Q # 4 (a)

Solid Waste Management :-

Solid Waste management is the strategy to properly dump all waste products and materials in a good controlled form where; China has also introduced recycling of waste. It has also asked Pakistan, according to Al-jazeera, that "China will help Pakistan to manage the growing waste dumping in the city of Karachi." Otherwise, the improper solid waste management is not only harmful for the health but also the major cause of pollution, that is devasting for whole of the ecosystem.

National Solid Waste Management Strategy in Pakistan :-

According to the 'Pakistan Enviornment Protection Agency', the guidelines of solid waste management been followed in Pakistan are:

i) Waste Collection and Segregation: firstly, all of the waste should be collected and then, separated to segregate the plastic materials because they do not decompose by themselves. For this, in Pakistan, Mostly hand picking by the poor individuals is been performed. Although, it is not governmental preferred method, it is in common practice in Pakistan.

ii) Waste Recycling and Resource Recovery:-

Due to lack of resource, Pakistan has not well-established industries like the USA's dumping plant and system. However, Pakistan has tried to manage in some areas of country like, Lahore, Islamabad and half-good in some other cities of the country, the dumping boxes. Where the governmental buses also pick and clean them to the desire dumping locations away from cities.

iii) Waste Disposal and Landfills:-

For example; Karachi Waste Reduction campaign with collaboration of China, Lahore Recycling Incentive Program, and Islamabad Landfill Rehabilitation. These are the some of the strategies Pakistan has adopted to waste disposals in the big cities, also the mostly waste affected cities of the country.

iv) Public Awareness and Education:-

For instance; Faisalabad Public-Private Partnership and Media Campaign of 2020, where famous actors of Pakistan were shown cleaning the streets of Karachi and Lahore. Such incentives are pointed in Pakistan policies to aware people about solid waste management.

v) Monitoring and Reporting:-

Although, in terms of systematic grounds, Pakistan has been ineffective to provide practical management strategy, the government

do still holds union councils, district councils and especial waste management officials designated by the country for the people of Pakistan. However, corruption and lack of check and accountability has rusten these sectors.

Suggestions for Improved Solid Waste Management in Pakistan :-
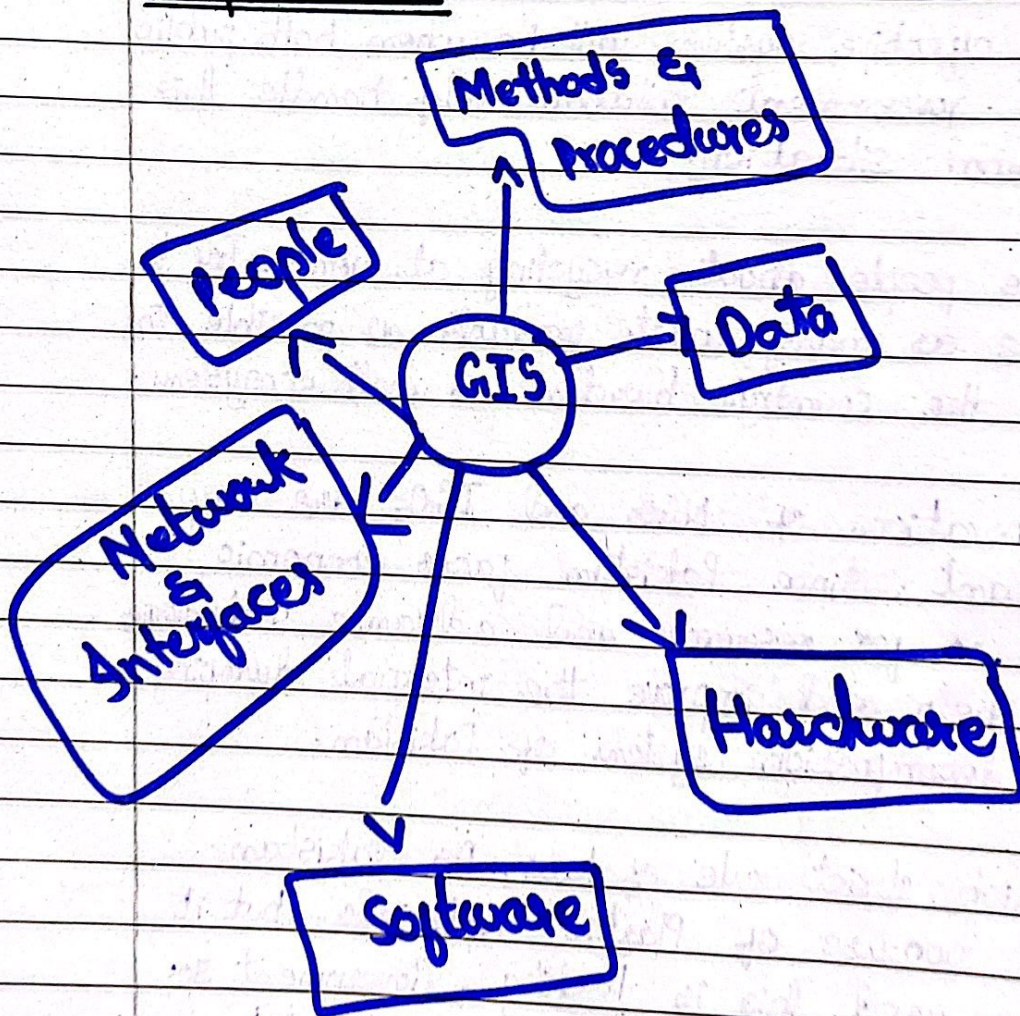
i) Incorporate the civil responsibility to manage the waste dump. Government is also working but effective system will be when both public and government collaboratively handle this abysmal situation.

ii) Aware people about recycling at home. Try to re-use as many waste products as possible to save the country's burden as well ecosystem.

iii) Collaboration of NGOs and IGOs are very important; since Pakistan faces economic crisis, so, for resources and advance technologies seek help and improve the internal dumping and decomposition system of Pakistan.

iv) Establish strict rule of law. As Pakistan issued non-use of Plastic materials, but it is been used. This is lacking. Government so: should take examplary measure to deter people if they go against policies.

Q# 4(b)

GIS (Geographic Information System)

It is a powerful tool used for capturing, storing, analyzing, managing and displaying geographically referenced data. GIS is widely used in fields such as urban planning, enviorn-mental management, natural resources, exploration, disaster management, and more.

Components :-

Methods & Procedures

People

Data

GIS

Network & Interfaces

Hardware

Software

i) **Hardware :-** This refers to the physical equipments used to operate GIS software. i.e. Computers, servers, scanners, and other devices.

ii) **Software :-** It facilitates the tools and functionalities to create. edit, analyze and visualize geographic data. i.e. ArcGIS, QGIS, GRASS

iii) **Data :-** There are two types of data in GIS
   a. Spatial data :- This includes information about the geographic location and shape of features such as paints lines, polygons
   b. Attribute data :- This includes non-spatial data. ie. map of cities, attributes of population; area, name etc.

iv) **Methods and Procedures :-** This including various ways of data analyzing using various tools. ie. overlaying, buffering, routing etc.

v) **People :-** Skilled professionals, such as GIS system analysts, cartographers, spatial data scientists, play a crucial role in designing, implementing, and utilizing GIS systems.

vi) **Network and Interfaces :-** Related to transportation and logistics, road systems and the stations to the overall working network of GIS.

Q # 4 (c)

Causes of Over-Population In Pakistan:-

i) **Poor Family Planning :-**
More appropriately, no family planning. Families are not even considering the over population as a problem in the country.

ii) **Lack of education and Poverty:-**
People are not educated and poverty is at rise. The poor families use children as their source of earning. More children more hands for earning.

iii) **Mis-interpretation of Religion:-**
Use of birth-control is mis-interpretated as anti-religious.

iv) **Gender sterotypes and society Contrains:-**
Role of women as only child-bearer. Moreover, the pressure of boy-child. If the person keeps on having girl children. They keep trying unless they gets boy children. In this process, over population keeps exaggerated!

Control Measures :-

i) Proper family Planning :-

Government should designate social workers for this awareness.

ii) Strict rule of maximum '2-child' policy:-

Government should adopt strict rules like China not to control over-population. but 2-child policy.

iii) Education and women empowerment:-

Empower women with education and opportunities for independence. If she knows what and how to control, patriarchal norms can never affect her.

iv) Media Campaigns for awareness and control strategies :-

Incorporate media to aware people abouts the ills of over-populations. For example: the dramas like 'Udari' calls voice against domestic violence such initiatives should be promoted against undue child-births.

<center>Q# 4 (d)</center>

Montreal and Kyoto Protocols :-

Both are the international protocols to control carbon emission that is harmful for the ecosystem. Specially the major contributor in climate change and global warming. The countries committed to reduce emission as the binding of these international treaties to save ozone layer and prevent global warming.

Carbon - Market :-

It is a market-based approach designed to help countries and companies achieve their emission reduction targets by allowing them to buy and sell permits or credits that represent the right to emit a certain amount of greenhouse gases.

These are two main types of Carbon-market:

a. Cap and Trade:-

In this system, government sets a limit (Cap) on the total amount of greenhouse gases. Emissions than distributed and auctions to the companies.

ii) Carbon offset Market :-

This involves reduction in carbon emission, i.e; reforestation or renewable energy projects.

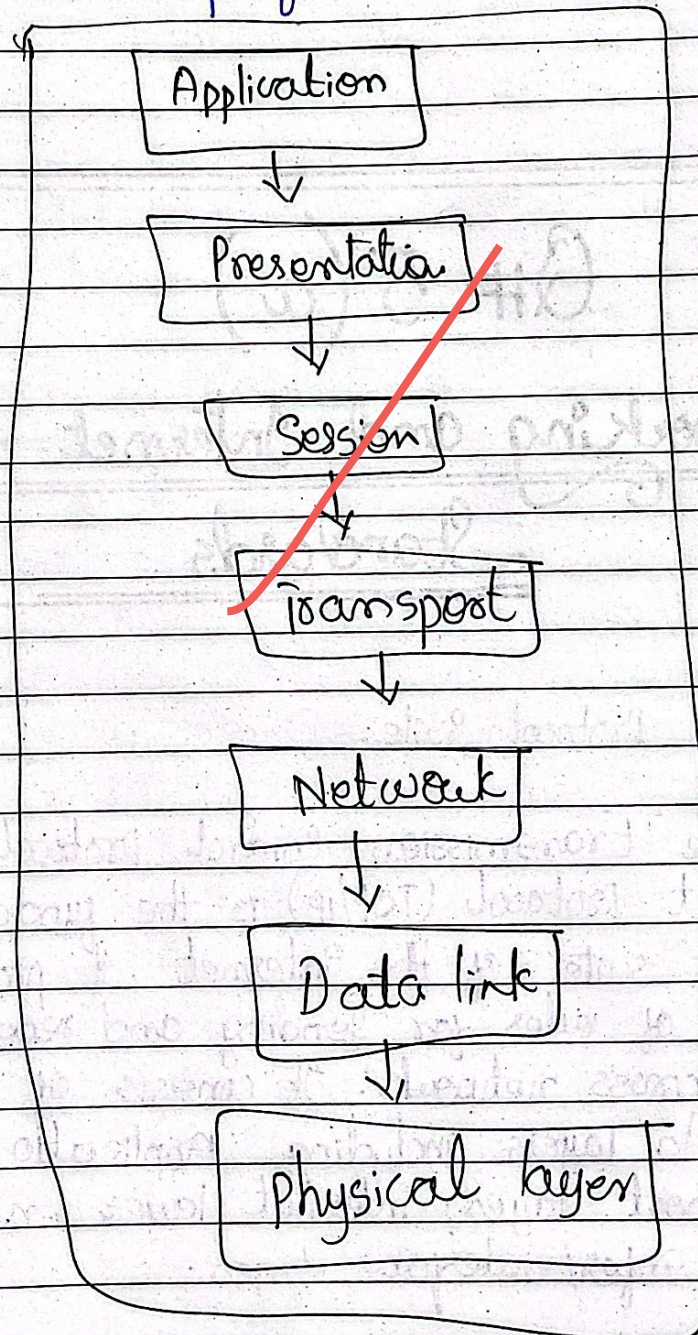$$\times \text{==============} \times$$

Q# 5 (a)

Networking and Internet Standards

i) TCP/IP Protocol Suite :-

The Transmission Control Protocol/ Internet Protocol (TCP/IP) is the fundamental protocol suite of the internet. It provides a set of rules for sending and receiving data across network. It consists of multiple layers, including Application layer, Transport layer, internet layer, network and ~~infory~~ interface layer.

ii) OSI model:-

The open system Interconnection (OSI) model is another protocol and it is conceptual framework for network system. It has 7 layers and each layer has specific role

```
┌─────────────────────────┐
│   ┌──────────────┐       │
│   │ Application  │       │
│   └──────┬───────┘       │
│          ↓               │
│   ┌──────────────┐       │
│   │ Presentatio  │       │
│   └──────┬───────┘       │
│          ↓               │
│   ┌──────────────┐       │
│   │ Session      │       │
│   └──────┬───────┘       │
│          ↓               │
│   ┌──────────────┐       │
│   │ Transport    │       │
│   └──────┬───────┘       │
│          ↓               │
│   ┌──────────────┐       │
│   │ Network      │       │
│   └──────┬───────┘       │
│          ↓               │
│   ┌──────────────┐       │
│   │ Data link    │       │
│   └──────┬───────┘       │
│          ↓               │
│   ┌──────────────┐       │
│   │Physical layer│       │
│   └──────────────┘       │
└─────────────────────────┘
```

The 7-layer OSI model.

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iii) Ethernet :-

It is wired network and operates at the Data link layer of the OSI model. It is the foundation of LAN network.

iv) HTTP and HTTPs :-

It is used for transferring web pages and other content on World wide web.

v) DNS :-

This system translates human-readable domain name ie www.google.com into IP addresses that computer uses to identify each other on internet.

vi) IPV4 and IPV6 :-

These are the protocols used to identify devices on network.

vii) Wifi standards :-

These standards define wireless network technologies, like IEEE 802.11ac and 802.11ax (wifi - 6)

There are many more, but they collectively create the framework that enable devices, services and applications to communicate in a network.

Q# 5 (b)

Artifical Intelligence:-

It is new technology emerged in the globe that provides aid to human daily lives. It works like human brain and keeping learning human-like behaviour so that it can perform as intelligently as human do. It mainly includes computer sciences machine learning, quantum physics and natural language processing.

Pros:-

i) Aids to humans in difficult tasks and computations. ie. Robots replacing humans in deep dark mining, land digging, water diving curvelliances.

ii) The AI is helping humans to better communication in job vacanies with you weak english professionals. ie. Chat gpt.

iii) AI is helping in better and early diagnos of cancerious deaseases. ie. ML- body scanners; AI -based medical treatments.

iv) AI is helping for targeting audience and enhanced marketing strategies. i.e. AI base recommendation System.

v) The face-recognition mechanism due to AI is helping culprit capturing and better surveillence system. ie. Traffic control.
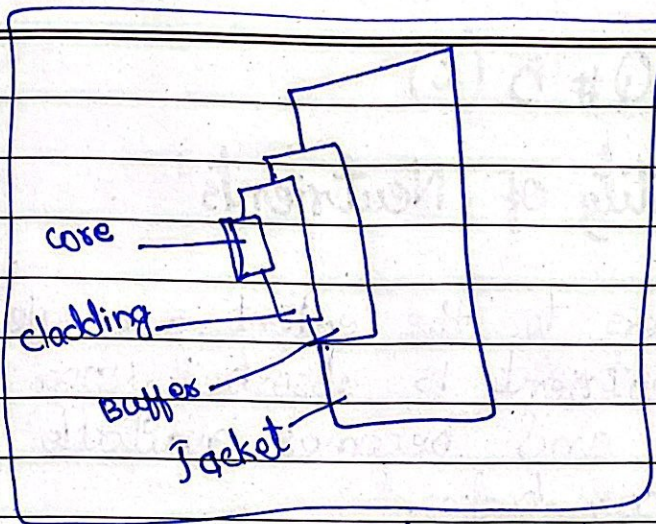
Cons:-

i) Fear of human-replacement in jobs and increase of poverty.

ii) Privacy and data breaches due to unethical use of AI. ie. Manipulation of images used in pornographic content without permission.

iii) Gender biases due to recommendation algorithms designed to promote patriarchy. ie: job vacannies visible for male audiences only.

iv) lack of morality in AI-based system often becomes weapon against mankind. ie. The rapescenes in avatars of AI report case 2016 on AI-based games.

Q # 5(c)

Construction of Optical Fiber:-

i) **Core:-** It is central part of the optical fiber through which light travels. It allows refractive index the phenomeon of total internal reflection to keep the light inside the core.

ii) **Cladding:-** Surrounding the core is cladding, a buffer glass or plastic that helps the reflection back into the core.

iii) **Buffer Coating:-** It is made of plastic and added to protect bending, stretching and other external factors.

iv) **Strength member:-** like Kevlar, it is added for extra mechanical support and protection.

v) **Outer Jacket:-** It is made of a more robust material which safeguards the fiber from environmental condition such as moisture, chemicals and physical damage.

Fiber optic Cable Construction

Transmission of Electromagnetic Radiation:-

i) Total internal Reflection ensurses confined and Subtle transmission of radiation.

ii) Core and cladding guides continues internal reflection that control transmission breakage.

iii) Minimized Signal loss

iv) High Bandwidth facility

v) low interference of outer environment.

vi) Secure communication.

vii) Versatility in transmiting various electro-magnetic radiation: Infrared, visible light etc.

Q # 5 (c)

'Bioavailability of Neutrients'

It refers to the extent and rate at which neutrient is absorbed from food we eat and becomes available for use by our bodies.

Factors affecting Bioavailability:

i) Since it is in chemical form, ie, animal-based foods (heme iron) is generally more bioavailable than iron in plant-based foods (non-heme iron).

ii) Digestion and Absorption of the body also affects the availability of neutrients to the body utilize for health.

iii) Food Matrix like cooking, grinding also affects.

iv) Age and Health status also play crucial role in this process.

Examples of Nutrient Bioavailability:-

i) Calcium; It is found in milk and yougurt.

ii) Vitamin D from Sunlight.

iii) Iron from animal sources, spinach.

iv) Zinc in whole grains and legumes.

Section - B

Q# 6.

a) let the three parts be A, B and C.

Given:
$$B = (1/4) C$$
$$A : C = 3 : 5$$

Since $A : C = 3 : 5$,
we can express A in terms of C.
$$A = (3/5) C.$$

Now, we know that sum of the 3 parts is $370.

$$A + B + C = \$370.$$
$$\left(\tfrac{3}{5}\right)c + \left(\tfrac{1}{4}c\right) + c = \$370.$$

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$$\frac{12c}{20} + \frac{5c}{20} + \frac{20c}{20} = \$370.$$

$$\frac{37}{20}c = \$370.$$

Now solve for C:

$$c = \frac{(\$370 \times 20)}{37}$$

$$c \approx \$200..$$

finding A & B using given ratio:

$$A = \frac{3}{5}c \approx \frac{\$200 \times 3}{5} \rightarrow \$120.$$

$$B = \frac{1}{4}c \approx \frac{\$200 \times 1}{4} = \$50.$$

Hence;
$$A = \$120$$
$$B = \$50$$
$$C = \$200 \qquad \text{Ans}.$$

(part - b)

Given:
Total fees = RS 800.
Borrowed from brother = 20% of 800 = 160.
Remaining = 800 - 160 = 640.

funded by mother = 30% of 640 = 0.3×640
$$= 192 \text{ Rs.}$$

Remaining = 640 − 192 = 448 Rs.

Kashif bank balance = 200 Rs.
Total remaining = 448 − 200 = 248 Rs.

Hence; Kashif needs RS 248 more

Ans.

(Part-C)

let A be drawing a red ball
and B be selecting the third Bag.
we need;
$$P(B|A)$$
using Bayes' theorem.

$$P(B|A) = \left(P(A|B) * P(B) \right) / P(A)$$

$$P(A) = \left(\frac{3}{10} + \frac{8}{20} + \frac{4}{10} \right) = \frac{15}{20}.$$

$$P(B) = 1/3$$

$$P(A|B) = 4/10.$$

Therefore:

$$P(B|A) = \frac{\left(\frac{4}{10} * 1/3 \right)}{\left(\frac{15}{20} \right)} = \frac{2}{15} \quad \text{Ans.}$$

(part-d)

Time Intervals:
    24 sec
    36 sec
    72 Sec.

LCM of 24, 36 and 72 = 72 sec.

Convert 72 sec into houses

$72 = \dfrac{72}{66}$ minutes = 1 hour & 12 min.

Therefore;

The traffic lights will change simultaneously again at 8:20:00 + 1 hour 12 minuts = $\boxed{9:32:00}$

Ans.

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Q # 8 (a)

∵ Average Speed = $\dfrac{\text{Distance}}{\text{Time}}$.

let's assume total distance = D.

During first Half = $\dfrac{D}{2}$ km at 40 km/h.

Second half = $\dfrac{D}{2}$ km at 60 km/h.

So;

Total time = $\dfrac{\left(\frac{D}{2}\right)}{40} + \dfrac{\left(\frac{D}{2}\right)}{60}$ = ~~$\dfrac{3D + 2D}{2 \times 40 \times 60}$~~

$= \dfrac{5D}{480}$

$= \dfrac{D}{96}$

Average Speed = $\dfrac{D}{D/96}$ = 96 km/h.

Ans.

(b)

Using Code Pattern

R = 6
O = 8
S = 2
E = 1
C = 7
H = 3
A = 4
I = 5
P = 9.

So:

SEARCH.

will be.

2 5 7 9 3 4.

Ans.

(c)

D is the grandson of A.

Explanation:

⇒ A is brother of B.

⇒ B is the sister of C.

(implying A & C are siblings).

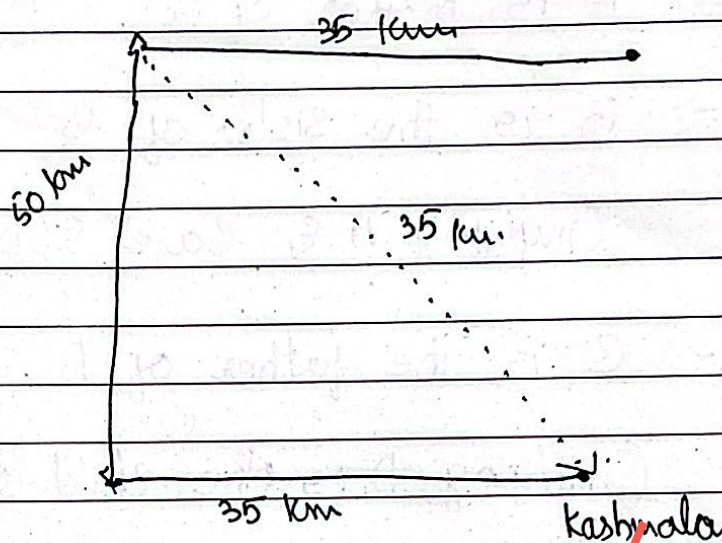⇒ C is the father of D.

(implying D is the child of C)

Thus,

D is the grandson of A.

(ঐ)

Data:-

= 35 km - West
- 50 km - north
→ 35 east.

Using Pythagorean theorem:

$$hy^2 = p^2 + b^2$$
$$hy^2 = 50^2 + 35^2$$
$$hy = \sqrt{2500 + 1225}$$
$$= \sqrt{3725}$$

$$\approx 61.05 \text{ km}.$$

kashmala is approximately 61.05 km from her original position.

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