

Section - I

Q#02 (a)

Main Components of A Cell

CELL MEMBRANE (PLASMA MEMBRANE)

The second outermost layer of the plant cell and first outermost layer of the animal cell.

Structure:

phospholipid bilayer with protein embedded.

Function:

- 1) Regulate entry and exit of substances.
- 2) Maintain internal environment.
- 3) Facilitates communication through receptors.

CYTOPLASM:

Cell living matter

Structure:

Semifluid matrix containing organelles.

Function:

- 1) Provide medium for biochemical reactions.
- 2) Support organelles and allow their movement.

NUCLEAR:

Brain of the cell.

Structure:

Double membrane with pores,
Containing DNA.

Function:

- 1) Controls genetic information.
- 2) Directs protein synthesis.

MITOCHONDRIA:-

Powerhouse of the cell.

Function:

It produces ATP through cellular respiration.

ENDOPLASMIC RETICULUM (ER)

1) Rough ER:

It contains ribosomes; synthesizes proteins.

2) Smooth ER:

It manufactures lipids and detoxifies harmful substances.

GO

Functions:

It modifies, then packages and dispatches proteins and lipids for secretion or internal use.

LYSOSOMES

Present in animal cells.

Functions:

It digests and recycles cellular debris through hydrolytic enzymes.

CYTOSKELETON

Function:

It provides supports intracellular transport, and cell motility.

CELL WALL (Cellulose + pectin)

It is Present in Plants, Fungi and Bacteria

Function:

It provides rigidity, mechanical strength and defense against external strength.

Difference Between

Prokaryotic And Eukaryotic

Cells

Features	Prokaryotic cell	Eukaryotic cell
1) Nucleus	Absent	Present
2) Organelles	Absent membrane bounded	Present membrane bounded
3) Size	Smaller	Larger
4) DNA	Circular	Linear and chromosomal
5) Division	Binary fission	Mitosis and Meiosis

Cellular Response To External Stimuli

Signal Reception:

special type of receptor proteins on the surface of the cell detect external matter such as hormones, nutrients, or toxins.

Cellular Adaptation:

These responses may include gene expression, enzyme activation or directional movement.

Example:- Chemotaxis $\rightarrow$ movement of bacteria towards nutrients or away from toxins.

Homeostasis in Cells

It is the balancing system of the cell. It balances the internal environment despite fluctuating external conditions.

Mechanisms:

Transport System:

Active and passive transport regulation and nutrient balance

Buffer System:

It maintains pH levels for enzymatic activities.

Q# 02 (c)

Different Layers Of The Earth And Their Interactions With Each Other

Crust

Structure:

The outermost solid layer, which is divided into continental and oceanic crust.

Functions:

- 1) It supports ecosystems and human settlements.
- 2) It is the source of minerals, soil and natural resources.

Mantle

Structure:

It is the thick layer of semi-fluid rock beneath the crust.

Functions:

It is responsible for volcanic eruptions and mountain formation.

Outer Core

Structure:

It is molten iron and nickel.

Function:

It generates Earth's magnetic field.

Inner Core

Structure:

It is solid iron-nickel alloy at the center.

Function

It maintains gravitational balance.

Interaction Among Layers

- 1) The movement in the mantle causes continental drift and earthquakes.
- 2) Volcanic eruptions from mantle material recycle nutrients to the crust.
- 3) Magnetic field generated by the core shields ecosystems on the surface.

The Earth's Water Cycle

Main Processes.

Evaporation

Water from oceans, rivers and soil turns into vapor.

Condensation

Vapor cools and forms clouds.

Precipitation

Water returns to the surface.

in the form of rain, snow or hail.

Runoff and Infiltration:

water flows back to rivers or seeps into ground waters.

Importance For Life

- 1) It regulates climate and temperature
- 2) It distributes fresh water which is essential for drinking, agriculture, and ecosystem.
- 3) It supports biodiversity by sustaining rivers, lakes, forests and wetlands.

Human Impacts on

Earth's Ecosystem

And Resources

Deforestation:

It leads to soil erosion, biodiversity loss and climate change.

Industrialization And Pollution

- The air and water pollution disrupt ecosystems.
- And the excessive CO₂ emissions cause global warming.

Overexploitation of Natural Resources

The mining, overfishing, and groundwater depletion reduce sustainability.

Q#02 (d)

Main Sources of Air Pollution

Natural Sources

- 1) Volcanic Eruptions
- 2) Dust Storm
- 3) Wildfires

Anthropogenic (Human-Induced) Sources

- 1) Industrial Emissions
- 2) Transportation
- 3) Agricultural Activities
- 4) Domestic sources.

Effects of Air Pollution

Effects on Human Health

- 1) Respiratory disorders
- 2) Cardiovascular Diseases
- 3) Neurological Effects
- 4) Premature Deaths

Environmental Effects.

- 1) Global warming

- 2) Acid Rain
- 3) ozone (O_3) Depletion
- 4) Biodiversity Loss.

Primary And secondary Air Pollutants

Primary Air Pollutants

- Directly emitted into the atmosphere
- Examples:

CO → Carbon monoxide

SO₂ → Sulfur dioxide

NO_x → Nitrogen oxides

PM → Particulate matter.

Secondary Pollutants

- formed by chemical reactions between primary pollutants and atmospheric elements.

Examples:

Ground level ozone (O_3)

↳ formed from NO_x + VOCs under sunlight.

Smog

↳ mixture of pollutants including ozone & particulates.

Acid Rain

↳ formed from SO₂ / NO_x mix with water vapor.

Reducing Air Pollution Individual Actions

- 1) using public transport, cycling or

or walking.

- 2) Energy conservation
- 3) Adopting clean cooking fuels instead of coal or wood.
- 4) Planting trees.

Collective Actions

- 1) Regulation of emissions
- 2) Promotion of renewable energy
- 3) Urban planning
- 4) Global Agreements
- 5) Awareness Campaigns.

Q#04 (c)

Balance Diet

A balance diet is a diet that provides all essential nutrients in appropriate proportions.

WHY IS A BALANCE DIET ESSENTIAL

It is essential to:

- 1) ensure proper growth and repair of body tissues
- 2) maintain energy levels
- 3) strengthen immunity
- 4) Reduce risk of malnutrition

Importance Of Micronutrients

1) Carbohydrates:

Prevents fatigue and maintains blood sugar balance.

2) Proteins:

It is essential for muscles, immunity and cell functions.

3) Fats:

It protects organs and regulates hormones.

Importance of Micro-Nutrients

Vitamins

↳ Vit-A → Good eyesight

↳ Vit-D → Bone health.

↳ Vit-C → Wound healing

↳ Vit-B-complex → Energy metabolism.

Minerals

↳ Calcium → Strengthens bones and teeth.

↳ Iron → Hemoglobin formation, prevents anemia.

↳ Zinc → Boosts immunity.

Water And Fiber

↳ Water → regulates temperature

↳ Fiber → Helps in digestion.