PART - II

SECTION 'A'

Q4(a): ROLE OF HEART AND BLOOD VESSELS IN CIRCULATION:

THE HEART:

(A) DEFINITION: The heart is the muscular organ that is responsible for pumping blood throughout the body and supply oxygen & remove waste products.

ROLE OF THE HEART IN CIRCULATION:

The heart is a muscular organ located in the chest cavity of the human body. It is responsible for pumping blood throughout the body, in order to supply oxygen and nutrients to different parts of body and removing carbon dioxide & metabolic waste.

CHAMBERS OF THE HEART:

There are four chambers of the heart:
Two atria
Two ventricles

HOW IT OPERATES:

The right side of the heart recieves deoxygenated blood from the body and pumps it into the lungs for oxygenation, forming the pulmonary circulation. The left side of the heart recieves oxygenated blood that is rich in oxygen and supplied to the systemic circulation to be distributed to organs and tissues of the body.

The systemic contraction (systole) and relaxation (diastole) ensures continuous blood flow. Specialized cells in the heart such as sinoatrial nodes generate electrical impulses that regulate heart-beat ensuring synchronized pumping. Without the heart's pumping action, blood

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Dos and Don'ts for the General Science & Ability Paper
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 atleast 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.
Good luck for CSS 2026 — you're going to ace it, in sha Allah! 🌟

would stagnate, depriving tissues of vital nutrients and oxygen which highlights its indespensible role in sustaining life.

THE BLOOD VESSELS:

DEFINITION: Blood vessels are tubular channels (arteries, veins, capallaries) that carry blood to and from heart facilitating transport of oxygen, nutrients and waste in the body.

ROLE OF BLOOD VESSELS IN CIRCULATION:

Blood vessels are tubular structures that forms a network to carry blood to and from the heart

TYPES OF BLOOD VESSELS:

They are classified into 3 main types, each possessing distinct role in circulation:

1) **Arteries:** Arteries carry oxygen-rich blood away from the heart to different parts of body. They have thick muscular walls to withstand highpressure generated by ventricular contractions.

2) **Veins:** Returns deoxygenated blood to the heart. They have thinner valves and walls to prevent back-flow of blood, ensuring one way movement despite lower pressure.

3) ~~Cappat~~ **Capillaries:** Capillaries are tiny thin walled vessels connecting arteries and veins. Their thin walls facilitate exchange of oxygen, nutrients and waste products between blood and tissues.

Together blood vessels form a closed circulatory system, maintaining efficient blood flow and homeostasis throughout the body. They donot only transport blood but also regulate blood pressure and distribute heat contributing

Q4(b): DEFINITION OF CYCLONE AND IT'S FORMATION:

DEFINITION: A cyclone is a large scale, low pressure weather system characterized by strong winds rotating around the central calm region called the "eye." It is often accompanied by thunderstorm, heavy rainfall and storm surges, making it one of the most destructive natural disaster. Cyclone are known by different names in different regions, such as hurricane in Atlantic, Typhoons in Pacific, and Cyclone in the Indian Ocean. Cyclones are examples of intense atmospheric circulation resulting from temperature and pressure differences over warm ocean waters. They play a significant role in redistributing heat energy on Earth.

FORMATION OF A CYCLONE:

The formation of a cyclone is a complex process involving atmospheric, ocenic and thermal factors. The key steps involved in development of cyclone are as follows:

1. Warm Ocean Waters:
Cyclones form over oceans with surface temperature above 26-27 °C, which provide the heat and moisture necessary for storm

2. Evaporation and Moisture Rise:
Warm water evaporates and the humid air rises, creating low pressure at the ocean surface.

3. Coriolis Effect and Rotation:
The Earth's rotation causes the rising air to rotate counterclockwise in the Northern Hemisphere and clockwise

In the Southern Hemisphere, leading to the characteristic spinning of cyclone.

4. Formation of Clouds and Storm System:
As the warm moist air rises, it cools and condenses, forming thick cumulonimbus clouds. This releases latent heat, further strengthening the upward ~~temperature~~ motion and deepening the low pressure center.

5. Development of the Eye and Wind Structure:
The cyclone organizes into central calm eye, surrounded by spiralling bands of intense winds and rain, creating a mature cyclonic system, capable of causing widespread damage when it reaches land.

Q4(c): FUNCTIONS OF CARBOHYDRATES:

1. Carbohydrates are primary source of energy for the human body. ~~They~~
2. They when broken down into glucose, fuels the brain, muscles and tissues.
3. Excess glucose is stored in the form of glycogen in the liver and muscles, providing an energy reserve.
4. Carbohydrates ~~are sph~~ also spare protein and fats from being used for energy and contribute to digestive health through fiber.
5. An adequate amount of carbohydrate intake is essential for daily physical and mental activities.

2) FUNCTIONS OF PROTEINS:

1. Proteins are building blocks of the body made up of amino acids.

2→ They are essential for growth, repair and maintainance of the tissues, including muscles, skin and organs.

3→ Protein also forms enzymes and hormones that regulate biochemical , and antibodies that strengthen immunity.

4→ In energy storage, protein can serve as secondary energy source, but their main role is structural and functional.

3) ROLE OF FATS:

1. Fats provide concentrated source of energy providing 9 kcal per gram compared to 4 kcal from carbohydrates or protein.

2→ They insulate the body, protecting from against heat loss and cushion vital organs.

3→ Fats are also important for absorption of fat soluble vitamins (A, D, E, K) and are parts of cell membrane and cell synthesis.

4→ Moderate fat intake is essential for growth and overall health.

4) FUNCTIONS OF CALCIUM:

1. Calcium is mineral essential for strong bones and teeth, providing structural rigidity. It also plays a crucial role in

2. It also plays a crucial role in blood clotting, muscle contraction, nerve conduction and enzyme activation.

3. Calcium deficiency can lead to osteoporosis, weak bones, and dental problems.

4. Calcium is particularly important during growth, pregnancy and old age.

5) FUNCTIONS OF IRON:

1) Iron is a trace mineral necessary for oxygen transport.

2) It is a key component of haemoglobin in RBCs which carries oxygen from the lungs to the tissues and myoglobin in muscles.

3) Iron is also involved in energy production and enzyme functions.

4) Deficiency of iron leads to anemia, fatigue, and reduced immunity.

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Q4(d): EMPLOYMENT OF REMOTE SENSING FOR ENVIRONMENTAL PURPOSES :-

DEFINITION OF REMOTE SENSING:-

Remote sensing is a technique of acquiring information about the Earth's surface and atmosphere without direct physical contact, usually by the use of satellite and aerial sensors/cameras and drones. Remote sensing provides accurate, real-time, large scale data that is invaluable for monitoring and managing environmental systems. It allows scientists and policy makers to study the area that is inaccessible and vast making it an essential tool in environmental protection and sustainable development.

APPLICATION OF REMOTE SENSING FOR ENVIRONMENTAL PURPOSE:

Remote sensing has multiple application in environmental monitoring, assessment and management. Key areas include:

1) Forest and Vegetation Monitoring:
Satellite can track deforestation, afforestation and forest degradation.
* Vegetation Indices like NDVI help assess plant health and biomass.

2) Water Resource Management:
- Remote sensing monitors water bodies, river flow, reservoirs, and ground water levels.
- Helps in flood prediction, water management and drought assessment.

3) Air Quality and Pollution detection:
- Sensors detect aerosal levels, greenhouse gases distribution concentration and pollutant distribution in atmosphere.
- This enables early warning and policy Intervention.

Q3 a) WAYS TO REVERSE GLOBAL WARMING:

GLOBAL WARMING:-

Global warming refers to the gradual increase in Earth's average surface temperature, mainly due to accumulation of the Greenhouse gases (GHGs). like carbon dioxide, methane and nitrous oxide in the atmosphere. This rise in temperature leads to melting glaciers, sea level rise, extreme weather events and biodiversity loss. Reversing global warming requires both mitigation and adaptation strategies aiming at reducing GHGs emissions and restore ecological balance.

STRATEGIES TO REVERSE GLOBAL WARMING:-

1) Reducing GHGs Emissions.
→ Transition to renewable energy resources.

like solar, wind and hydroelectric power instead of fuels.

- Promote energy efficiency in industries, building and transportation.

Implement carbon taxing, emission trading and stricter environmental regulations.

2) Afforestation And Reforestation:

- Planting new trees (Afforestation) restoring degraded forests (Reforestation) absorbs CO_2 from atmosphere acting as a natural carbon sink.

- Protecting existing forests prevent further release of stored carbon.

3) Carbon Capture and Storage (CCS)

- Technological solutions capture CO_2 from industrial emission and store it underground or under the sea.

- Help reduce CO_2 level, complementing natural methods.

4) Adopting Sustainable Agriculture:

Reducing methane emission from livestock, using organic fertilizers and crop rotation improve soil carbon storage. Promote low carbon food production.

5) Reducing Waste and Promoting Circular Economy:

- Minimize landfill waste, recycle material and convert waste to energy.

- Prevent methane emission from organic waste decomposition.

Q3(b)   CERAMICS:

DEFINITION:- Ceramics is an inorganic, non-metallic material that are formed by heating and then cooling natural or synthetic compounds, typically oxides, nitrides and carbides. Ceramics include material such as clay, porcelin, glass and advanced technical ceramics. They are widely used due to their mechanical strength, chemical stability, resistance to heat and corrosion, making them important in both traditional and modern application.

PROPERTIES OF CERAMICS:

1) HIGH HARDNESS:
Ceramics are extremely hard and wear resistant making them ideal for cutting tools and abbrasive.

2) BRITTLENESS:
They are brittle and tend to break under high impact unlike metals which deform.

3) HIGH MELTING POINT:
Most ceramics can withstand high temperatures which allow them to be used in furnaces heat-shields

4) ELECTRICAL INSULATION:
Many ceramics are good insulators of electricity which is useful in electrical and electronic components.

5) CHEMICAL INERTNESS:
Ceramics resist chemical and erosion effects making them suitable for acid resistant container in chemical industries

APPLICATIONS OF CERAMICS:-

1) STRUCTURAL APPLICATION:

Bricks, tiles, cement and pipes are made up of ceramics due to their strength and durability.

2) ELECTRICAL AND ELECTRONICS:-

Ceramics are used in insulator, capacitor, semi-conductors and micro wave component due to their electrical resistance.

3) REFRACTORY APPLICATIONS:

Kilns, furnace linning and space craft and heat shields uses ceramics due to high melting point and thermal resistance.

4) MEDICAL APPLICATIONS:-

They are used in dental implants, bone substitute and prostetics.

Q3 (c):-

WORKING OF THE OPTIC FIBERS :-

Optic fibers are thin, flexible strands of the glass or plastic that are transmit information as pulse of light over long distances. They rely on the principle of total internal reflection which ensures that light signal remain confined within the fiber core even when the fiber bends.

WORKING PROCESS:-

1. **Light Source:-** A laser or LED generates light pulses that carry data.

2. **The Core:-** The fiber core surrounded by cladding layer with lower refrective index guide the light through repeated reflections without significant loss.

3. **Detector :-** At the receiving end a photodetector converts light pulse into electrical signals which are then decoded as information.

WORKING OF MOBILE PHONES:-

A mobile phone is a wireless communication device that transmits and recieve voice, Text and data signals using radio waves.

WORKING:

1) **Input Conversion:-** The uses speaks in microphone converting sound waves into electrical signals.

2) **Signal Transmission:-** The signals are modulated into radiowaves and transmitted to nearest cell tower or base station.

3) **Switching and Routing:-** The mobile network routes the signal to recipient through towers, switching centers.

4) **Reception and Output:-** The recipient's phone recieve the signals via antenna, demodulates it and converts it back into sound through speaker.

Q3(d):-

1) FOOD ADDITIVES:- Food additives are substances intentionally added to food to enhance its flavors, color, texture or shelf life without significantly changing its nutritional values. They are regulated to ensure safety for human consumption.

EXAMPLES:-
Coloring agents
Flavor enhancers
Emulsifiers
Stabilizers and thickness

2) FOOD PRESERVATIVES:- Food preservatives are chemical or natural substances added to food to prevent spoilage caused by bacteria, fungi and oxidation thereby increasing its shelf life.

EXAMPLES:-
Chemical preservatives
Natural preservatives
Antioxidants

3) FOOD ADULTERATION:- Food adulteration is an addition of intentional or unintentional addition of inferior, harmful, non-permissible substances to food which reduces its quality, nutritional value and safety.

EXAMPLES
Mixing with
Adding starch or flour in spices
Using lead chromate to color turmeric.

4) FOOD CONTAMINATION:- Food contamination occurs when becomes infected polluted with harmful microorganisms, chemicals or foreign particles making it unsafe for consumption.

Unlike adulteration, contamination can
be accidental.

EXAMPLE:-

Microbial contamination
Chemical contamination.
Physical contamination.

Q 8 (A):-

Five houses in a ___ to E

D B A   A, B, C, D, E

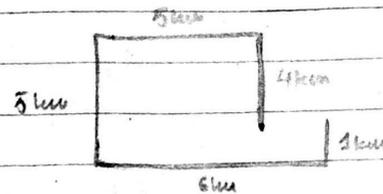Solving the equation:

⇒ D B A E C

Sequence of houses D, B, A ___

∴ A ____ in the middle.

Q 8 B):-

A) Distance $= \sqrt{(north)^2 + (east)^2}$

$= \sqrt{(2)^2 + (1)^2}$

$= \sqrt{5}$

$= 2.24\ km$

B) Direction = Last turn is in the direction of North.

C) After second turn direction = South.

D) Final direction to go back to initial point is South to West.

Q8 c) PICK ODD MAN OUT:

a) SHIRT
b) COAT
c) BLOUSE
d) SKIRT
e) SWEATER

⇒ Shirt is the odd one out being a lower wear.

Q8 d) There are 24 triangles.

Q 6 (a): My brother Ahsan's brother
Only daughter of my brother
Ahsan's niece
Her granddaughter is my niece →
The woman's granddaughter = Ahsan's niece.

The granddaughter is Ahsan's niece then woman must be Ahsan's mother.

Therefore the woman is Ahsan's mother.

Q6 b):

Given:
Ratio of length and breadth = 3:2
Let length be 3x
Let breadth be 2x

Speed = 12 km/hr
Time per round = 8 mins

∴ 12 km/hr = 12,000 m/60 min.
= 200 m/min.

Distance = $200 \times 8 = 1600\,m$

Perimeter = $2(\text{length} + \text{breadth})$

$2(3x + 2x) = 10x$

$10x = 1600 \longrightarrow x$

$\dfrac{1600}{10}$

$= 160$

$\begin{array}{r} 1\,\tfrac{1}{3}\,\tfrac{166}{3} \\ 480 \end{array}$

Length = $3x = 480\,m$ $(3 \times 160 = 480)$

Breadth = $2x = 320\,m$ $(2 \times 160 = 320)$

Area = Length $\times$ Breadth

$= 480 \times 320$

$\boxed{= 153,600\ m^2}$

Q6 c)

Ten digits = x

Then unit digit = $x + 2$

Sum of digit = 144

$10x + (x+2) = 11x + 2$

Sum of digits = $10x + (x+2) = 2x + 2$

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

$(11x + 2)(x + 1) = 72$

$11x^2 + 13x - 70 = 0$

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$\boxed{\text{Answer} = 24}$

Q6 d)

LCM of 2 numbers = 48

Ratio = 2 : 3

Sum of numbers = ?

Let ratio be = $2k$, $3k$

$$\text{LCM}(2k, 3k) = 6k = 48$$

$$\frac{\cancel{48}^{\ 8}}{\cancel{6}}$$

$$k = 8$$

Finding numbers = $2k = 16$, $3k$

$$= 24$$

Sum of numbers = $16 + 24$

$$= 40.$$