly.

(d)

Food additives:

Food additives are substances added to food to improve taste, color, texture, or shelf life.

Examples:

Food colors, emulsifiers, flavor enhancers.

Food Preservation:

Food preservatives are chemicals added to prevent food spoilage by microorganisms.

Examples:

Salt, sugar, vinegar.

Food adulteration:

Food adulteration is the intentional addition of harmful or inferior substances to food.

Examples:

Water in milk, brick powder in spices.

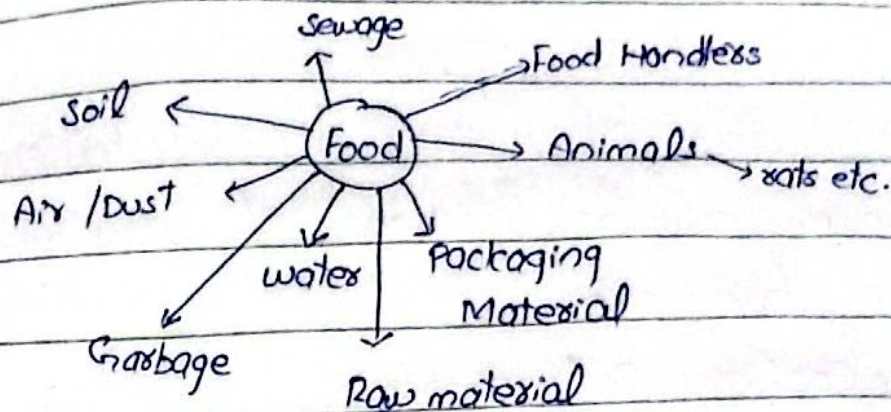
Food Contamination:

Food contamination occurs when food is accidentally polluted by harmful microbes, chemicals or foreign particles.

Examples:

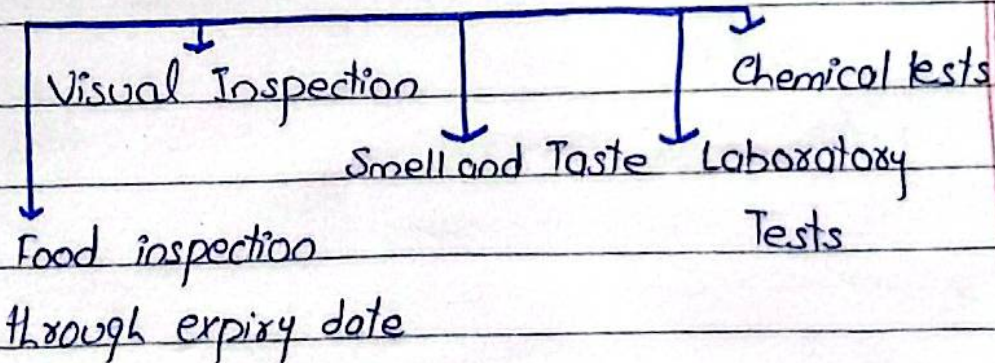
Bacteria in uncovered food, pesticides on vegetables.

Sources of Food Contamination:



Detection of Food Adulteration:

There are various methods to detect food adulteration:



Side-effects of Food Additives:

Food additives have some side-effects

Like:

1. Allergic reactions
2. Toxicity
3. Digestive problems
4. Headaches and Migraines

Day: _____

Date: _____

- 5. Cancer risk
- 6. Hyper-activity in children.
- 7. Nutrient loss

Methods of Food Preservation:

Some common methods of preserving the food are:

- Cooling / Refrigerator
 - Low microbial growth
- Freezing
- Canning / Bottling
 - Food is heated to kill microbes.
- Drying / Dehydration:
- Smoking
- Vacuum Packing