

PART-II (SECTION-I)

QNO(3)

(a) Why cells form organelles? Discuss mitochondria in a human cell.

(Ans) Cells form organelles to perform different functions efficiently - just like a factory has different departments for specific tasks.

Key Reasons

1) DIVISION OF LABOR

Each organelle performs a specific function (eg: mitochondria produce energy, nucleus stores DNA). This specialization increases efficiency.

2) COMPARTMENTALIZATION

Organelles create separate areas within the cell so that different chemical reactions can occur without interfering each other.

3) Efficiency and Control

Reactions inside organelles happen faster and can be

better regulated because conditions (like pH and enzymes) are controlled

4) Protection

Harmful reactions (like those in lysosomes) are kept inside specific organelles to protect the rest of the cell.

Conclusion:

Organelles allow cell to work in an organized, efficient and safe manner — each doing its part for the survival of the cell

MITOCHONDRIA IN HUMAN CELLS:

- (•) Mitochondria are double membrane organelles — outer membrane (smooth) and inner membrane (folded into cristae)

Functions

1. Energy Production

Mitochondria are called powerhouse of the cell. They produce ATP by a process called cellular respiration

(2) Regulation of metabolism

They control the cell's energy balance and play a role in metabolism of fats, carbohydrates and amino acids

(3) Apoptosis

Mitochondria release certain proteins that trigger cell death when a cell is damaged

(4) Own genetic material

Mitochondria regulate calcium ions for muscle contraction and have their own genetic material

(b) What is doping? Discuss different types of semi-conductors?

(c) DOPING :

Doping is the process of adding a small amount of impurity to a pure semiconductor to change its electrical conductivity.

Types

- (1) Intrinsic Semiconductors : An intrinsic semiconductor is a pure form of semiconductor

without any impurity
of silicon and germanium

2) Extrinsic Semiconductor

An extrinsic semiconductor is formed when a small amount of impurity (dopant) is added to a pure semiconductor to improve conductor

(a) N-type semiconductor (Extra electrons)
Made by adding pentavalent impurity such as phosphorus, antimony

(b) P-type semiconductor (Extra holes)
Made by adding a trivalent impurity such as boron, aluminium, gallium

(c) Merits and Demerits of Volcanic Eruption

Volcanic eruption are natural phenomena that can be destructive and beneficial

Merits

1) Fertile Soil Formation Volcanic ash and lava when broken

down create mineral rich and fertile soils

2) Source of minerals and Resources

Volcanic area contain valuable minerals such as gold, silver, copper and diamonds. These are brought close to the surface through volcanic activity making mining possible.

3) Geothermal Energy :

Heat from volcanic regions is used to produce geothermal energy, a renewable and eco-friendly power source.

Demerits

1) Loss of life & Property

Powerful eruption can cause massive destruction.

2) Air Pollution

Volcano release ash, dust, sulfur dioxide causing air pollution.

3) Economic loss

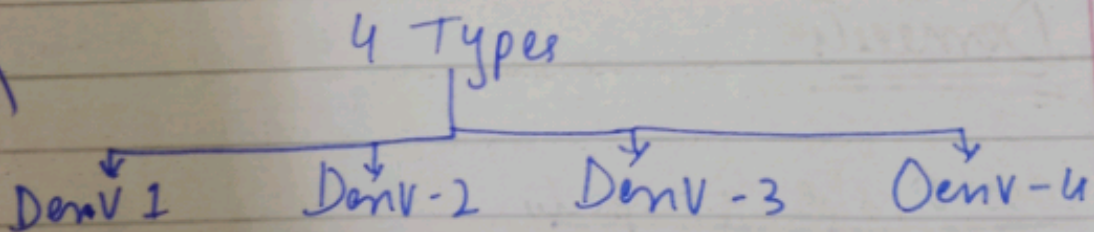
Agriculture, transport and local businesses suffer heavily due to damaged land and infrastructure

(d) Dengue

Dengue is a viral disease spread by the bite of infected female Aedes mosquitoes, mainly Aedes aegypti

(e) Causative Agent

The disease is caused by dengue virus (DENV)

(e) Symptomatology

Symptoms appear (4-10 days) after the mosquito bite.

Mild Dengue

Sudden high Fever
Severe headache

Severe Dengue

Severe abdominal pain
Continuous vomiting

(c) Muscle and joint pain	Bleeding from gums and nose
(c) Fatigue and weakness	Restlessness or irritability

Question (4)

(a) Write a note on plant kingdom -

Chlorophyll is a green pigment found in plants, algae and cyanobacteria. It is crucial for photosynthesis, the process by which plants convert sunlight into energy.

Chlorophyll absorbs light most efficiently in blue and red parts of the electromagnetic spectrum but reflects green light. This pigment plays a vital role in the survival of plants by extension, life on Earth.

(b) Describe role of ribosome in protein synthesis

Ribosomes are cellular structures responsible for protein synthesis.

The read messenger RNA (mRNA) sequence and assemble amino acids into polypeptide chain which fold into protein

Ribosomes can be found floating free in the cytoplasm or attached to endoplasmic reticulum

Their role is essential for translating proteins that perform various cellular tasks.

(c) Discuss different method of solid waste management.

(Ans) Solid Waste management involves several methods

(i) Landfilling

Disposing of waste in a landfill

(ii) Recycling

Converting waste into reusable materials

(iii) Composting

Breaking down organic waste into ~~reusable materials~~ Nutrient rich soil

Incineration:

Burning waste to reduce volume and sometimes generate energy

(d) Define Terms

BIOFUEL:

Fuels derived from organic matter like plants and waste

ADULTERATION:

The act of adding inferior or harmful substances to food or product

HYDROSPHERE:

The part of Earth surface containing water including oceans, lakes, rivers

TROPOSPHERE:

The lower layer of Earth's atmosphere where weather occurs

(SECTION-II)

Q6)

b)

Camera 200 with 25% off + 6% tax

$$\text{Discount} = 200 \times 0.25 = 50$$

$$= 200 - 50 = 150$$

$$\text{Tax} = 15 \times 0.06 = 9$$

$$\text{Total} = 150 + 9 = \boxed{159}$$

(c)

Bicycle 36 km at 18 km/h start 1 pm

$$\text{Time} = \frac{\text{Distance}}{\text{speed}} = \frac{36}{18} = 2 \text{ hours}$$

$$\text{Reach at } 1 \text{ pm} + 2 \text{ hours} = \boxed{3 \text{ pm}}$$

(d)

Unscramble

=

SKTALIS = STATISTICS

LGEBMAN = ALGEBRA

(7) (a) Calculate volume of a sphere with diameter 14 cm

$$\text{Radius} = \frac{\text{diameter}}{2} = \frac{14}{2} = 7 \text{ cm}$$

$$\text{Volume of sphere} = \frac{4}{3} \pi r^3$$

$$= \frac{4}{3} \left(\frac{22}{7} \right) (7)^3$$

$$= \left(\frac{4}{3} \right) \left(\frac{22}{7} \right) \times 343$$

$$= 1437.3 \text{ cm}^3$$

(b) Find friends Total savings = 25,000
ratio 1: 2: 3: 4: 5

$$\text{Total parts} = 1+2+3+4+5 = 15 \text{ parts}$$

$$\text{Smallest share} = \left(\frac{1}{15} \right) \times 25,000 = 1666.6 \text{ Rs}$$

(c) Spot the error

2, 6, 18, 54, 162, 486

(multiplied by 3)

numbers are correctly fitting

3, 5, 7, ~~11~~, 13, 17 complete