

Hi there — you've prepared well! Remember, knowing the content is one thing, but presenting it in the paper exactly as required is another. Here are a few key points to keep in mind:

1. For a 5-mark part, aim to write at least 2 and at most 3 sides of the answer sheet. Often, a question has two or three parts, and the marks are divided accordingly — so address each part fairly.
2. Manage your time wisely — you have about 35 minutes per full question, which comes down to around 8 minutes for each 5-mark part. Stick to this to avoid rushing later.
3. Make your answers look scientific, not just theoretical. Use flowcharts and diagrams wherever they add clarity.
4. Neatness matters — keep your handwriting clean, avoid cutting or overwriting.
5. Mind your spelling and grammar — while GSA doesn't deduct marks for these, your expression leaves an impression.
6. In the ability portion, explain analytical ability questions in words. For a 5-mark part, show all steps and provide clear explanations.

Here's a brief key/sample of your Ability questions

Syeda Farza Kazmi

LMSID: 38986-1-00-077

Q.6

a) Candy ratio problem

Given: Packets in flavors Apple : Berry : Cherry : Date = 3 : 6 : 2 : 5.

Asked: If Apple candies exceed Date candies by 35, how many Berry candies are there?

Note (consistency check): The ratio shows Apple = 3 parts and Date = 5 parts, so Date is larger than Apple in the ratio. The statement "Apple candies exceed Date candies by 35" contradicts the ratio (Apple cannot exceed Date if ratio is 3:5). Two ways to handle this:

1. If the problem truly intends Apple - Date = 35, that's impossible with the given ratio (would require negative common factor).

2. Most likely the intended meaning is Date exceeds Apple by 35 (i.e. Date - Apple = 35). I will solve that reasonable interpretation.

Formula: Let common factor =  $k$ . Apple =  $3k$ , Date =  $5k$ .

So  $5k - 3k = 35 \Rightarrow 2k = 35$ .

Solution:  $2k = 35 \Rightarrow k = 35 \div 2 = 17.5$ .

Berry =  $6k = 6 \times 17.5 = 105$ .

Answer: 105 Berry candies.

(If you intended the other wording exactly as written, note that it is inconsistent with the ratio.)

b) Camera discount + tax

Given: Original price = \$200. Discount = 25% off. After discount, 6% tax applied.

Asked: Total amount paid.

Formula / Steps:

Discount amount = 25% of 200 =  $0.25 \times 200$ .

Sale price = 200 - discount.

Tax = 6% of sale price.

Total = sale price + tax.

Solution (digit by digit):

Discount =  $200 \times 0.25 = 50$ .

Sale price =  $200 - 50 = 150$ .

Tax =  $150 \times 0.06 = 9$ .

Total paid =  $150 + 9 = 159$ .

Answer: \$159.00

c) Bicycle travel time

Given: Distance = 36 km, speed = 18 km/hr. Start time = 1:00 PM.

Asked: Arrival time.

Formula: Time = Distance  $\div$  Speed

Solution: Time =  $36 \div 18 = 2$  hours. Start 1:00 PM + 2 hours = 3:00 PM

Answer: 3:00 PM

d) Unscramble math terms

i. STATISTICS

ii. GAMBLER

Q7.

Given:

- Diameter ( $d$ ) = 14 cm

- Radius ( $r$ ) =  $d/2 = 14/2 = 7$  cm

-  $\pi = 22/7$

Asked: volume of sphere

Formula:

Volume =  $(4/3)\pi r^3$

Now, let's plug in the values.

Volume =  $(4/3) \times (22/7) \times (7)^3$

=  $(4/3) \times 22 \times 7 \times 7$

= 1437.33 cm<sup>3</sup>

Answer:

The volume of the sphere is approximately 1437.33 cm<sup>3</sup>

(b) Five friends' savings (total Rs. 25,000; ratio 1:2:3:4:5)

Given: Total = Rs. 25,000. Ratio = 1 : 2 : 3 : 4 : 5.

Asked: Smallest share (the "1" part).

Formula: Sum of ratio parts =  $1+2+3+4+5 = 15$ . Smallest =  $(1/15) \times \text{total}$

Part (a)

Why cells form organelles? Discuss mitochondria in human cell.

Answer:

Role of Organelles:

→ As cell is the basic structural and functional unit of life. So, it must have all those components that independently carry out all the functions of life.

→ Cells form organelles because of "Division of Labour". There are numerous biochemical processes that cells have to perform. In order to ensure the proper life functioning, cells consist of various organelles like nucleus (for replication functions), mitochondria (for energy production), ribosomes (for protein synthesis), Golgi apparatus (for detoxification of proteins and lipid metabolism) etc.

⇒ So, various organelles perform their respective functions making cell basic structural and functional unit of life

(2)

## Mitochondria In Human Cell

Mitochondria are present in eukaryotic cells like plants and animals. The number of mitochondria in a cell vary depending upon the functioning of the cells. For examples muscle cells and nerve cells have more mitochondria than epithelial cells.

(2a)

### Structure of Mitochondria:

- ⇒ Mitochondria consist of double membrane called outer membrane and inner membrane.
- ⇒ The outer membrane is smooth while the inner membrane consist of many infolding called Cristea with ribosomes and F<sub>1</sub> particles on it.
- ⇒ The cytoplasm of mitochondria is called matrix.
- ⇒ Matrix contain various proteins and metabolic enzymes for cellular respiration.
- ⇒ Mitochondria has a small circular DNA, that help it in its replication.

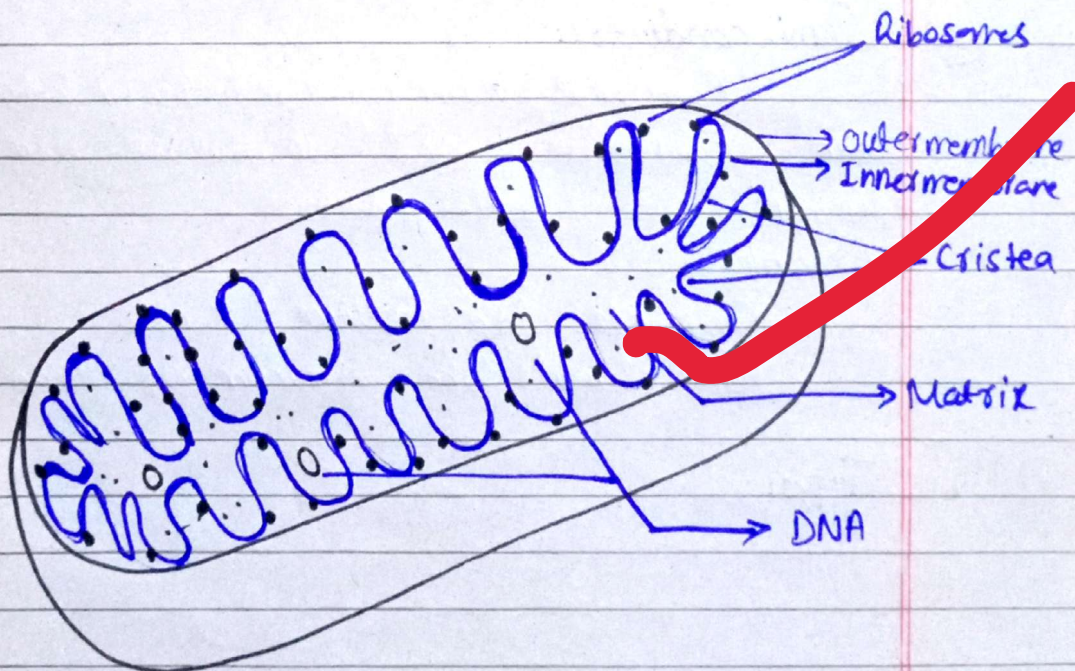
(26)

## Functions of Mitochondria:

Mitochondria, a self-replicating organelle perform following functions:-

- 1) It is involved in energy production of the cell through kreb cycle, which takes place in mitochondrial matrix. Energy is produced in the form of ATPs from NADH and FADH<sub>2</sub>.
- 2) Mitochondrial inner membrane is also involved in ATP production through electron transport chain through series of oxidation and reduction reactions.
- 3) Mitochondria stores energy in the form of ATP and ADP.

## Diagram:



Q no 1 # (b)

What is doping? Discuss different types of Semiconductors?

Answer:

(1) Doping:

The process of adding impurity to a semi-conductor is called doping.

It is the process of addition of small amount of impurities to a pure semi-conductor material for changing its electrical properties.

(2) Types of Semiconductors:

(a) Semi-conductor:

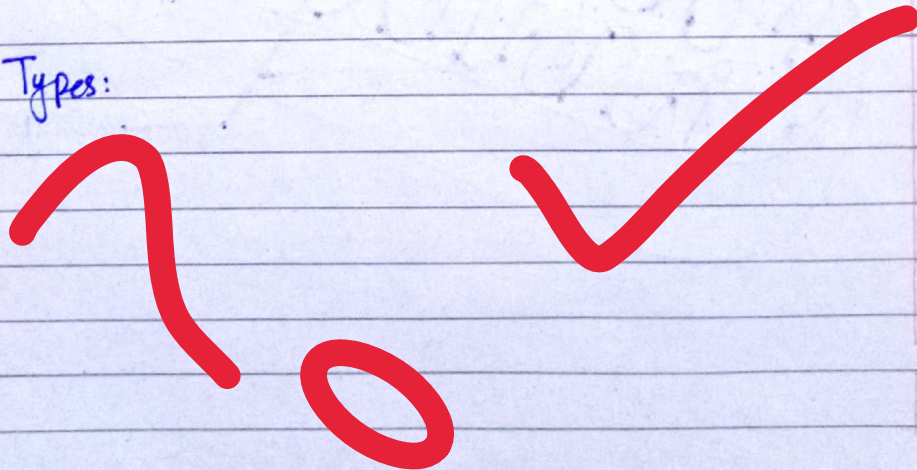
Compounds having conductivity between conductors and insulators are known as semi-conductors.

Examples:

Compounds like Gallium Arsenide

Pure elements like Germanium or Silicon

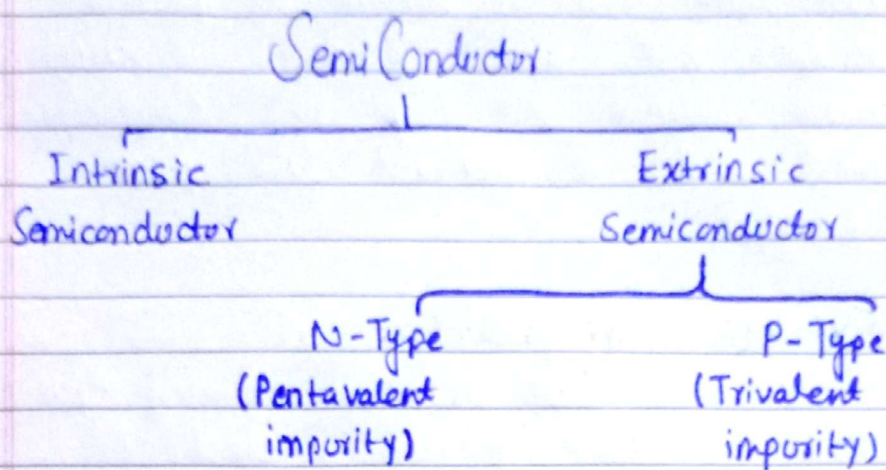
(b) Types:



(2)

Date: \_\_\_\_\_

Day: \_\_\_\_\_



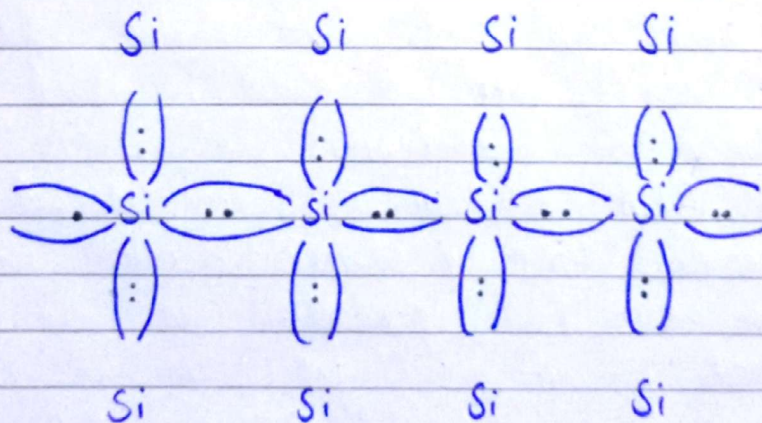
### i) Intrinsic Semiconductor

The pure semi-conductors with equal electrons and holes concentration and with low conductivity.

It is made up of only single kind of element

Example:

Pure Silicon and Germanium



### Structure of intrinsic Semiconductors

⇒ At zero kelvin temperature, covalent bonds are very strong and there are no free electrons.

And semi-conductors behave as perfect insulators but with increase in temperature valance  $e^-$  jump into conduction band and it behaves like poor conductor.

## ii) Extrinsic Semi-conductor:

The <sup>doped</sup> semi-conductors having impurities to enhance the electrical properties are called extrinsic semi-conductors.

⇒ Usually 1 atom in  $10^7$  is replaced by a dopant atom in the doped semi-conductor.

⇒ Extrinsic semi-conductors can be classified as:

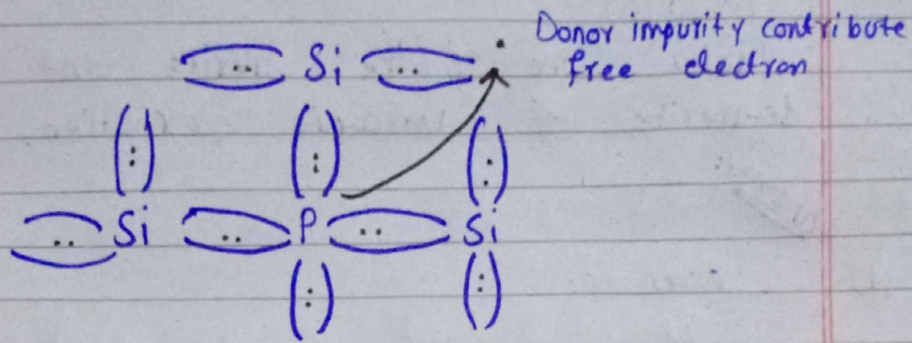
### a) N-type semi-conductors:

The semi-conductors doped by a pentavalent impurity (like Phosphorus, Arsenic, Antimony, Bismuth etc) then four electrons out of five valence electrons bond with 4 electrons of Silicon or Germanium.

The fifth electron of the impurity is free. Thus impurity atom donates a free  $e^-$  for conduction in the lattice called "Donor".

Date: \_\_\_\_\_

Day: \_\_\_\_\_



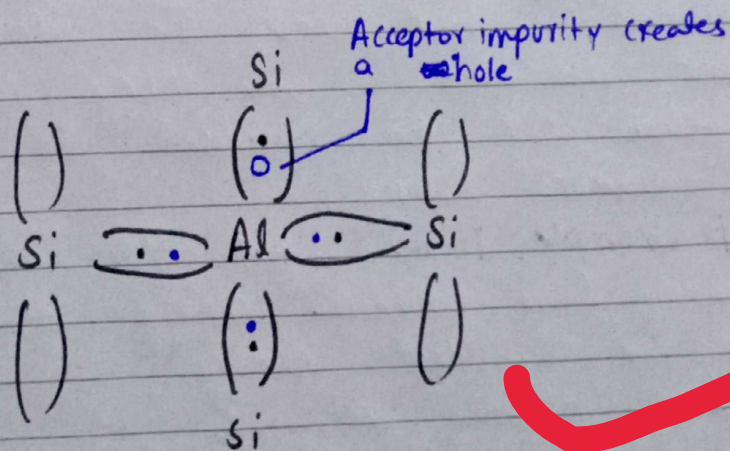
N-Type Semiconductor

### b) P-type Semiconductor

When a pure semi-conductor is doped with trivalent impurity it is called p-type semiconductor.

Trivalent impurity is from Group III A of periodic table like Boron, Aluminium, Indium Gallium etc. Here three electrons of the impurity bonded with three of the four electrons of the semi-conductor and this creates hole in the impurity.

The impurity atoms which accept the bonded electrons are called acceptors.



Date: \_\_\_\_\_

Day: \_\_\_\_\_

Q no 1: (c)

States some of the merits and demerits of volcanic eruption.

Answer:

(1) Volcanoes:

It is a vent in the earth crust or another planet or satellite from which eruption of molten rock fragments and hot gases takes place.

⇒ Volcanic eruption is the eruption of molten rock, hot rock fragments, and hot gases through volcano. They range from relatively gentle eruptions to massively destructive ones. Like the 2019 eruption of White Island in New Zealand which killed 22 people.

(2) Merits of Volcanic Eruption:

a) Source of Energy:

Volcanoes are huge source of energy if we are able to harness them properly. The internal heat associated with young volcanic system can be harnessed to produce "Geothermal Energy".

For example, Iceland gets 90% of its energy from geothermal energy and some portion of that energy is obtained from volcanic emissions.

(3)

Date: \_\_\_\_\_

Day: \_\_\_\_\_

The geothermal energy can be used for a number of purposes like heating and cooling of buildings through geothermal heat pumps, generating electricity through geothermal power plants.

#### b) Source of Minerals:

Most of the metallic minerals mined in the world such as Copper, Gold, Silver, lead etc are associated with magma found deep within roots of extinct volcanoes.

#### c) Economic benefit:

Volcanic materials ultimately break-down to form most fertile soils. Cultivation in these soils produces abundant food. Crop yield increases significantly. Resultantly export of surplus crops lead to economic benefit.

#### 2) Demerits of Volcanic Eruption.

##### a) Loss of Lives and Habitat Destruction:

Volcanic eruption causes loss of life and habitat of various living organism. For example most deadliest volcanic eruption recorded in the history is 1815 volcanic eruption of Mount Tambora in Indonesia. It causes an estimated 10,000 to 11,000

Date: \_\_\_\_\_

Day: \_\_\_\_\_

Deaths from direct volcanic effects and 49,000, to 90,000 deaths from post eruption famine and epidemic diseases.

b) Economic Losses after eruption:

Evident, as soil is damaged and all the standing crops destroyed causing huge loss of farmers. Also economic activities suffer much because it is hard for business to operate after eruption.



Question No:1 (Part d)

What is dengue? Discuss Symptomatology Causative agent and remedies?

Answer:

Dengue:

Dengue is a viral infection caused by dengue virus (DENV), which is transmitted to humans through bite of infected mosquitoes (World Health Organization).

⇒ About half of the world population is now at risk of dengue with an estimated 100-400 million infections occurring each year.

- ⇒ Dengue is found in tropical and sub-tropical climates world wide, mostly in urban and semi-urban areas.
- ⇒ WHO has reported over **13 million** cases of dengue only in America in year **2024**. And from January to July **2025** over **4 million** cases and **3000** deaths have been reported to WHO by **97** countries.

## 2) Symptomatology of Dengue:

Most people having dengue having mild or no symptoms and will get better in 1-2 weeks. Rarely, dengue can be severe and lead to death. Include following symptoms

- 1) Severe headache
- 2) Pain behind eyes
- 3) Muscles and joint pain
- 4) Nausea
- 5) Vomiting
- 6) Swollen glands
- 7) Fatigue
- 8) Rapid breathing

## 3) Causative Agent of dengue:

Dengue fever is mosquito-borne infection caused by dengue virus. It is found in tropical and sub-tropical climates around the world.

Date: \_\_\_\_\_

Day: \_\_\_\_\_

Main causative agents are:

- Aedes Aegypti
- Aedes Albopictus

#### (4) Remedies:

An infected person should take following measures:-

- 1) Taking Rest
- 2) Drinking plenty of liquids
- 3) Use of acetaminophen for pain
- 4) Avoiding non-steroidal anti-inflammatory medication such as ibuprofen and aspirin

#### Question No 2: Part (a)

Pakistan is 5<sup>th</sup> most populous country of the world. What are the causes of population explosion in Pakistan? What can be the control measures?

Answer:

#### Population Explosion:

A rapid increase in the population is called population explosion. The two causes of population explosion are:

- a) Increase in birth rate
- b) Decrease in death rate

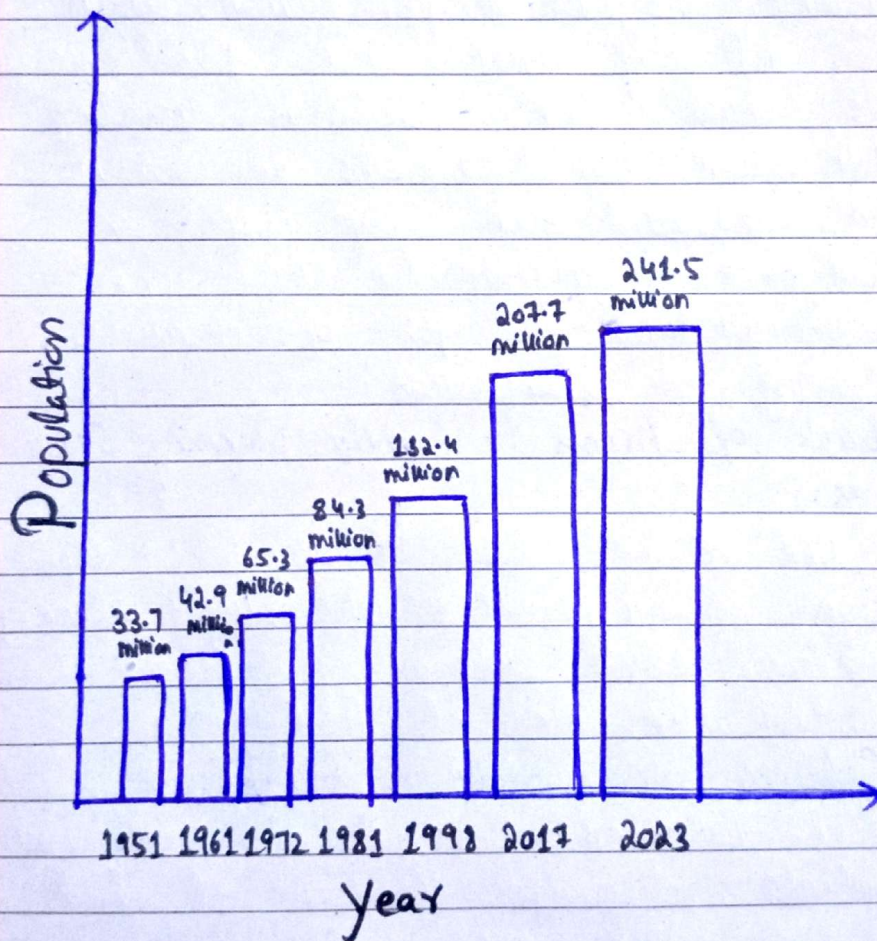
(4)

Date: \_\_\_\_\_

Day: \_\_\_\_\_

According to Pakistan Bureau of statistics, Digital census 2023, Pakistan population reached over 241.5 million with annual growth rate of 2.4%, among highest in the world.

### Population Explosion Demonstration Since 1951-2023



(Source: Pakistan Bureau of statistics)

- \* The graph depicts the exponential increase in population over a period of 72 years

## (II) Causes of Population Explosion:

The causes of over-population in Pakistan are complex and multifaceted. Some of the main factors are:-

### 1) High fertility rates and urbanization:

Pakistan has high fertility rates of around 3.3 children per woman, which is significantly higher than global average. As China with population exceeding 1.4 billion has 1.00 births per woman in 2023. And such huge population will have to migrate to cities for better facilities and job opportunities leading to urbanization.

### 2) Lack of Access to family planning services:

One of the cause of population explosion is no access to family planning services, which make it difficult to control the size of population.

### 3) Cultural and Religious Beliefs:

Pakistan's cultural and religious beliefs discourage the use of birth control, which can contribute to high fertility rates and intense population explosion.

### 4) Poverty and lack of education:

People who are poor or have

Limited education are less likely to have access to family planning services, and may not have the knowledge or resources to control their fertility.

#### 5) Political Instability and Lack of govt Actions:

Political instability and lack of govt actions in promoting family planning and education also play significant role towards population explosion.

### (III) Control measures for population explosion

There are several measures to be implemented for population control in Pakistan.

#### 1) Promotion of Comprehensive Family Planning:

By increasing access to family planning services, and providing education on reproductive health can control population explosion.

#### 2) Education and Awareness:

Investing in education can create awareness in masses. Results decrease in fertility rates and better control family size.

#### 3) Encouraging Urban planning:

Encouraging urban planning and development can help to alleviate the strain on infrastructure and resources in urban areas.

#### 4) Shift in Government Policies:

Govt policies such as tax incentives for smaller families and penalties for having more than certain number of children, help to control population explosion.

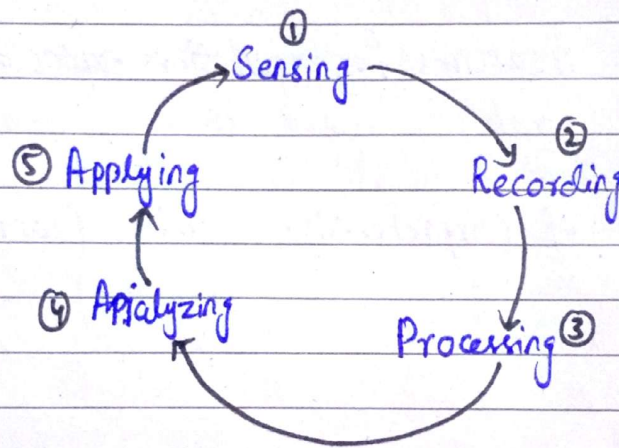
Q no 2 (Part B)

What is remote sensing? Discuss role of GIS in environmental science.

Answer:

### 1) Remote Sensing:

It is the science/art of acquiring information about earth surface without actually being in contact with them. This is done by



⇒ Remote sensing works on the principle of absorption and emission of electromagnetic radiation. It is a useful tool in monitoring environmental conditions, in urban planning and disaster damage assessment.

### (2) Role of GIS in Environmental Science:

Geographic information system is a computer system for performing geographical analysis. The computer system captures, stores, checks and displays data related to the position on earth surface.

(5)

Date: \_\_\_\_\_

Day: \_\_\_\_\_

GIS is employed in various subjects of environmental science that include urban planning, waste water management, environmental impact assessment, disaster management, monitoring marine pollution, air pollution, hazard identification, forest fire management etc.

a) GIS and Remote Sensing in Urban planning:

It detects urban climatic issues, planning public service and making them vital tool for sustainable urban development. It also monitors cities growth patterns.

b) Role in Disaster management:

It plays a role in disaster management by providing precise spatial data on past disasters. GIS assist in hazard zone mapping, emergency operation and decision making processes.

c) GIS and Remote sensing in Ecosystem Management:

GIS help to link environmental effects with physical parameters, which aids in implementing management strategies.

d) Role in Ecosystem Fisheries:

GIS allows researchers and policy makers to visualize and analyze the complex relationship between ecological variables, human activities and fishery resources.

Date: \_\_\_\_\_

Day: \_\_\_\_\_

### c) GIS and Remote Sensing in Ecosystem Healthcare:

By capturing real time environmental data such as

→ pollution levels

→ Land Use

→ Temperature variations

allow healthcare professionals to identify high risk areas and plan targeted interventions

→ Moreover, it help to control vector born diseases

Q no 2 (Part c)

"The atmosphere is the blanket of earth" Justify with your opinion.

Answer:

### Atmosphere:

It is a thick blanket of protective gases that shelter all life on earth, by keeping the temperature within a relatively narrow range and blocking harmful rays of sunlight.

Composition of Atmosphere

| Gases         | Percentages |
|---------------|-------------|
| Nitrogen      | 78.0%       |
| Oxygen        | 21.0%       |
| Carbondioxide | 0.003%      |
| Argon         | 0.9%        |
| Traces        | 0.1%        |

## Atmosphere As Earth's Blanket:

### 1) Retaining Sun's heat:

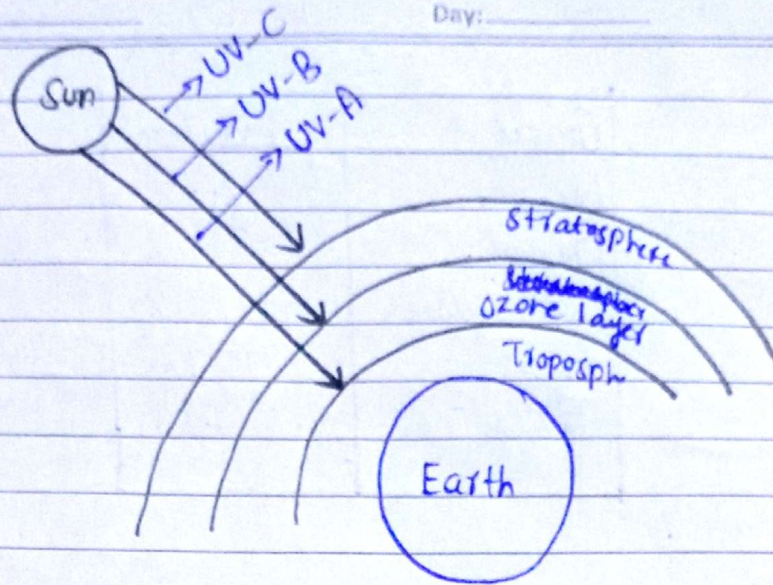
Various gases in the atmosphere help to retain the sun's heat. Heat of sun reaches earth in the form of long infra-red radiation and that are trapped by earth thick blanket of gases mainly Carbon dioxide through a process called **Green House Effect**. Thus maintaining earth's temperature for sustaining life.

### 2) Protection of Earth from Harmful Radiations:

The various layers of earth's atmosphere are involved in trapping heat for protecting earth from harmful radiations like UV radiation. The atmospheric layers namely troposphere, stratosphere etc absorb these harmful radiation before they reach earth.

Date: \_\_\_\_\_

Day: \_\_\_\_\_



\* Diagrammatic representation showing earth's atmospheric layers act as blanket to harmful radiations.

\* Mainly ozone molecule in stratosphere absorb the harmful type of UV radiation that can cause skin cancer and eye cataracts etc.

c) Atmospheric layers as a soul reason for life on planet earth:

Atmosphere contain 20% of oxygen which is vital for every living organism. without it no life is possible on earth. It gives all the life on earth and thus making earth a liveable place.

6)

Date: \_\_\_\_\_

Day: \_\_\_\_\_

Q no 2 (Part d)

Define following terms:

1) Hydrometer:

An instrument used for measuring the density of liquids.

2) Epicenter:

The point on the surface directly above the focus where intensity of earthquake will be highest and decreases as one moves away.

3) Eye wall of cyclone:

The most dangerous and destructive part of the tropical cyclone where winds are strongest and rainfall is heaviest.

4) Deep focus:

During earthquake when depth of focus is greater than 300 km it is called deep focus.

5) Light year:

It is the distance that light travels in one year in air or vacuum. It is equal to  $3.8 \times 10^{12} \text{ ms}^{-1}$



Date: \_\_\_\_\_

Day: \_\_\_\_\_

## Section-II

Question No 6:

Part (d)

i) STSTAICITS  
STATISTICS

ii) LGEBMAR  
GAMBLER

Part (b)

Distance covered = 36 km

Speed = 18 km/hr

Time = ?

Formula:

$$\text{Distance} = \frac{\text{Speed}}{\text{Time}}$$

$$\text{Time} = \frac{\text{Speed}}{\text{Distance}}$$

$$= \frac{18 \text{ km/hr}}{36 \text{ km}}$$

$$= 0.5 \text{ hr} \text{ or } 30 \text{ min}$$

Date: \_\_\_\_\_

Day: \_\_\_\_\_

Q no 7.  
Part (a)

Diameter = 14 cm  
Volume of sphere = ?

Formula

$$\text{Volume of sphere} = \frac{4}{3} \pi r^3 \rightarrow (1)$$

$$\text{Diameter} = 14 \text{ cm}$$

$$\begin{aligned} \text{Since, Radius} &= \frac{d}{2} \\ &= \frac{14}{2} = 7 \text{ cm} \rightarrow (2) \end{aligned}$$

Putting value of "r" from (2) in (1)

$$\begin{aligned} V_{\text{sphere}} &= \frac{4}{3} \times 3.14 \times (7)^3 \\ &= \frac{4}{3} \times 3.14 \times 343 \end{aligned}$$

$$= 1.33 \times 3.14 \times 343$$

|                                           |
|-------------------------------------------|
| Volume of sphere = 1432.43 m <sup>3</sup> |
|-------------------------------------------|