Part - II

Section - A

Q. No. 3

Part. a - Answer:

Reserving global warming involves multiple strategies across various sectors.

1. Reduce Greenhouse Gas Emission

i. Transition to Renewable Energy:

Shifting from fossil fuels to solar, wind, and hydroelectric power to reduce carbon emission.

ii. Energy Efficiency:

Improve energy efficiency in building, transportation, and industries through technology and better practice.

iii. Electric Vehicles:

Promote electric and hybrid vehicles to reduce emissions from transportation.

2. Carbon Capture and Storage:

i) Capture CO_2 Emission:

Implement technologies that capture carbon dioxide from industrial processes and store it underground.

ii) Direct Air capture:

Invest in technologies that can remove CO_2 from the atmosphere.

3. Reforestation and Afforestation:

i) Plant Trees

ii) Sustainable Land Management:

Implement practices that preserve existing forest, improve soil health and increase biodiversity.

4. Sustainable Agriculture:

i) Regenerative Practices:

Use techniques like cover cropping

and agroforestry to enhance soil carbon storage.

- Reduce food waste throughout the food supply chain.

6. Policy and International cooperation:

- Strength international agreements on climate.
  e.g: Paris Accord
- carbon pricing: Implement carbon taxes or cap and trade system to incentivize reduction
- Reduce, Reuse, Recycle.

7. Public Awareness, education and technology innovation:

- Educate communities on climate change impact and personal carbon footprint reduction.
- Community engagment - Encourage in climate action initiative.

Conclusion:

Reversing global warming require collaborative effort from individuals, gover-ment, and industries waldwide. Each of these measure can contribute significantly to decreasing GHG concentration and mitigate climate change.

Part b.

Answer:

Ceramics:

"Ceramics are inorganic, non-metallic material made from powdered chemical and are typically hardened by heating."

E.g: tiles, bricks, porcelain, and glass.

Properties of Ceramics:

- **Hardness)** - Ceramic possess high hardness making them resistant to scratching and wear.

- **Brittleness** } can fracture under tensile stress.

- **Chemical resistance** } Generally resistant to corrosion and chemical attack, making them suitable for harsh environment.

- **Thermal stability** } They can be withstand high temperature without melting or deforming.

- **Low Electrical conductivity** } Most are poor conductor of electricity, which makes them excellent insulator.

- Application of Ceramics:

- **Construction Material** } Used in bricks, tiles and sanitary ware

- **Electronics** } serve as insulator and substrate in capacitors etc.

- **Medical Device** → Employed in dental implants, prosthetics
- **Aerospace** → Utilized in thermal barriers and components that require high strength and thermal resistance.
- **Household Items** → commonly found in dishes, cookware

Part. C.

Answer

Optical Fibers:

Definition:

Optical fibers are thin strands of glass or plastic that transmit data as pulses of light over long distances

E.g: They are used for

- Telecommunication
- Internet connection
- medical instrument

Working Principle:

1. Total Internal reflection:

Optical fibers operate on the principle of total internal reflection. When light travels from a denser medium to a less dense medium (air), it reflects back into the glass if it hit the boundary at an angle greater than the critical angle.

2. Core and Cladding:

→ core → The central part that carries light made of glass or plastic

→ cladding → surrounds the core and has a lower refractive index to maintain total internal reflection.

3. Light Transmission:

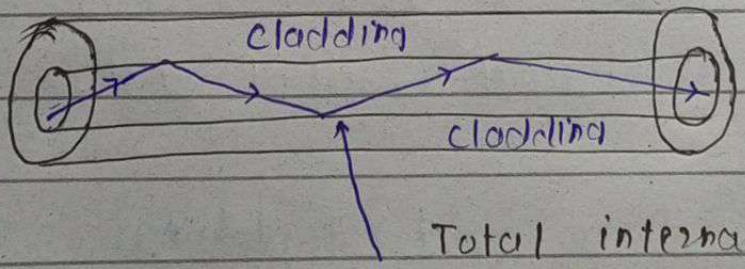
Light is injected into core, travelling along the fiber by bouncing off the walls

4. Multiplexing:

It can be sent simultaneously at different wavelength.

5. Input and output:

At the endpoint, light signals are converted back electrical signals for processing and use.



Total internal reflection occurs here

- Mobile Phone:

Definition:

"Mobile phones are wireless devices enabling communication via voice, text and data over cellular network"

Working Principle:

1. Radio communication:
   - Use radio waves to send and receive signals.
2. cellular network:
   - The area is divided into ~~cellular~~ cells tower.
3. Signal transmission:
   - Voice converted into digital signals and transmitted as radio waves to the nearest cell tower.
4. Routing:
   - The base station forwards these signals to central switching center connecting your call to the recipient.
5. Reception:
   - The recipient's phone converts the signals back into sound or data.

Q. No. 3

Part. d:

Food Additives:

Definition:

"Food additives are substances added to food to enhance its flavour, appearance, texture. They can also help preserve food quality."

Example:

- Coloring Agents
- Flavour Enhancer
- Texturizers

Food Preservatives:

Definition:

"Food preservation are substances used to prevent spoilage, extend shelf life, and maintain the safety of food product by inhibiting microbial growth."

Example:

- Sodium Benzonate in acidic foods

Food Adulteration:

1 Definition:

"Food adulteration refers to the addition of inferior or harmful substances to food, compromising its quality and safety."

Example:

- Water added to milk.
- Artificial colour in turmeric powder.
- [redacted] Metanil yellow dye in rice.

Food contamination:

Definition:

"It occurs when food is tainted by harmful bacteria, chemicals, posing health risk."

Example:

- Biological contamination
- chemical contamination:
  Pesticide residue on fruits and vegetable.

Q. No. 4

Part. c.

Answer:

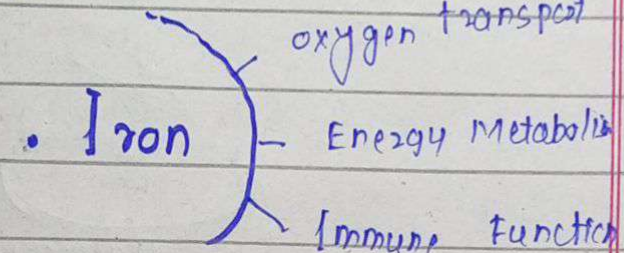
- **Carbohydrates:**
  - Energy source:
    Quick energy for bodily functi
  - Storage:
    storage as glycogen in live and muscles.
  - Digestive health:
    Provide dietary fiber for digestion.

- **Proteins:**
  - Building Blocks
  - Enzymatic Function
  - Immune Function

- **Fats:**
  - Energy storage
  - cell structure
  - Nutrient Absorption

Calcium:

- Bone health
- Muscle Function
- Blood clotting



Q. No. 4

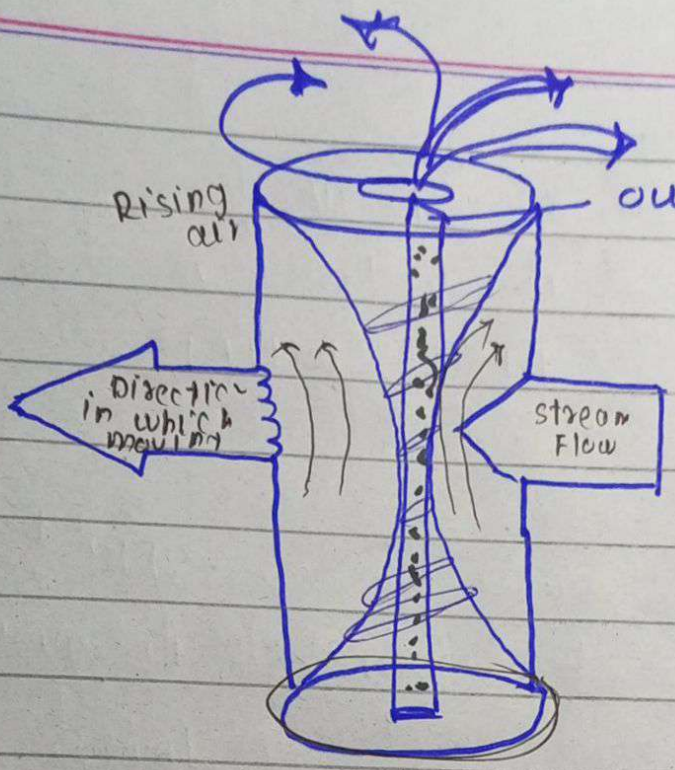
Part b.

Cyclone:

Definition:

"A cyclone is a large scale rotating air mass around a low pressure center, characterized by strong winds and heavy rainfall."

Formation of a cyclone:



Hurricane

- Warm mois air:

  Cyclone form over warm ocean wate (above 26.5°C) where moist air rises, creating low pressure.

- convergence and updraft:

  Cool air moves in to fill vacuum convergence at the surface.

- Cloud Formation

  Rising air cools, causing water vapour into clouds releasing heat

- Low pressure system:

  The continuous rising air lower the Pressure further with coriolis effect causing rotation, leading a defined cyclone structure.

Section - B

Q. No. 6

A. Answer:

The women is Ahsan's mother.

B. Answer:

Given Information:

- Ratio of length to breadth = 3 : 2
- Speed of man = 12 km/hr
- Time taken for one complete round = 8 minutes

- To find area of park

Calculations:

Step 1: Convert speed to meters per min.

$$\text{Speed} = 12\text{km/hr} = \frac{12 \times 1000}{60}\ \text{m/min} = 200\ \text{m/min}$$

Step 2: Perimeter of the park

- Time taken = 8 minutes
- Distance covered in 8 min = speed x Time

$= 200\text{m/min} \times 8\text{ min} = 1600\text{ meters}$

Step 3: Dimension in term of variable

length $3x$ breadth $2x$

$P = 2(L + B) = 2(3x + 2x) = 2(5x) = 10x$

Set Perimeter equal to 1600 meters:

$10x = 1600 \Rightarrow x = 160$

Step 4: Calculate

Length $= 3x = 3 \times 160 = 480\text{m}$

Breadth $= 2x = 2 \times 160 = 320\text{m}$

Step 5:

$A = L \times B = 480\text{m} \times 320\text{m}$

$A = 153600\text{ sq.m}$

Thus, the area of Park is 153600 sq.m

C. Answer:

Let the two digit number be

$10a + b$

Given information:

1. The unit digit exceeds the ten's digit by 2:

$$b = a + 2$$

2. The product of the number and the sum of its digit equals 144

$$(10a + b)(a + b) = 144$$

Steps:

1. Substitute b:

$$b = a + 2 \Rightarrow 10a + b = 10a + (a + 2) = 11a + 2$$

$$a + b = a + (a + 2) = 2a + 2$$

2. Set up the equation:

$$(11a + 2)(2a + 2) = 144$$

3. Expand:

$$22a^2 + 22a + 4 = 144 \Rightarrow 22a^2 + 22a - 144 = 0$$

4. Simplify:

$$11a^2 + 11a - 70 = 0$$

5. Solve using quadratic formula:

$$a = 5 \Rightarrow b = 7$$

Hence, The number is 57.

D. Answer:

Let the two numbers be $2x$ and $3x$

Given:

L.C.M = 48

Ratio = 2 : 3

Steps: 1. Product relationship

L.C.M × G.C.D. = Product of the numb.

Let G.C.D. = 1

$48 \times 1 = (2x)(3x) = 6x^2 \Rightarrow$

$48 = 6x^2 \Rightarrow x^2 = 8 \Rightarrow x = 2\sqrt{2}$

2. Numbers:

- First number: $2x = 4\sqrt{2}$
- Second number: $3x = 6\sqrt{2}$

3. Sum: $4\sqrt{2} + 6\sqrt{2} = 10\sqrt{2}$

Q. No. 8

Part A.

Answer:

Information:

1. A is to the right of B = B < A

2. E is to the left of C

and right of A : A < E < C.

3. B is to the right of D: D < B

Arranging house:

- From point 1, we have:

D < B < A

- From point 2, we add:

A < E < C

combining these:

D < B < A < E < C

Thus, in the middle is A.

Part B.

Answer

1. Distance from the starting point = 1 km
2. Final direction while finishing = west
3. Direction after the second around = South
4. Direction to return to the starting point: West.

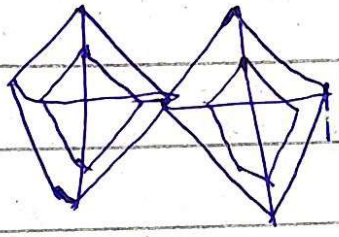
Part C.

Answer:

Odd man out is AOTC.

Part D.

Answer:



This figure is a classic visual puzzle. The two main diamond shapes each contain 14 triangles, for a total of 28.