

## Part-II

### General Instructions Section #A

1. Give numbering to headings
2. Do not write lengthy paragraphs. Write medium sized paragraphs with headings.
3. Do not use table for comparison and contrast questions.
4. Draw figures/diagram/flowchart where needed.
5. Start new question from fresh page.
6. Write unit of the answer in ability section.
7. Explain mathematical steps and the reasoning for better score.
8. Change colour scheme for references to give them more visibility.
9. Manage time well.
10. Wide page borders are discouraged. Should be reasonable.
11. Avoid writing wrong references.
12. Give more weightage to expressedly asked parts of the question.

### Types of Avalanche

There are basically two types of avalanche that frequently happen.

- i) loose Snow Avalanche
- ii) Slab Avalanche

Other types?

### → loose Snow Avalanche

The fall of snow is slopy and is less cohesion. It appears in a "v" pattern on the snow slope. They are rarely large enough to do significant property damage.



## → Slab Avalanche

It occurs when a cohesion layer of snow slides the slope. They are formed by the flow of wind and are from new snow.

## Causes of Avalanche

The causes of Avalanche can be categorised into four types.

Diagram?

### 1 - Terrain-related factors

Factors causing Avalanche are, slope size, slope shape, slope aspect etc.

### 2 - Snowpack related factors

Layers of snow build-up and slide down the mountains at a high speed.

Through steepness of slope.

### 3 - Weather-related factors.

Heavy snowfall causes the occurrence of avalanche.

Precipitation during summer is the main cause. i.e. nowadays, adverse change in climate.

### 4 - Man-Related Factors.

Human activities has adverse effect on the pattern of snowfall. Winter sports, heavy deforestation and use of vehicles and snowmobiles are causing



avalanche.

The construction work is also weakens the structure.

~~Effects~~

Part - b

## Electromagnetic - Radiations

Electromagnetic radiations is a type of radiations that surrounds us all the time. EM radiations are those which need "no medium for their propagation."

### • Common Types of EM radiations

Light rays

Radio waves

Microwaves

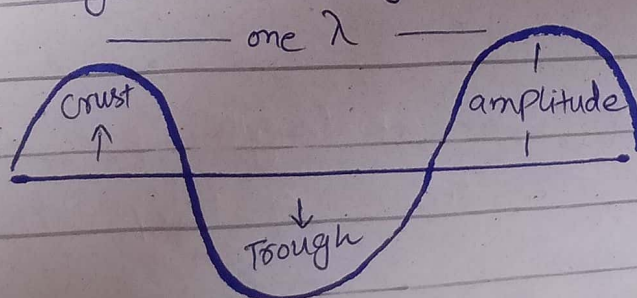
X - Rays

Gamma rays

while visible light contributes to a small portion of EM-radiations and have a broader wavelength (400-700nm VIBGYOR)

## Amplitude of EM-radiation

- Amplitude is the measure that how big the wave is
- upper height is crest and lower height is trough



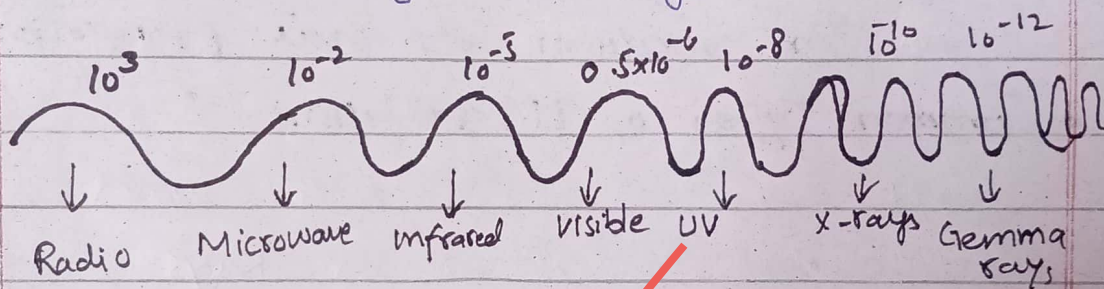


The frequency of EM could be found by formula.

$$v = f\lambda \Rightarrow f = \frac{v}{\lambda}$$

## Electromagnetic Spectrum

The spectrum of EM-radiations is determined by examining the rate of frequency and wavelength, i.e., increasing frequency and decreasing wavelength.



### Radio Waves

These are longer wave i.e. 1mm to KM  
They have <sup>longer</sup> high wavelength and shorter frequency. They are used in satellites, radio and computer networking.

### Microwave

This type of waves are shorter than radio waves. They are used in microwave ovens to cook food.

### Infrared.

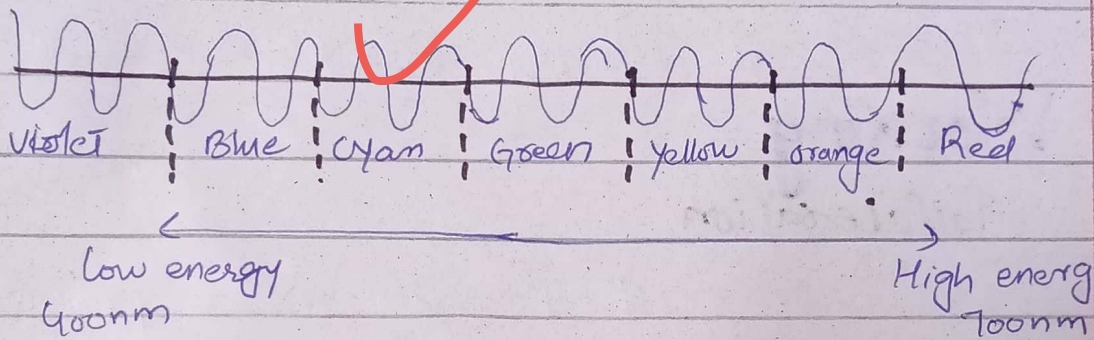
Infrared span wavelength span is from 70 nm to 1mm. At temp 37°C, our body emits these waves.



They are used to treat strained muscles and tissues.

## Visible light

Visible light ranges from 350-700 nm. Our sun emits visible light and also the colors of rainbow.



## Ultraviolet

Their wavelength ranges from 10-310 nm.

Hot stars produce emit such waves.

## X-Rays

X-Rays are ranging from 0.01-10 nm.

They can penetrate soft tissues like skin and muscles and are used to take pictures of bones of body.

## Gamma rays.

Gamma rays have very shorter wavelength i.e. 0.01 nm. This is the most energetic region of EM waves.

They are used to sterilize food and research equipments.



# Part - C

## GPS

GPS, is a global positioning system, is a satellite based navigation system that allows users to determine their precise location anywhere in earth. It operates by employing a network of at least 24 ~~to~~ satellites orbiting around the planet.

## Working

### Trilateration

The working of GPS relies on a process called trilateration. GPS receiver on the ground communicate with multiple satellites simultaneously. Each satellite continuously broadcasts its own precise location and the time the signal was sent.

### Distance Measurement

The GPS receiver calculates its distance from each satellite based on the time it took for the signals to arrive. By measuring the "time delay" b/w when the signal was transmitted and when it was received, the receiver can determine the distance of each satellite.



## Positioning

once GPS receiver has calculated its distance from at least four satellites, it uses its information to trilaterate its exact position on Earth's surface. Trilateration involves finding the "intersection point of spheres centered on each satellite", where the radius of each is the calculated distance from the GPS receiver to the satellite.

## Usage :-

GPS can provide real-time accurate positioning info, enabling navigation, tracking, and a wide range of location-based services that we use in our daily lives.

## Part-d

### Computer

is an electronic device, that is used to store and manipulate the raw facts and figures into useful information.

### Computer Buses

computer buses are facilitators for the transmission of data, instructions and control signals b/w various hardware components within a computer system.



# Types of buses

## Data bus

It carries data b/w CPU, memory, and peripheral devices. It allows data to flow in both directions.

## Address bus

This is uni-directional bus it transfers memory addresses generated by the CPU to access specific locations in memory or devices.

## Control bus

Responsible for transmitting control signals that manage data flow and coordinate activities b/w components.

## CPU: Brain of computer.

The CPU is a microprocessor chip that is a single piece of "silicon" containing millions of tiny, microscopically-wired electrical components. Information is stored in CPU and this memory location is called register.

CPU is divided into two separate operations.

### ALU

It performs arithmetic operation (+, -, ×, ÷, >, <)

### CU

It supervises the things are doing well or not



## Q#4 (b)

### Water Scarcity

It refers to a situation in which the demand ~~is~~ exceeds the available supply of freshwater resources in a particular region.

### Measures to Deal Water Scarcity

Preventing water scarcity requires a combination of conservation efforts, sustainable practices, and efficient water management. Here are few measures.

#### Implementation of Techniques.

Implementing water-saving techniques and practicing, such as ~~water~~ rain water irrigation.

#### Water - Conservation Awareness

Promoting water conservation through public awareness.

#### Industrial Water Management

Encouraging industries to recycle water.

#### Protection of Water Sources.

Protecting water sources from pollution and over-extraction.

#### Water Infrastructure Investment

Investing in infrastructure, including reservoirs and water storage system.



## Water use Regulations and pricing

Enforcing strict water usage regulations and encouraging responsible consumption.

## Sustainable Agriculture

Developing sustainable practices.

## Research and Innovation

Investing in research and innovation for water conservation

Tariff

## Regional Collaboration

collaboration in a way to manage water resources effectively

## Groundwater Management

to avoid depletion

of aquifers.

Q#4 (C)

## Vaccines

The method of stimulating resistance in human body to specific diseases-causing micro-organisms such as bacteria or virus is called vaccination.

Details?

## Types of Vaccines

These are a few different types of vaccines. They include:



## Attenuated

live viruses are used in some vaccines such as in the measles, mumps, and rubella (MMR) vaccine.

## Killed (Inactivated)

viruses and bacteria are used in some vaccines, such as in IPV

## Toxoid vaccines.

it contains an inactivated toxin produced by the bacterium. e.g. tetanus vaccine.

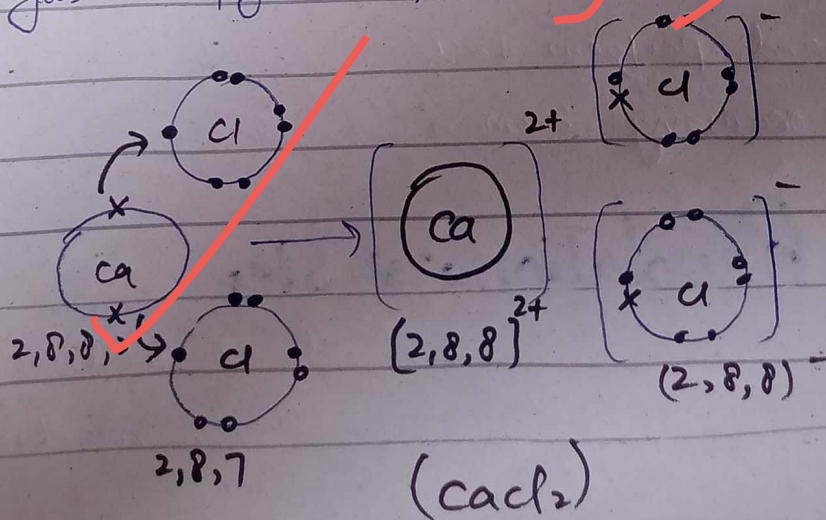
## Conjugate vaccines

contain part of bacteria combined with proteins e.g. Hib.

## Q#15(c) 4(d)

## Ionic bond

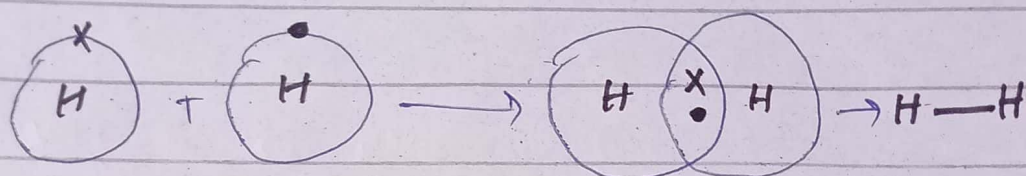
One or more atoms lose e's and other atoms gain them in order to gain the noble gas configuration, is called ionic bond.





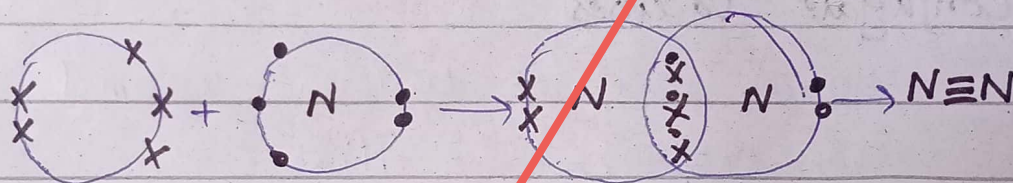
# Covalent bond

By the mutual sharing of electrons in non metal atoms, they share one, or more, pair of electrons, a covalent bond is formed.



Hydrogen atoms sharing a pair of e's

## Multiple covalent bonds



Nitrogen Molecule

Q# 4(a)

## Artificial Intelligence

AI, or artificial intelligence, refers to the simulation of human intelligence in machines that are programmed to think and perform tasks typically in seconds requiring human intelligence.

## Revolutionary Step

Detail?

AI has indeed revolutionized the world by enabling machines to



Perform tasks that typically require human intelligence. Here are few features.

- 1- AI's automatic capabilities have made a more ease.
2. Breakthroughs in healthcare.  
↳ It has made easy to diagnostic treatment and drug discovery.
- 3- AI have personalized experiences in e-commerce, entertainment, and social media
- 4- AI enable faster and more accurate data analysis.
- 5- AI's integration has transformed sectors like finance, transportation, and manufacturing.

Thus AI has revolutionarized the world.

## Section-B

### Q#6 (a)

Five year ago father age =  $F - 5$

Five year ago son's age =  $S - 5$

$$(F - 5) = 3(S - 5)$$

∵ Current age of son is 30 years ( $S = 30$ )

$$(F - 5) = 3(30 - 5)$$

$$(F - 5) = 3(25)$$



$$F - 5 = 75$$

$$F = 75 + 5 \quad \rightarrow \quad F = 80 \text{ years}$$

The correct age of father is 80 years.

**Q#6 (b)**

$$10\% \text{ of } x = 1500$$

Now

$$0.10x = 1500$$

$$x = 1500 / 0.10$$

$$x = 15000$$

So, The man's income is Rs 15000

**Q#6 (c)**

Arithmetic mean of 6 no = 20

$$\text{Sum of 6 num} = 20 \times 6$$

Now if we remove one num, there left 5 numbers, The average of remaining is 15 as elaborated in question.

Let assume

$$S = 20 \times 6$$

$$S' = 5 \times 15$$

$$\text{The no. removed is } = S - S'$$

$$= (6 \times 20) - (5 \times 15)$$

$$= 120 - 75$$

$$= 45$$



Q#16 (d)

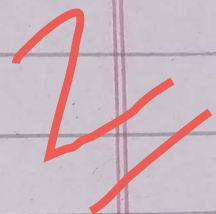
i) 8, 4, 32, 7, 5 \_\_\_\_\_

8, 4, 32, 7, 5, 35

Reason?

ii) 7, 19, 23, ~~29~~, 31, 37

7, 19, 23, 29, 31, 37



Q#8 (c)

Total Profit = 406,000

Tahir's Investment = 15,000

Umar's Invest after 9 months = 30,000

Usman " " 9 " = 45,000

Now

Tahir's share  $\left( \frac{\text{Tahir's Investment}}{\text{Total Invest}} \right) \times \text{Profit}$   
 $= 15,000 / 90,000 \times 406,000$

(∵ Total Investment = 90,000)

Tahir's share = ~~67,666.67~~

Now

Umar's share =  $\left( \frac{30,000}{90,000} \right) \times 406,000$   
 $= 135,333.33$

Now

Usman's share =  $\left( \frac{45,000}{90,000} \right) \times 406,000$   
 $= 203,000$



## Q# 8 (d)

Total property = 640,000

debt due to him = 40,000

Burial expense = 5,000

$$\begin{aligned} \text{Remaining} &= 640,000 - 40,000 - 5,000 \\ &= 595,000 \end{aligned}$$

$$\begin{aligned} \text{Widow's share} &= \frac{1}{8} \times 595,000 \\ &= \text{RS } 74,375 \end{aligned}$$

$$\begin{aligned} \text{Daughter's share} &= \frac{2}{3} \times 595,000 \\ &= \text{RS } 396,666.67 \end{aligned}$$

Son's share.

Remaining amount to share b/w sons = 595,000

- widow's share - Daughter's share

$$= 595,000 - 74,375 - 396,666.67$$

$$= \text{RS } 123,958.33$$

Share

Remaining / no. of sons

$$= 123,958.33 / 2$$

$$= 61,979.17 / \text{son}$$