

PART-II

SECTION-I

QUESTION #3

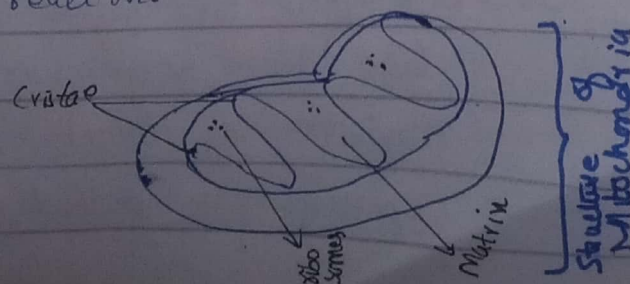
PART (a)

WHY CELLS FORM ORGANELLES:

Cell forms organelles to carry out different life processes efficiently. Each organelle performs a specific function that contributes to overall working and survival of cell. By dividing the cell into specialized compartments (organelles), the cell carry out its different activities simultaneously and effectively. This ensures non-interference between different chemical reactions taking place inside the cell.

MITOCHONDRIA IN A HUMAN CELL:

Mitochondria are double-membraned organelles found in the cytoplasm of almost all human cells. The outer membrane is smooth while inner membrane is folded into structures called cristae, which increase the surface area for chemical reactions.



The fluid-filled region inside the inner membrane is called matrix. The DNA, ribosomes and enzymes are also present inside the inner membrane.

They are also called the power house of cell as they produce energy in the form of Adenosine Triphosphate through cellular respiration

They control energy balance and supply power for vital processes like muscle contraction, nerve transmission etc.

Energy Production

Regulates cell metabolism

FUNCTIONS OF MITOCHONDRIA

Apoptosis

Produce their own proteins

Mitochondria releases enzymes that help destroy damaged or unwanted cells

They have their own DNA & ribosomes, allowing them to produce some of their own proteins.

PART (b)

DOPING=

"The addition of small quantity of impurity to a pure semiconductor like Silicon, Germanium to improve its electrical properties, is called doping."

TYPES OF SEMICONDUCTORS

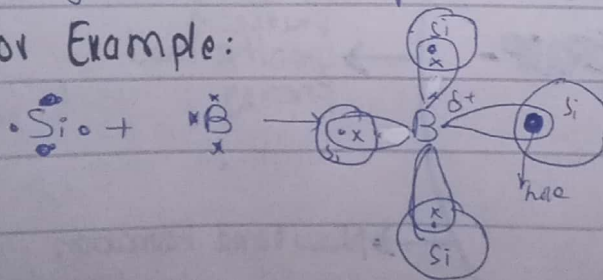
There are two types of semiconductors based on their doping:

- 1) P-type semiconductor
- 2) N-type semiconductor

1) P-TYPE SEMICONDUCTOR:

It is a type of extrinsic semiconductor where doping is done from Group-III elements. Since the pure semiconductor (Si or Ge) has 4 electrons in its valence shell while the impurity from Group-III has 3 electrons. ~~So~~ three bonds are formed with elements of Group-III while the remaining electron waiting to form a bond creates a hole which behaves like a proton. Thus, creates a positive charge on the doped semiconductor.

For Example:



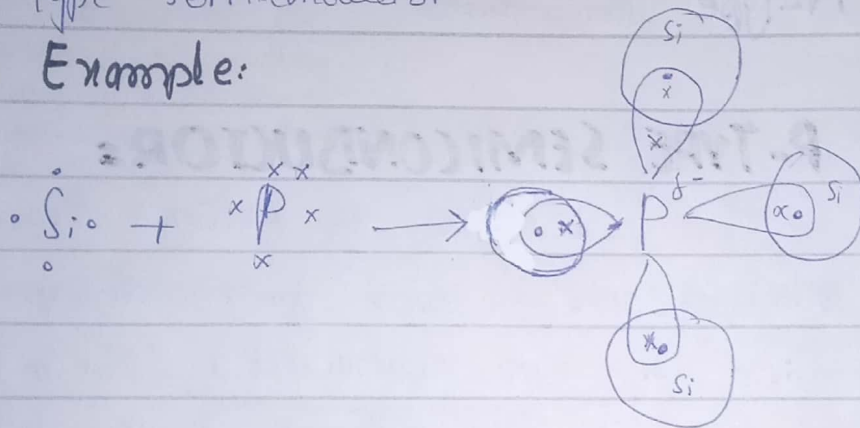
2) N-TYPE SEMICONDUCTOR:

It is a type of extrinsic semiconductor in which doping is done from elements of Group V. Since the pure

Semiconductor has only 4 electrons in its valence shell while that the impurity has 5 electrons.

So, the extra electron creates a negative charge on the doped semiconductor. It is called N-type semiconductor.

For Example:



PART (C)

MERITS OF VOLCANIC ERUPTION

- **Fertile Soil**: Volcanic ash and lava break down over time to form fertile soil that is excellent for farming. For example: soil around Mount Vesuvius in Italy.
- **Mineral Resources**: Eruptions bring valuable minerals like copper, gold, and silver from deep within the Earth to surface.
- **Source of Geothermal Energy**: Heat from volcanic eruption can be used to generate renewable energy source.
- **New Land Formation**: Lava flows can create new islands and expand land areas. For instance: The Hawaiian Islands.
- **Tourism**: Volcanoes attract tourists for sight-seeing, boost the country's economy.

DEMERITS OF VOLCANIC ERUPTION

- **Loss of life and Property:** Explosive eruptions can destroy the nearby settlements and cause deaths.
- **Air Pollution:** Volcanic gases and ash pollute the air causing breathing problems and reducing visibility.
- **Destruction of vegetation and wildlife:** Lava flows, heat and ash can destroy forests, crops and animal habitats.
- **Climate Effects:** Large eruptions release dust and gases that can cool the Earth's climate temporarily by blocking sunlight.
- **Displacement of People:** People living near volcanoes often have to evacuate their homes, leading to loss of livelihood and shelter.

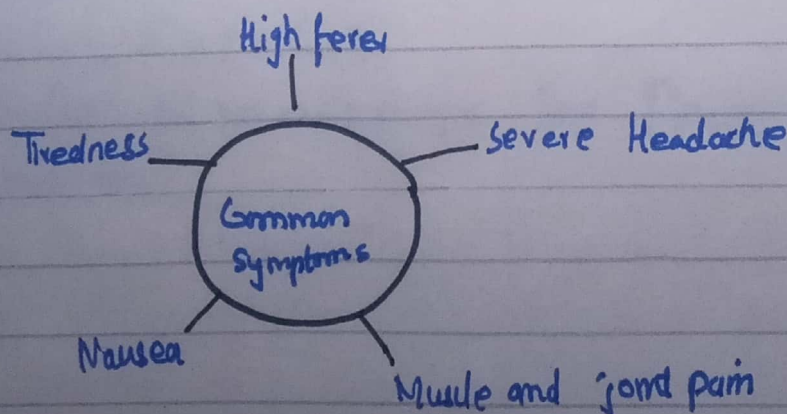
PART (A)

DENGUE:

It is a disease caused by a virus that spreads through the bite of an infected Aedes mosquito, especially *Aedes aegypti*. It is common in tropical and sub-tropical regions.

SYMPTOMS:

Its common symptoms are :



In case of severity, symptoms also include

Stomach ache, difficulty in breathing, bleeding from nose or gums, blood in vomit or stool and low blood pressure.

CAUSE:

Dengue spreads by mosquito bites, not from one person to another.

Remedies:

There is no specific medicine for dengue, but it can be managed with care by:

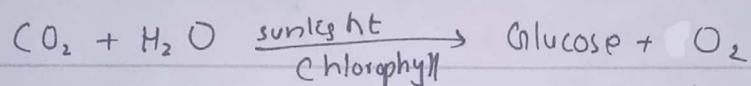
- Taking plenty of rest
- increasing intake of fluids (juice, soup, water)
- using paracetamol for fever and pain
- avoiding aspirin or ibuprofen as they can cause bleeding

QUESTION #4

PART (a)

CHLOROPHYLL:

Chlorophyll is a green pigment present in the leaves and stems of plants. It helps the plant in photosynthesis and absorb sun light. During the photosynthesis, plants use this energy to convert carbon dioxide and water into glucose (food) and O_2 (Oxygen).



The Equation of Photosynthesis

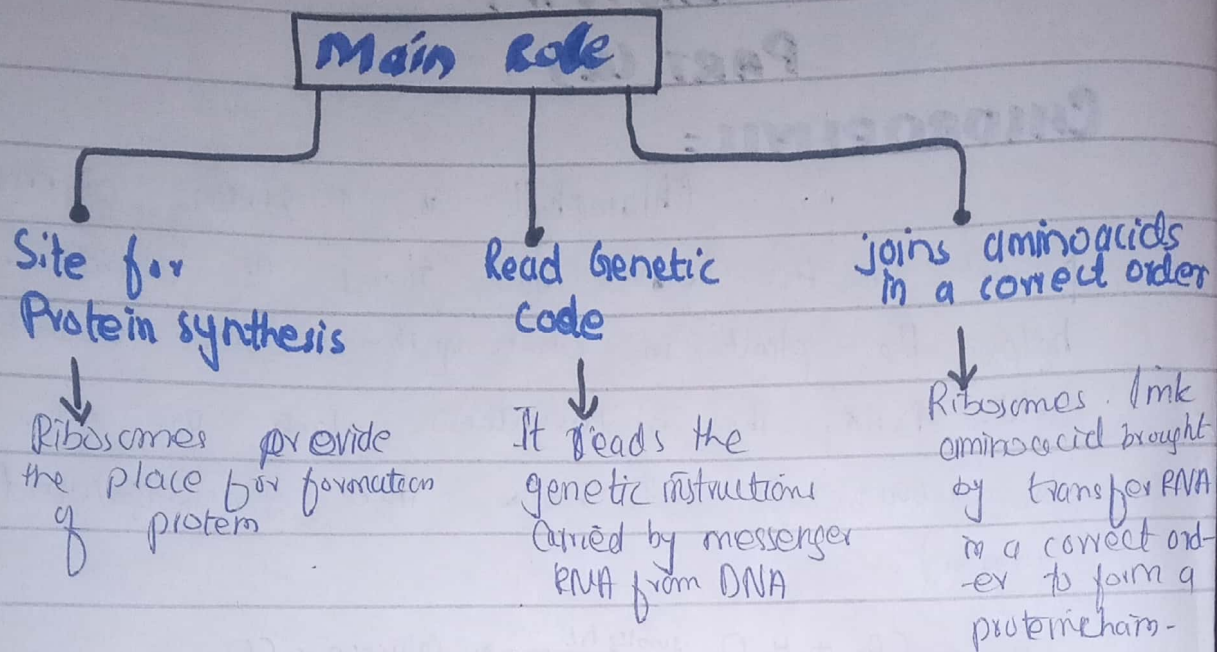
Importance:

- 1) Chlorophyll gives ^{green} color to the plants
- 2) They help produce food and oxygen, which are essential for all living things.
- 3) They support life on earth by maintaining the oxygen-carbon dioxide balance in the atmosphere

PART (b)

ROLE OF RIBOSOMES IN PROTEIN SYNTHESIS:

Ribosomes are tiny, round structures found in the cytoplasm or attached to the endoplasmic reticulum of a cell. They are also termed as 'protein factories' ~~during~~ because they make proteins.



Only the proteins are made, it releases them into cytoplasm for use in the cell.

Part (d)

(i) BIOFUEL

A biofuel is a type of fuel made from living things (plants or animals). It is a renewable energy source produced from materials like corn, sugarcane or vegetable oils.

For instance: Ethanol and biodiesel

(ii) ADULTERATION

Adulteration means mixing impure, harmful or cheaper substances into food, fuel or other products

to increase profit

For Example: ... mixing water in milk

(iii) **HYDROSPHERE:**

The Hydrosphere includes all the water found on Earth — in oceans, rivers, lakes, glaciers, underground water and even ^{water} vapours in the air.

(iv) **TROPOSPHERE:**

The Troposphere is the lowest layer of the Earth's atmosphere, where all weather changes (like rain, wind and clouds) occur. It extends upto about 15 km above the Earth's surface. The temperature decreases with altitude here.

(v) **ISOTOPES:**

Isotopes are atoms of the same element having same atomic number but different mass number.

For Example: Carbon-12 and Carbon-14 are isotopes of carbon.

Part (c)

METHODS OF SOLID WASTE MANAGEMENT

There are different methods of solid waste management which include open dumping, composting, incineration and landfilling method. However, open dumping is discouraged due to its extreme hazards. Composting, Incineration and Landfilling are effective methods of waste management.

COMPOSTING

It is the controlled biological decomposition of organic waste to compost (fertilizer).

INCINERATION:

This method is used for treatment of hazardous waste during which the waste is burnt to reduce volume and sometimes recover energy using incinerators.

LANDFILLING METHOD =

It is one of the most common and traditional ways to manage waste. In this method, solid waste is buried under the ground in a carefully prepared area called a landfill site.

SECTION-II

QUESTION #6

PART (a)

Candies ratio
Given:

$$\text{Apple} : \text{Berry} : \text{Cherry} : \text{Date} = 3 : 6 : 2 : 5$$

we get,

$$\text{Apple} = 3x$$

$$\text{Berry} = 6x$$

$$\text{Cherry} = 2x$$

$$\text{Date} = 5x$$

$$\text{Given: Apple} = \text{Date} + 35$$

$$\Rightarrow 3x = 5x + 35$$

$$\Rightarrow 2x = 35$$

$$\boxed{x = \frac{35}{2}}$$

$$\Rightarrow \text{Berry Candies} = 6(x) = 6\left(\frac{35}{2}\right)$$

$$= 3(35)$$

$$\boxed{\text{Berry Candies} = 105}$$

Part (b)

$$\text{total price} = 200\$$$

$$\text{discount} = 25\%.$$

$$\text{tax} = 6\%.$$

$$\text{So, total payment} = \text{total price} - \text{discount} + \text{tax}$$

$$= 200 - \left(\frac{25}{100} \times 200\right) + \left(\frac{6}{100} \times 200\right)$$

$$= 200 - 38$$

$$\boxed{\text{total payment} = 162 \$}$$

Part (c)

start time = 1 pm

distance covered : $s = 36 \text{ km}$

speed of bicycle : $v = 18 \text{ km/hr}$

$$\text{time} = t = \frac{v}{s} = \frac{18}{36} \text{ hr}$$

$$t = \frac{1}{2} \text{ hr} = 30 \text{ minutes}$$

So, reaching time is $= 1 \text{ pm} + \frac{1}{2} \text{ hr} = 1:30 \text{ pm}$

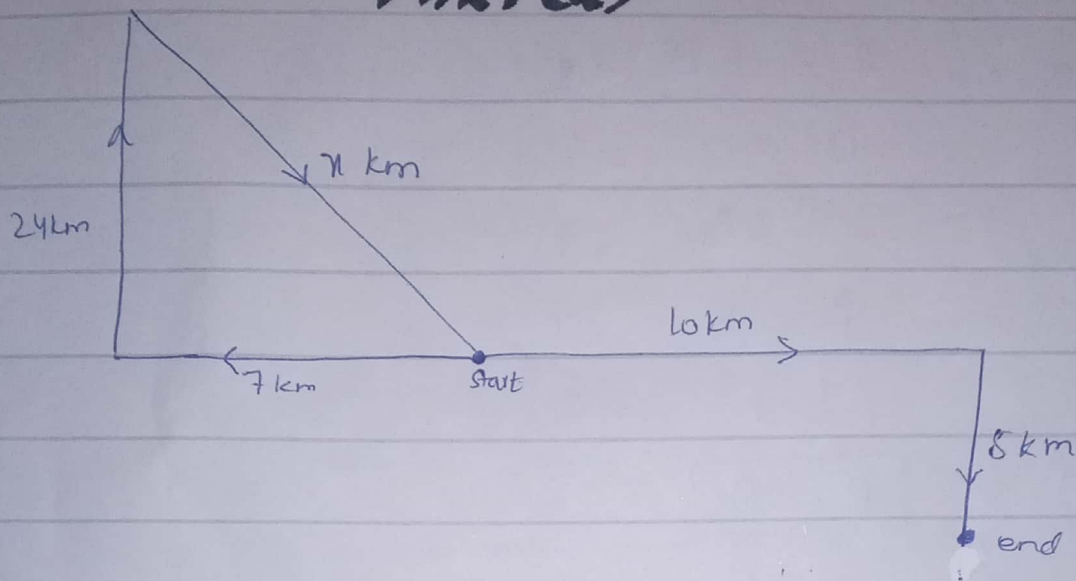
Part (d)

(i) STATISTICS

(ii) ALGEBRA

QUESTION # 8

PART (a)



To find unknown distance in the looping,
using the pythagoras theorem

$$(x)^2 = (24)^2 + (7)^2$$

$$x^2 = 576 + 49$$

$$x^2 = 625$$

$$\boxed{x = 25 \text{ km}}$$

Now, total distance walked = $7 + 24 + 25 + 10 + 5$
by the hiker = 71 km

$\boxed{\text{So, total distance walked} = 71 \text{ km}}$
by hiker

Distance of hiker from = $10 + 5$
starting point = 15 km

Part (b)

total share of siblings - Rs. 9000 $\rightarrow$ (α)

Given : $A = \frac{1}{2} B \rightarrow$ (1)

$$B = 3C \rightarrow (2)$$

$$C = 4D \rightarrow (3)$$

$$D = 2E \rightarrow (4)$$

$$E = F \rightarrow (5)$$

(1) $\Rightarrow$ $B = 2A$

putting (1) in (2) $\Rightarrow$ $C = \frac{2A}{3} \rightarrow (2)^*$

putting (2)* in (3), (3) $\Rightarrow$

$$D = \frac{2A}{3 \times 4} = \frac{A}{6}$$

$D = \frac{A}{6} \rightarrow (3)^*$

Now, putting (3)* in (4), (4) becomes,

$$E = \frac{A}{12} \rightarrow (4)^*$$

putting (4)* in (5), (5) becomes

$$F = \frac{A}{12} \rightarrow (5)^*$$

Now, using eq (α),

$$A + B + C + D + E + F = 9000$$

$$\Rightarrow A + 2A + \frac{2A}{3} + \frac{A}{6} + \frac{A}{12} + \frac{A}{12} = 9000$$

$$\Rightarrow 3A + \frac{2A}{3} + \frac{A}{6} + \frac{A}{6} = 9000$$

$$\Rightarrow 3A + \frac{2A}{3} + \frac{A}{3} = 9000$$

$$\Rightarrow 3A + A = 9000$$

$$\Rightarrow 4A = 9000$$

$$\Rightarrow A = \frac{2250}{1}$$

$$\boxed{A's \text{ share} = \text{Rs. } 2250}$$

equation $B = 2A \Rightarrow$

$$B's \text{ share} = 2(2250)$$

$$\boxed{B's \text{ share} = \text{Rs. } 4500}$$

$$(3)^* \Rightarrow D's \text{ share} = \frac{2250}{6}$$

$$\boxed{D's \text{ share} = \text{Rs. } 375}$$

$$(2)^* \Rightarrow C = \frac{2 \times 2250}{8}$$

$$\boxed{C = \text{Rs. } 562.5}$$

$$(4)^* \Rightarrow E = \frac{2250}{12}$$

$$\boxed{E = \text{Rs. } 187.5}$$

Since $E's \text{ share} = F's \text{ share}$

$$\text{So, } \boxed{F's \text{ share} = 187.5}$$

So, shares are:

$$A = \text{Rs } 2250$$

$$B = \text{Rs } 4500$$

$$C = \text{Rs } 1500$$

$$D = \text{Rs } 375$$

$$E = \text{Rs } 187.5$$

$$F = \text{Rs } 187.5$$

PART (C)

Length of the box: $l = 8\text{m}$

Breadth of the box: $b = 6\text{m}$

Height of the box: $h = 4\text{m}$

Surface area of the rectangular box $= 2(lb + bh + lh)$

$$= 2(8 \times 6 + 6 \times 4 + 8 \times 4)$$

$$= 2(48 + 24 + 32)$$

$$= 2(72 + 32)$$

$$= 2(104)$$

Surface area	$= 208\text{ m}^2$
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$$\text{Volume} = l \times b \times h$$

$$= 8 \times 6 \times 4$$

$$= 48 \times 4$$

Volume	$= 192\text{ m}^3$
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Part 1d)

In a 8 membered family, there are 4 men and 4 women, their average consumption are:

$$\underbrace{W_1 + W_2 + W_3 + W_4}_{\text{women}} = 50, \quad \underbrace{M_1 + M_2 + M_3 + M_4}_{\text{men}} = 72$$

$$\Rightarrow \boxed{W_1 + W_2 + W_3 + W_4 = 200} \quad \text{①}, \quad \boxed{M_1 + M_2 + M_3 + M_4 = 288} \quad \text{②}$$

Anna joined the family and the overall average becomes 67, we have to find consumption of Anna in kgs = A.

$$\frac{W_1 + W_2 + W_3 + W_4 + M_1 + M_2 + M_3 + M_4 + A}{9} = 67$$

using values from eq ① and ② here:

$$200 + 288 + A = 67 \times 9$$

$$A = 603 - 488$$

$$A = 115 \text{ kg}$$

So, Anna ate 115 kgs.