

SECTION - I

Q NO: 03

(a)

Why cells form organelles? Discuss mitochondria in Human cell.

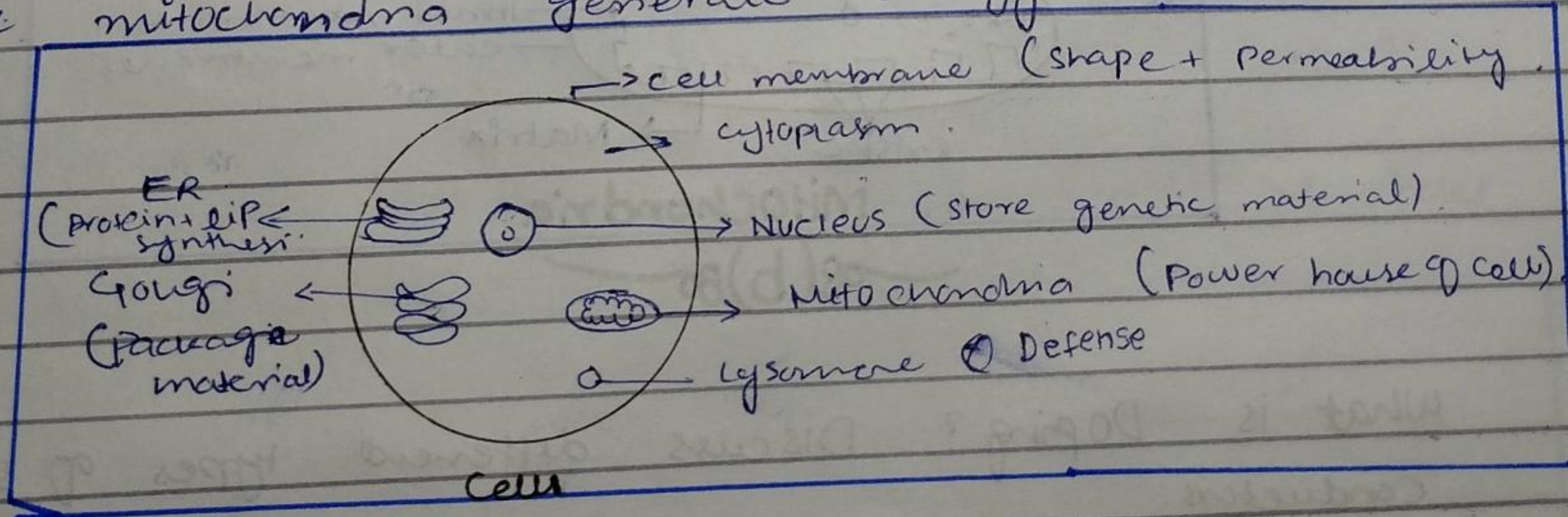
Cell form organelles:

Cells form organelles to compartmentalize different biochemical activities. Each organelle performs a specific function, allowing cell to work efficiently. This division of labor helps maintain order, increase efficiency, and prevent interference between incompatible chemical reactions.

For instance:

The nucleus store genetic material.

The mitochondria generate energy.



Thus organelles make cell a well organized and self-sustaining system.

Mitochondria in human cell.

The mitochondria are known as "Powerhouse" of the cell.

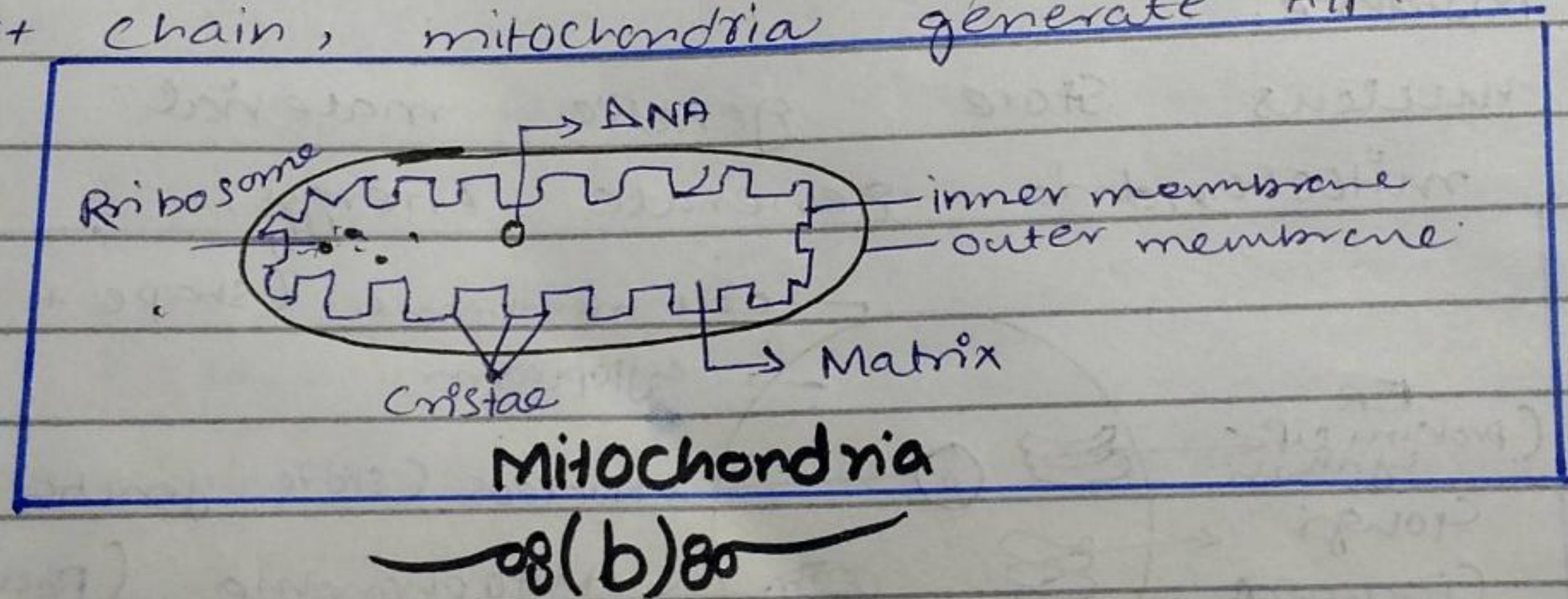
They play a vital role in energy production through a process called cellular respiration. Mitochondria convert nutrients such as glucose and oxygen into adenosine Triphosphate (ATP) the main energy currency of the cell.

Key Features and Function

Double membrane: The outer membrane is smooth, while the inner membrane folds into cristae to increase surface for energy reaction.

DNA and Ribosomes: Own DNA and Ribosomes allow mitochondria to produce some of their own proteins.

Energy Production: Through Krebs cycle and electron transport chain, mitochondria generate ATP.



What is Doping? Discuss different types of semi-conductors.

Doping:

Doping is the process of adding a small amount of impurity (dopant) to a pure semiconductor like Silicon to increase its conductivity.

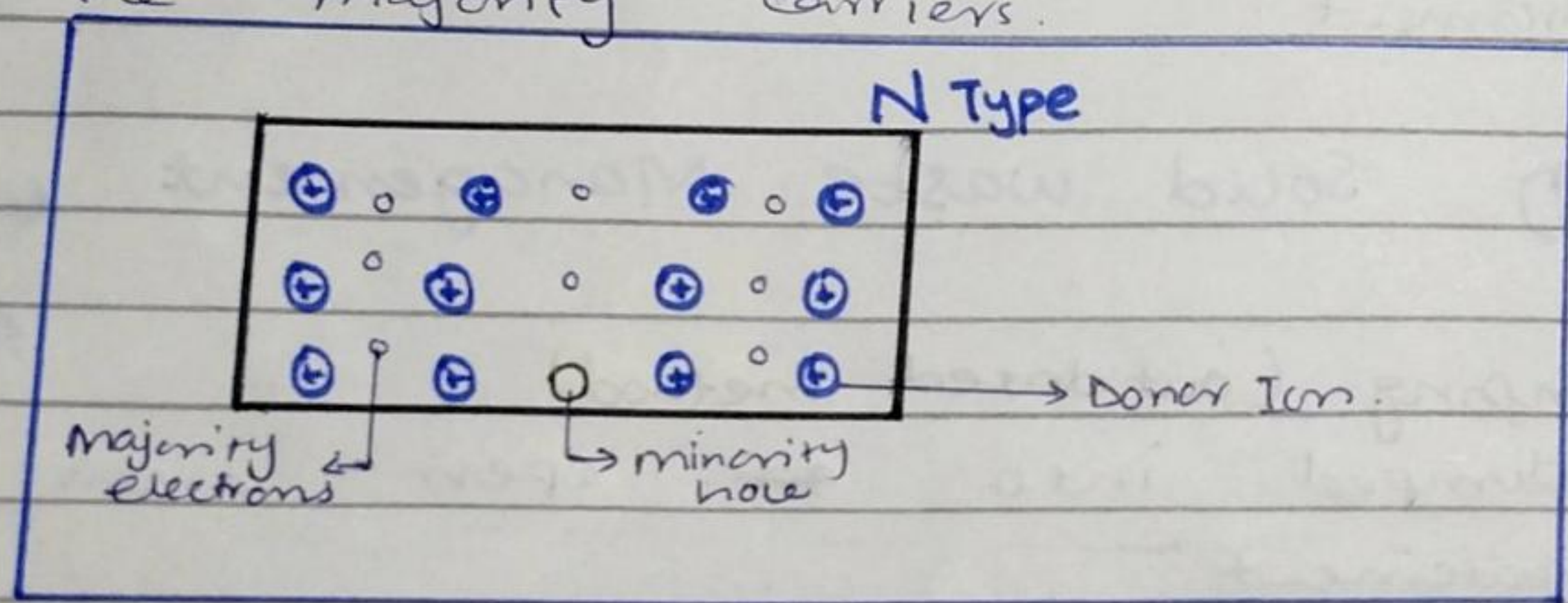
It changes an intrinsic semi-conductor into an extrinsic one by creating more charge carriers electrons or holes.

Types of Semi-conductors

Following are the types of semi-conductor.

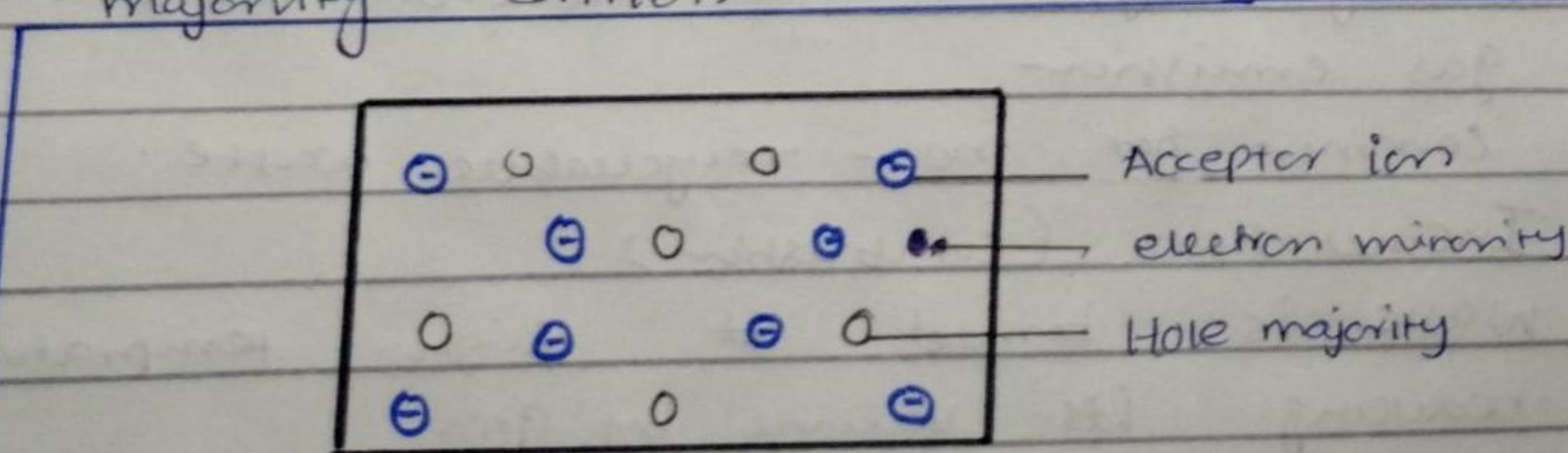
N-Type Semi-conductor

- = Doped with pentavalent elements (5 valence electron) such as Phosphorus or arsenic.
- = Provides extra electrons, making ~~electrons~~ ^{electrons} the majority carriers.



P-Type Semi-conductor

- = Doped with trivalent (3 valence electrons) such as boron and gallium.
- = Creates holes (positive carriers), making holes the majority carriers.



P-Type

08(C)

State some of the merits and demerits of volcanic eruption

Merits of volcanic eruption

- 1: Fertile Soil:
Volcanic ash break down into minerals that make the surrounding soil rich and productive for agriculture.
- 2: Formation of new land.
Lava solidifies to form new islands and land forms. for instance The Hawaiian Islands.
- 3: Mineral resources
Volcanoes bring valuable minerals like copper, gold and sulphur to the surface.
- 4: Geo thermal Energy:
Heat from volcanic areas can be used to produce clean, renewable geothermal power.

Demerits of volcanic Eruption

- 1: Loss of Life and Property:
Explosive eruptions cause death, destruction and displacement of people.
- 2: Air and water Pollution
Volcanic gases and ash pollute the atmosphere and nearby water sources.
- 3: Climate Effects:
Volcanic dust and sulphur dioxide (SO_2) can block sunlight, leading to temporary global cooling.

- 4: Disruption of Ecosystems:
Lava flows and ash can destroy forests,
crops and wildlife habitat.

~~Q(d)~~

What is Dengue? Discuss Symptomology, Causative agents and remedies.

Dengue:

Dengue is a viral fever / disease spread by the *Aedes aegypti* mosquito. It is common in warm, humid regions and can range from mild fever to severe, life threatening illness.

Causative agent:

Dengue virus (DENV), a flavivirus with 4 serotypes (DENV 1-4).

Symptoms:

Mild

- High Fever
- Headache and eye pain
- Muscle and joint pain
- Nausea, Rash, fatigue.

Severe

- Bleeding gums or nose
- Severe abdominal pain
- Blood in vomit / stool
- Low blood pressure or shock.

Remedies:

- No specific antiviral drugs - only supportive care
- Drink plenty of water / fluids and soft diet.
- Hospitalization if bleeding or dehydration occurs.

Prevention:

- Avoid mosquito bites, remove stagnant water, use sprayed nets or mosquito repellent.

Q NO: 04

Write a note on plant (kingdom) Chlorophyll

Chlorophyll:

Chlorophyll is the green pigment found in plants, algae, and some bacteria that plays a vital role in photosynthesis - the process by which plants make food using sunlight, CO_2 and water.

Types of Chlorophyll:

- (i) Chlorophyll a: Main pigment in all green plants
- (ii) Chlorophyll b: Assists chlorophyll a by capturing more light.
- (iii) Other forms like c, d, and f occur in algae and bacteria.

Functions:

- Capture solar energy and convert it into chemical energy (glucose)
- Give plants their green color by reflecting green light.
- Essential for maintaining the energy flow in the ecosystem.

~~(b)~~

Describe Role of Ribosomes in Protein Synthesis

Ribosomes are tiny, dense granular organelles present in both prokaryotic and eukaryotic cells. They are often called the "protein factories" of the cell because they are the site of protein synthesis.

Functions and Roles:

1: Site of translation

Ribosomes read the mRNA sequence and translate it into a specific amino acid chain (protein).

2: Binding of tRNA

tRNA (transfer RNA) molecules bring amino acids to the ribosomes according to the codons on mRNA (messenger RNA).

3: Peptide bond formation

Ribosomes help join amino acids together by forming peptide bonds, creating a polypeptide chain.

Types:

(i) Free ribosomes make proteins for use inside the cell.

(ii) Attached ribosomes (on rough ER) synthesized proteins for export or membranes.

Q(C)Q

Discuss different methods of solid waste Management (SWM)

Q(Answer)Q

Solid Waste Management

Solid waste Management refers to the collection, treatment, and disposal of solid materials discarded by society to protect health and the environment.

Methods of Solid waste Management

- 1: Open Dumping (outdated method)
 - waste dumped into ~~an~~ open areas without treatment
 - Causes pollution, foul odor, and health hazards
 - Now being ~~controlled~~ ^{Replaced} by controlled methods.
- 2: Land fillings
 - Waste is buried in a designated area with layers of soil.
 - Modern Sanitary landfills include liners and drainage systems to prevent leachate and gas emission
 - Common for non-recyclable waste.
- 3: Incineration (Combustion)
 - Waste is burned at high temperatures reducing its volume by 90%.
 - Produces energy, but may release toxic gases if not well controlled.

4. Composting:
Biodegradable waste (organic) decomposes naturally by microorganisms to form Compost. Used as organic fertilizers.

* Eco friendly.

5. Recycling and Reuse

= Sorting, cleaning and reprocessing materials like plastic, paper, glass and metals into new products.

= Save resources and energy; reduces land fill waste.

~~old do~~

Define the terms:

(a) Biofuels:

Biofuels is a type of renewable energy made from biological materials such as

Plants, animal, waste or algae.

Examples: Ethanol from sugar-cane and biodiesel from vegetable oils.

(b) Adulterations:

Adulteration is the deliberate mixing of inferior, harmful, or cheap substances with food, to increase profit but reduce quality and safety.

Example: Mixing water in milk, bricks powder in red chili.

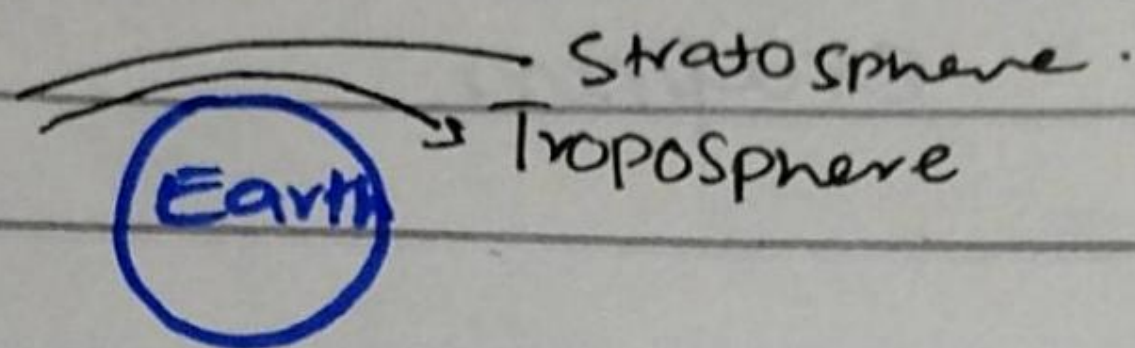
(c) Hydrosphere

The hydrosphere includes all the water present on planet Earth, such as oceans, seas, rivers, lakes, glaciers, and ground water.

It covers about 71% of earth's surface.

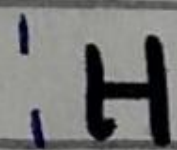
(d) Troposphere

The troposphere is the lowest layer of earth's atmosphere, where weather changes occur and most air mass exists. It extends upto about 8-15 km above earth.



(e) Isotopes:

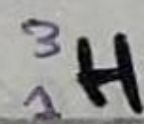
Isotopes are atoms of the same element that have the same number of protons but different number of neutrons.



Protium



Deuterium



Tritium

SECTION-II

Q (Q NO: 06)

(b)

A Camera priced at 200\$ get 25% off
plus 6% tax. Calculate the total amount paid.

Given:

Original price = 200\$

Discount = 25%

Sales tax = 6%

Step 01: Calculate discount

$$25\% \text{ of } 200 = \frac{25}{100} \times 200 = 50$$

$$\text{Discount amount} = \$50$$

$$\text{Price after discount} = 200 - 50 = 150$$

Step 02: Add 6% tax.

$$6\% \text{ of } 150 = \frac{6}{100} \times 150 = 9$$

$$\text{Total amount paid} = 150 + 9 = 159$$

Answer: The total amount paid for camera is \$159.

~~Q.10~~

A bicycle covers 36 km at 18 km/hr
Starting at 1 PM. What time does it reach?

Given:

Distance = 36 km

Speed = 18 km / hr.

Start time = 1:00 PM.

Step 01 :- Find Time taken

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

Step 02: Add to Starting time

$$1:00 \text{ PM} + 2 \text{ hours} = 3:00 \text{ PM}$$

Answer

The bicycle reaches at 3:00 PM.

Q No: 07

Calculate the volume of a sphere with diameter 14 cm (use $\pi = 22/7$)

Given:

Diameter = 14 cm

So radius = $14/2 = 7$ cm

Formula for the volume of sphere

$$V = \frac{4}{3} \pi r^3$$

Substitute value:

$$V = \frac{4}{3} \times \frac{22}{7} \times 7^3$$

(1) $\therefore 7^3 = 7 \times 7 \times 7 = 343$

2 $\therefore V = \frac{4}{3} \times \frac{22}{7} \times 343$

(3) Multiply Numerators

$$4 \times 22 \times 343 = 4 \times 7546 = 30184$$

4 = Multiply Denominators.

$$3 \times 7 = 21$$

$$V = \frac{30184}{21} = 1437.33 \text{ cm}^3$$

$V = 1437.33 \text{ cm}^3$

Q No: 08

Five friends' total savings = 25000 RS, ratio

1:2:3:4:5

Given:

Total saving = 25,000

Ratio of saving = 1:2:3:4:5

Step 01: Find the sum of ratio parts
 $1 + 2 + 3 + 4 + 5 = 15$

Step 02: Find the value of 1 part.

$$1 \text{ part} = \frac{25000}{15} = 1666.66$$

Step 03: Find the smallest share

The smallest ratio part = 1.

$$\text{Smallest share} = 1 \times 1666.66 = 1666.66 \text{ RS.}$$

$$\boxed{\text{Smallest share} = \text{RS } 1666.66}$$

~~~~~ og(G)80 ~~~~~

Spot the error / Complete the series.

(i) 2, 6, 18, 54, 162, 486  
which number doesn't fit?

"2" doesn't fit because all other numbers are multiple of "03"

(ii) Complete series  
3, 5, 7, 11, 13, — ?

The ~~list~~ series lists consecutive prime numbers

3, 5, 7, 11, 13, 17

17 is the next.

~~Q8(d)~~

A triangle with sides 5 cm, 12 cm, 13 cm.  
Find the angle  $\theta$  at all 3 sides

Sides : 5, 12, 13

$$(5)^2 + (12)^2 = (13)^2 \quad (\text{Right triangle})$$

Biggest side = (13 cm)  $\rightarrow$  opposite to  $90^\circ$

Now:

Smallest side = 5 cm (smallest angle).

$$5/13 = 22.6^\circ$$

$$\text{Other angles} = 90 - 22.6 = 67.4^\circ$$

Angles:

$$22.6^\circ, 90^\circ, 67.4^\circ$$