General Science & Ability

Q4) a) i) What is Artificial Intelligence:

Artificial Intelligence refers to the simulation of human intelligence in machines that enable them to think and emulate like humans. The term can be applied to any machine that exhibits human like behaviour such as learning and problem-solving, for machines to learn from experiences and, with the passage of time, revamp its responces.

2) Examples of using AI:

1) chess game
2) Self-driving game
3) smart assisstants e.g Siri

3) HOW AI has revolutionized the world:

The world has surely changed since AI the time that AI was practically used. AI has demonstrated the ability to perform tasks autonomously, freeing humans from repetitive or dangerous jobs. AI typi machines typically contain vast amount of data and, with the passage of time, they lean and improve their tasks. AI is currently deployed in various fields ranging from medical to more labour intensive such jobs such as

manufacturing in Industries. Even the cell phones are equip with A I features such as Smart Assistants e.g Bixby.

4) How AI is employed in various fields.

As aforementioned A.I has had an immense impact in almost all fields, completely revolutionising them. Few examples of how AI has impacted some of the fields is as follows:

4.1) Entertainment:

AI is successfully employed in many strategic games. The vast database stores all the possible actions and knows perfectly well on how to respond to different moves executed by the player. A typical example of this is a sig single player chess game.

4.2 Industries:

AI is not only used to cover the manufacturing aspects in industries but it can also be used to look after management tasks such as parking operations. Moreover, the more dangerous and labour intensive tasks can be executed by AI, such as molding using robotic arms.

4.3) AI in Medical Field :

AI can perform move than just repetitive tasks-
In the field of medical, AI is deployed to
assist doctors in their efforts to reduce mortality
rate among patients awaiting care from specialists.

b) 1) What is water scarcity :

Water scarcity refers to a situation where there
is a lack of sufficient water resources to meet
the needs of a particular region or population. It
occurs when the demand for water exceeds the available
supply.

2) Consequences of Water scarcity :

There are a plethora of ramifications that result
from water scarcity. This includes, but not limited
to, limited access to to clean drinking water,
inadequate sanitation facilities and negative Impact
on agricultural yeild, Industries and ecosystem.

3) How to deal with water scarcity :

There is no panacea to to fix this problem,
however, through meticulous planning and
comprehensive approach, the situation can be
ameliorated. Following are a few strategies :

3.1) Water conservation:

Exhort individuals, house holds and businesses to adopt water saving practices such as fixing leaks using efficient appliances, and exercising responsible daily water use.

3.2) Efficient irrigation:

Promote the use of modern irrigation techniques, such as drip irrigation and precision watering systems to minimize water wastage.

3.3) Rainwater harvesting:

Install systems that can collect and store rain water. This could be used in various ways such as irrigation.

3.4) Water recycling:

Install water treatment and reuse systems, allowing treated water to be used for potable purposes such as agriculture.

3.5) Infrastructure development:

Build dams, reservoirs & pipe lines to store and effectively transport water with minimum wastage.

c) 1) <u>What is vaccine :</u>

Vaccines are inactivated or dead microorganisms or toxins that are used to provide immunity against disease or may prevent infection. E.g. Polio vaccine.

2) <u>Types of vaccines:</u>

2.1) <u>In activated vaccines :</u>

These are the vaccines that do not provide stronge immunity unlike others, however, their booster shots, over time, may need to get ongoing immunity against time. E.g. Flu.

2.2) <u>Live-attenuated vaccines :</u>

Weakened form of disease is used inorder to prevent a natural infection. They create a long-lasting response and are strong enough that 1 or 2 shots protect for life time.

2.3) <u>Messenger RNA vaccines :</u>

Form protein in the body that is used to trigger an immune response. This triggred immune response helps to fight against infection. E.g Covid vaccine.

2.4) Toxoid vaccines:

These have targetted immune response response and create immunity or resistance against the disease causing part of germ germ inlieu of its whole body. Individuals might need booster shots to overcome ongoing disease.

Other types?

d) 1) Bonds :

Atoms need to make bonds with other atoms in order to stabilise. For atoms to achieve stability they must have 8 electrons in their outer most shell, unless its their shell in which case they only require 2 electrons. To attain the desired number of electrons to become stable, atoms form bonds where they share, lose or gain electrons.

2) Ionic Bond: This is a type of chemical bond where an atom completely transfers an electron to anoter atom, so that both can become stable.
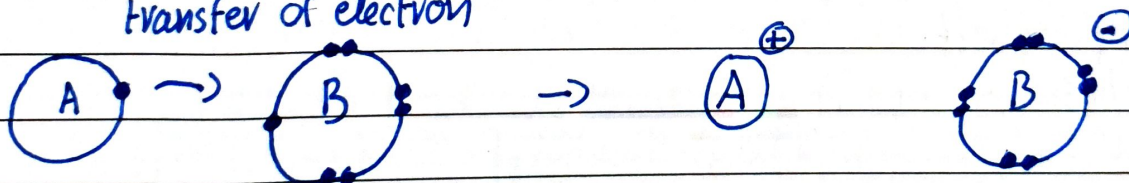
Example: NaCl -> Table Salt

Na has 1 electron in its outer most shell, where as Cl has 7. For Na to reach stability, it must dispose of the one electron it has in its outer most shell, and Cl needs one more electron to become stable. Therfore, Na tranfers one electron to Cl and as a result an Ionic bond is formed.

3) **Covalent Bond** : This is a type of chemical Bond in which both the atoms mutually share electrons inorder to become stable.

Example: Water Molecule → H_2O

The formation of water molecule consists of one Oxygen atom and two Hydrogen atoms. The two hydrogen atoms have one electron in their ~~first~~ outer most shell. Since their outer most shell is the first shell, they both require one electron each to stabilise. The Oxygen atom contains 6 electrons in its outer most shell and requires 2 electrons to become stable. Hence, these atoms mutually share electrons, where the two hydrogen atoms share their only electron with the oxygen atom and in return the oxygen atoms shares one electron with each hydrogen atom.
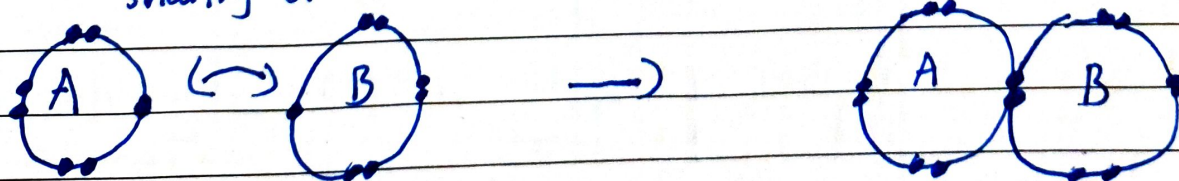
transfer of electron

Atom A   Atom B
metal   non-metal   **Ionic Bond**

sharing of electron

non-metal   non-metal or
               mettaloid.

Covalen Bond

(Q5) a) 1) <u>What is an Avalanche</u> :

A mass of snow, often mixed with ice &
debris, which travels down the mountain sides,
destroying all in its path.

2) <u>Types of Avalanche</u> :

Avalanches are categorised in four types
which are as follows :.

2·1) <u>loose snow Avalanche</u> :

Are common on steep slopes and are seen
after a fresh snowfall. Since the snow
does not have time to settle down the
snow pack is not very solid. These have a single
point of origin and ~~gett~~ get bigger as

they travel down.

2.2) Slab Avalanches :

Are caused by loose snow avalanches. These are characterised by the fall of a large block of ice down the slopes. The thin slabs cause only a modicum of damage while the large slabs can cause fatalaties.

2.3) Powder Snow Avalanche :

Is a combination of loose snow and slab. The bottom half consists of slabs and above is a cloud of powdered snow, which gets bigger as it travels down.

2.4) Wet snow Avalanche :

Are quite dangerous. They travel slowly due to eviction, but as it collects debris from it path, gt picks up speed.

Diagram?

b) 1) What are Electro magnetic waves :

Are form of energy which surround us in environment. According to the different wave length and frequency, this spectrum is of energy is divided into different forms. They contain both electric and magnetic field. They travel at the speed of light and require not medium to travel through.

2) Types & spectrum :

2.1) Radio waves :

Their wave length is greatest and the frequency in about 30 GHz. Their exposure is safe and are primarily used for communication

2.2) Microwave

They have wave length of about 10 mm and frequency of about 50 trillion GHz. Their exposure can cause burning. Typically used for microwave oven

2.3) Infrared :

Wave length of 740 nm and frequency

reaching 400 THz. They are used in night vision

2.4) Visible light:

Comprise of Infra-red and ultra violet rays. frequency about 800 THz and wavelength 240 nm. This is the light we can that is visible to human eye.

2.5) Ultraviolet rays:

has wavelength of 790 THz & wavelength frequency of 400 nm. Can cause skin cancer and is typically used to sterilize products.

2.6) X-rays

has wave length of 10 mm & frequency of 30 PHz. It is produced by fast hitting electrons & metals & can cause cancer.
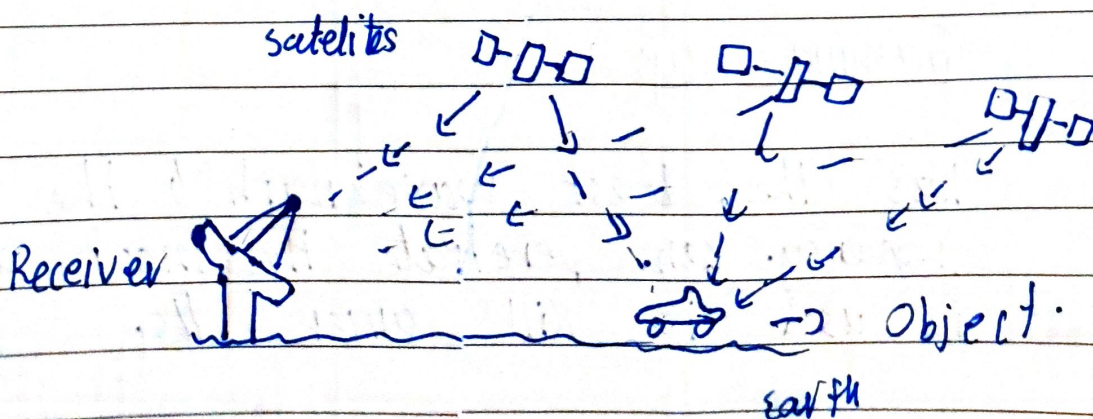
Diagram?

2.7) Gamma-rays

has the least wavelength & the highest frequency. Can penetrate the most and is used to kill cancer cells.

c) 1) **What is GPS :**

Global positioning system is a satelite-based navigation system designed by the U.S department of Defense. It consists of a network of 24 ~~sat ellil~~ satellites placed into orbit. This system can work in any weath conditions and works 24 hours a day.

2) **How does the GPS system work :**

The Gps satelities orbit the earth twice sending signals to earth. The GPS receiver receives the transmitted signals and uses triangulation to calculate the user's exact location. It calculates the time when the signal was transmitted and received and uses the time difference to accurately determine the exact position. It uses threes satelites for 2D position & four satelites to determine 3D position of the object i.e (latitude, longitude, altitude.

satelites

Receiver

Object.

earth

d) 1) Computer Buses :

The consist of set of parallel lines. It is used to transfer data between different components of the computer. A bus can send bits depending on the DATA line in it. If it has 16 lines it can carry 16 bits. Buses are the communication system that transfers data between components inside a computer or between computers

2) Types of Buses :

2.1) Data Bus :

It is responsible for transferring data to and from the memory of computer.
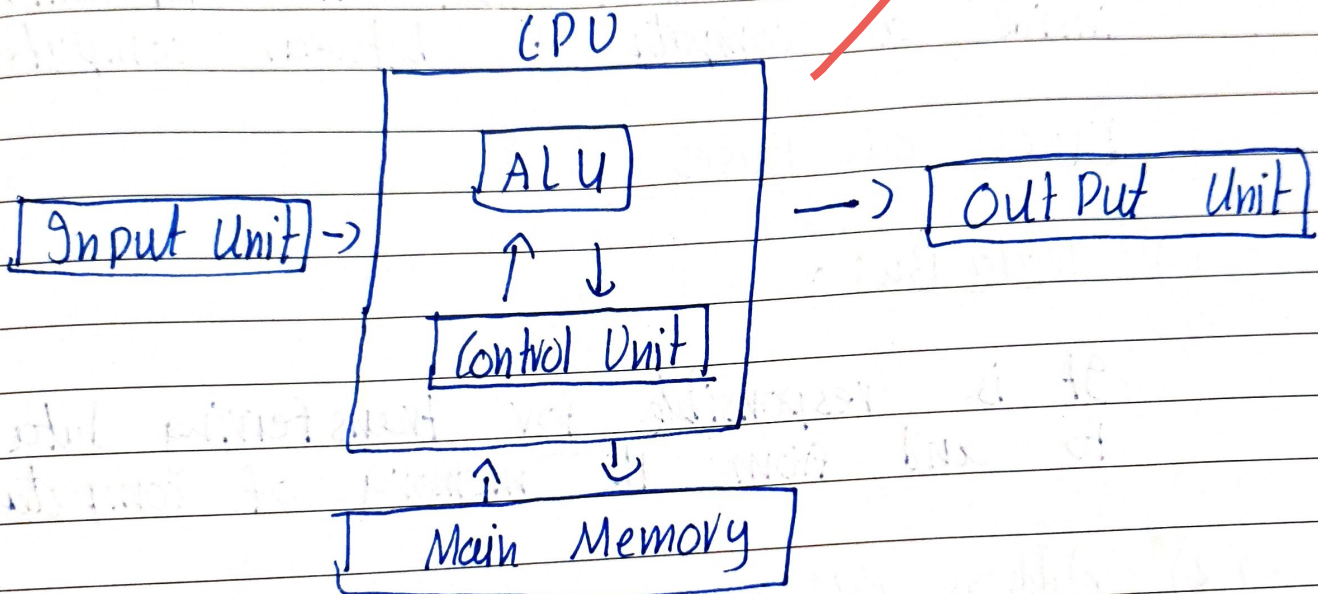
2.2) Address Bus :

Used for transferring data between devices

2.3) Control Bus :

used by the CPU to communicate to the rest of the devices in the computer

3) CPU :

Central processing unit is the electronic circuitry within a computer that carries the instructions of a computer program by performing the basic arithematic, logical, control, input & output operations specified by the instructions.

CPU

Section B

Q6 a) Son's age five years ago = 30 - 5 = 25
fathers age thrice of sons = (25) × (3) = 75

current age of father = 75 + 5
= $\boxed{80 \text{ years}}$

Given data
To find
Solution

b) Man pays 10% of income as income tax

Income tax paid = 1500
Suppose income = x

Income tax = 10% × x
1500 = $\frac{10}{100}$ × x

x = 15000

Therefore the Income of the man is Rs 15000

c) Mean of 6 numbers is 20
After removing 1 number, average of remaining 5 numbers is 15

Assume the number removed is 'x'

① Mean = $\frac{\text{Sum of numbers}}{\text{Total Numbers}}$

① Sum of 6 numbers = 6 × 20 = 120

② Sum of 5 numbers = 5 × 15 = 75

x = Difference of Sums
x = 120 − 75 = 45

Reason in detail.

d) I) 8, 4, 32, 7, 5 _ _ 35 _ _

$8 \times 4 = 32$
$7 \times 5 = 35$

Therefore ∴ 35

ii) 17, 19, 23, __29__, 31, 37

The numbers are prime numbers in increasing order, therefore the missing number is 29.

Q8)a) 3liters for 24 sqmeters
How many liters for 50·4 sq meters

① find the litres of paint required

$3 \text{ lts} = 24$
$x \text{ lts} = 50·4$

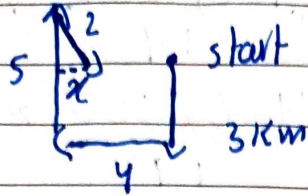$x = \dfrac{3 \times 50·4}{24} = 6·3$

② find the percentage

$\dfrac{x}{100} \times 3 = 6·3 - 3$

$x = 110 \%$

b)

$$H^2 = B^2 + P^2$$
$$(x+2)^2 = (4)^2 + (2)^2$$

$$(x+2)^2 = 16 + 4$$

$$\sqrt{(x+2)^2} = \sqrt{20} \qquad \rightarrow \text{Taking square root.}$$

$$x+2 = \sqrt{20}$$
$$x = 2\sqrt{5} - 2$$
$$\boxed{x = 2(\sqrt{5} - 1) \text{ Km}}$$

c)   Total investments

Tahir = $15\,000 \times 12 = 180,000$
Umar = $30\,000 \times 7 = 210,000$
Usman = $45000 \times 4 = 180,000$

In ratio $\Rightarrow 180,000 : 210,000 : 180,000$

$$\begin{array}{ccc} 18 & : 21 & : 18 \\ 6 & : 7 & : 6 \end{array}$$

Total share = 19
Profit = 406,000

Hence;

Tahir's share $= \dfrac{406,000}{19} \times 6 = 128,210.5$ Rs

Umar's share $= \dfrac{406,000}{19} \times 7 = 149,579$

Usman's share $= \dfrac{406,006}{19} \times 6 = 128,210.5$