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2nd Mock Exam

General Science and Ability

Section I

Question: 4

Q:(a) Enlist the available sources of renewable energy in Pakistan and suggest policy option to utilize these sources to overcome the present energy crisis?

Available Sources of Renewable Energy in Pakistan:

1. **Hydropower:**
Pakistan has significant hydropower potential due to its river systems, particularly the Indus River and its tributaries. Major hydropower plants include:
- Tarbela Dam
- Mangla Dam

2. **Wind Energy:**
The coastal regions of Sindh and Balochistan have high wind speeds

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Dos and Don'ts for General Science & Ability Paper

Hi there, you've done well. Know that acquiring knowledge is one thing and reproducing it in paper acccording to what's asked is another. There are a few things I would like to highlight.

1. A 5 marks part requires 2 sides(not more than that) of a paper. Know that there can be two or three parts of a question and their marks are divided accordingly. So, address all of them in a just manner.
2. Focus on time management. You get 35 minutes to solve one question and about 8 minutes per 5 mark part. Manage your time accordingly.
3. You need to understand that your paper is supposed to look more scientific than theoretical. So, add flowcharts and diagrams where required.
4. Your handwriting and neatness can be really impactful. Avoid cutting and overwriting.
5. Focus on your spellings and your grammar. Here, in GSA there's no deduction in marks but your expression will definitely create an impact.
6. In ability portion, give explanation for analytical ability question in words. You need to understand that a 5 mark part requires all steps written and explained.

Good luck for CSS 2025. You're gonna rock in sha Allah. :)

What is renewable energy?

particularly in the Gharo-Keti Bandar wind corridor, which is estimated to have a potential of around 50,000 MW.

3. Solar Energy:

Pakistan has a high solar isolation rate, with an average of about 5.5 to 6.0 kWh/m²/day. The country has vast arid and semi-arid regions suitable for large-scale solar power project.

4. Biomass Energy:

Biomass resources include agricultural residents, animal waste and industrial organic waste. Pakistan, being an agricultural country, has a significant potential for biomass energy production.

5. Geothermal Energy:

Pakistan has some geothermal potential in areas like the Chagai district in Balochistan and the northern areas, though it remain largely unplored

Policy options to Utilize Renewable Energy Source:

i. **Incentivizing Investment in Renewable Energy:**

- To provide tax breaks, subsidies and low-interest loans for renewable energy projects.
- To establish a clear and consistent policy framework to attract both local and foreign investors.

ii. **Developing Infrastructure and Technology:**

- To invest in modernizing the national grid to accommodate renewable energy sources.
- To promote research and developing in renewable energy technologies, especially in solar and wind.

iii. **Implementing Feed-in Tariffs (FiTs)**

To Establish attractive feed in-tariffs for electricity generated from renewable sources to ensure a steady income for renewable energy productions

iv- Enhancing Public-Private Partnerships (PPP):

- Encourage partnerships between governments and private sector to develop and manage renewable energy projects.
- To facilitate joint ventures with international renewable energy companies to bring in expertise and technology.

Good!

v. Strengthening Regulatory Framework:

- To ensure the National Electric Power Regulatory Authority (NEPRA) and other regulatory bodies streamline and the approval process for renewable energy project.
- To Develop Comprehensive policies for land acquisition and environmental impact assessment specific to renewable energy projects.

By implementing these policy options, Pakistan can effectively harness it renewable energy potential reduce its dependence and address its energy crisis sustainability.

Q:(b) Explain the structure of Sun.

Sun:

The Sun, a G1-type main sequence star (G1V) is composed of several layers with distinct characteristics and functions.

Here is an overview of the Sun's structure from the innermost to the outermost layer.

Structure of Sun:

1. Core:

Temperture: Approximately 15 million degrees Celsius.

Functions: The Core is the site of nuclear fusion, where hydrogen atoms combine to form helium, releasing vast amount of energy in the form of light and heat.

Process: Nuclear fusion reaction convert hydrogen into helium, producing energy through the proton-proton chain reaction.

2. Radiative Zone:

Tempretuse:

The tempretuse range from about 7 million degrees Celsius near the core to 2 million degrees Celsius as the outer edge.

Function:

Energy generated in the core travels outward through the radiative zone by the process of radiative diffusion. photons are absorbed and re-emitted by ions, slowly making their way outward.

Characteristics:

This zone extends from the edge of the core is about 70% of the Sun's radius.

3. Convective Zone:

Tempretuse:

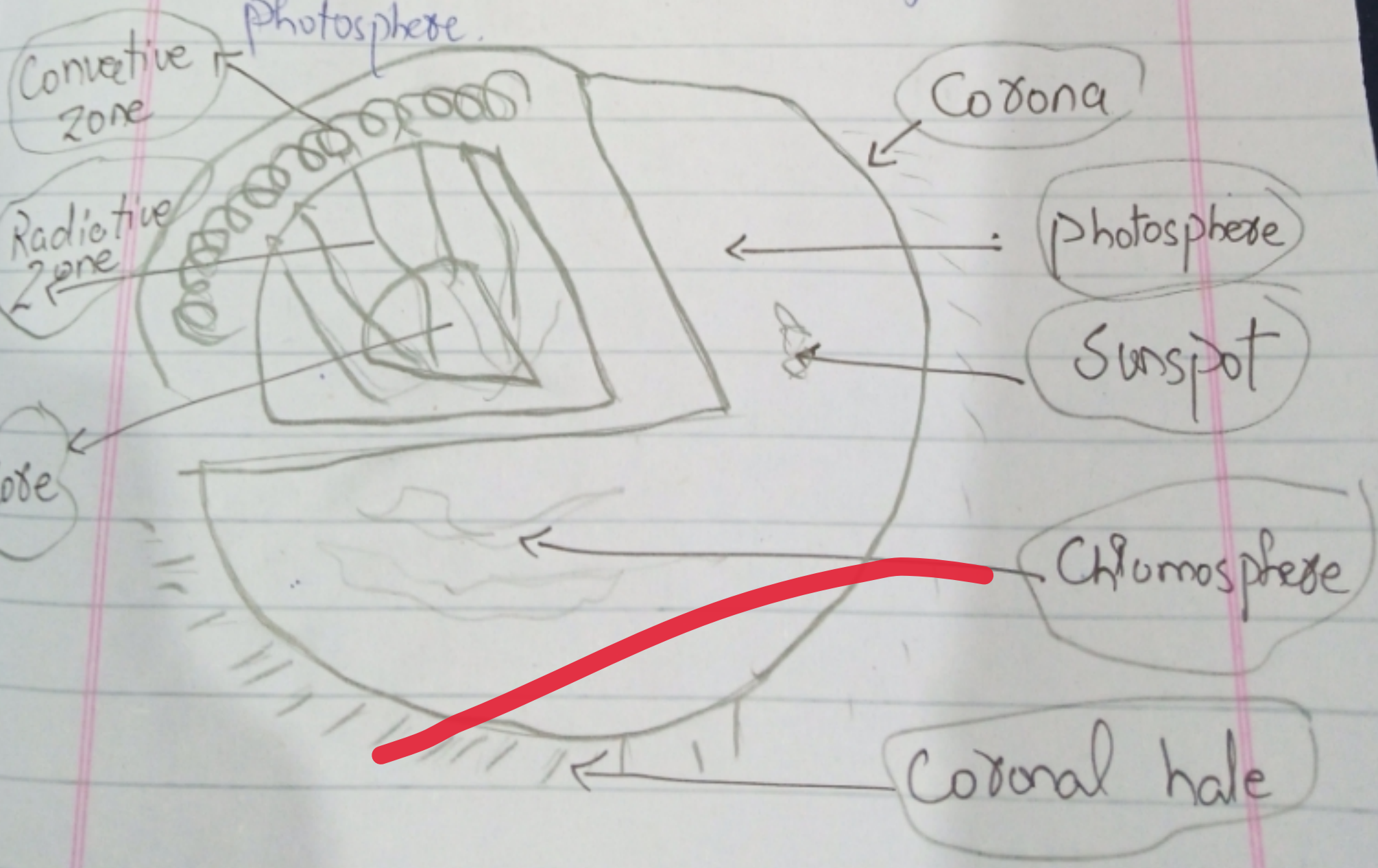
Temperetue drops from about 2 million degrees Celsius at the base to about 5,500 degrees Celsius at the outer edge.

Function of Convective Zone:

In this Zone, energy is transported by convection. Hot plasma rises towards the surface, cools down and sinks back to be reheated.

Characteristics of Convective Zone:

The convective zone extends from the outer edge of the radiative zone to the Sun's visible surface or photosphere.



4- **Photosphere :**

Temperature :

Approximately 5,500 degrees Celsius

Function :

The photosphere is the visible surface of the sun, from which light is emitted.

Characteristics :

It has granular appearance due to the convective cells called granules. Suspots, which are cooler, darker regions can also be observed on the photosphere.

5. **Chromosphere :**

Temperature :

Ranges from about 4,000 to 25,000 degrees Celsius.

Function :

The layer lies above the photosphere and is observed during the solar esclipses as a red rim around the Sun.

Characteristics :

The chromosphere emits light in the H-alpha spectral line, giving it a reddish appearance.

6. **Corona:**

Temperature:

Ranges from 1 to 3 million degrees Celsius.

Function:

The corona is the Sun's outermost layer, extending millions of kilometers into space. It is visible during total solar eclipses as a white halo.

Characteristics:

The corona emits X-rays and ultraviolet light and is the source of the solar wind, a stream of charged particles that affects the entire solar system.

Understanding the structure of the Sun helps in comprehending its behavior, energy production and the various phenomena that affects the entire solar system, including Earth.

Question: 4

Q: (c) What is ceramics materials? Is it possible that ceramics can be recycled?.

Ceramic Materials:

Ceramic materials are non-metallic, inorganic solids that are typically composed of material or non-metal compounds and are formed and then hardened at high temperatures. Ceramics are known for their durability, hardness and heat resistance.

Common examples of Ceramics include

- Pottery
- Bricks
- Tiles
- Electronics and medical devices.

Properties of Ceramics Material:

a. Hardness and Strength:

Ceramics are generally very hard and can withstand significant wear and tear.

b. Heat resistance:
They can endure high temperatures without melting or breaking down.

c. Electrical insulation:
Many ceramics are good electrical insulation.

d. Chemical stability:
Ceramics are often resistance to corrosion and chemical reaction.

e. Brittleness:
While strong, ceramics can be brittle and prone to cracking under sharp impacts.

Recycling of Ceramics:

Recycling ceramics is indeed possible, though it is more challenging compared to other materials like metals and plastics. The recycling process of ceramics typically involves the following steps.

Steps include for Recycling ceramics :

These are following steps include :

1. **Collecting and Sorting :**
This used ceramic products need to be collected and sorted. This can include anything from broken dishes to industrial ceramic waste.

2. **Crushing and Grinding :**
The collected ceramics are then crushed and ground into a fine powder or smaller fragments. The step is crucial to prepare the material for reuse.

3. **Purification :**
Any contaminants or unwanted materials are removed from the ground ceramic to ensure the recycled material's quality.

4. **Reuse :** The processed ceramic material can then be reused in various application.
Example: As Aggregate, new ceramics, Road base.

Challenges and Consideration of Ceramics :

(A) **Quality Control:**
Ensuring the recycled ceramic material meets quality standards for its intended use can be difficult.

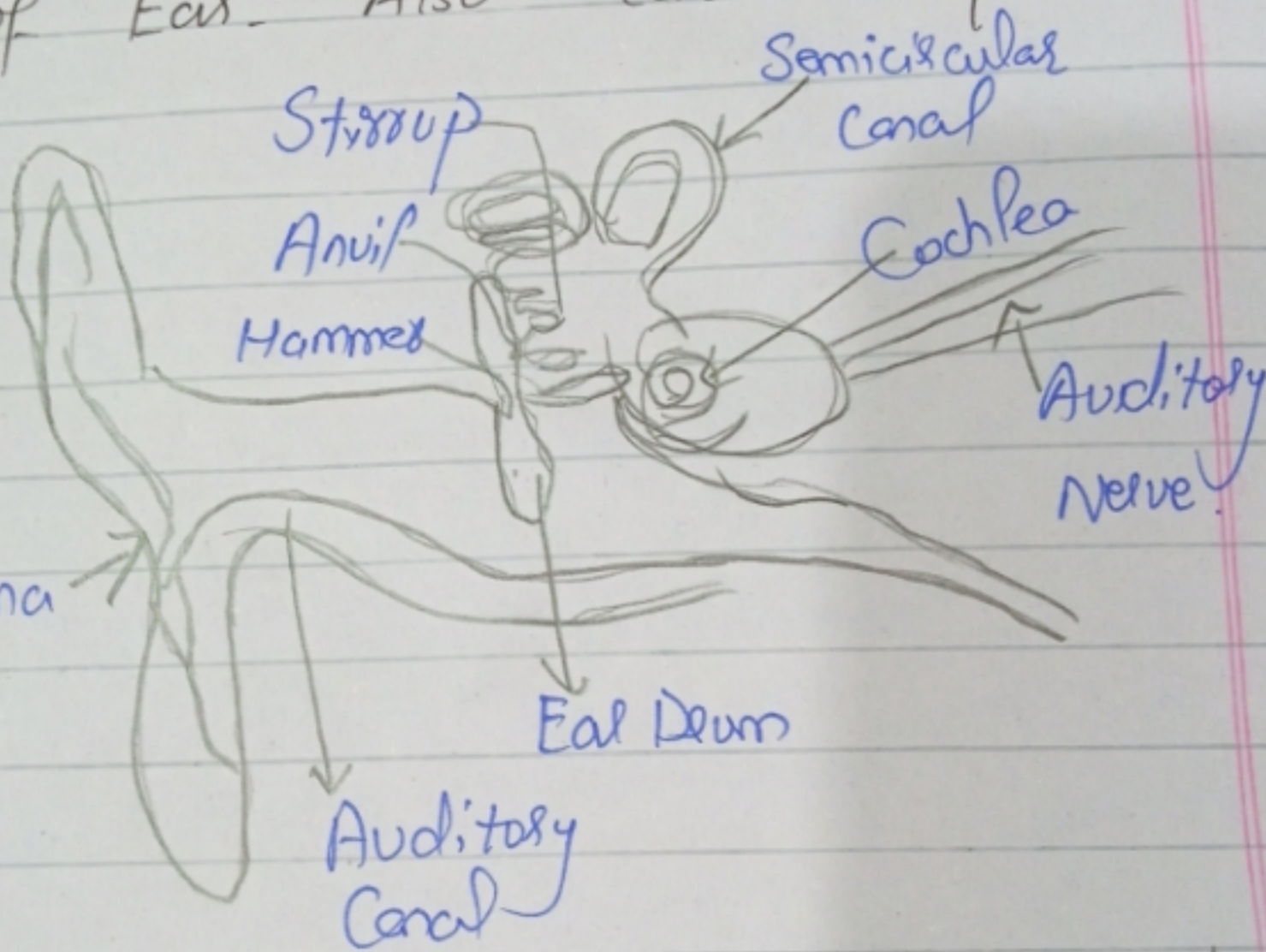
(B) **Cost:**
The recycling process can be more expensive than producing new ceramics, limiting its economic feasibility.

(C) **Separation and Sorting:**
Effective separation of ceramics from other waste materials is necessary to produce high-quality recycled material.

In conclusion, while recycling ceramics is possible and beneficial for reducing waste and conserving resources. It involves several challenges and is not as widely practiced as recycling other materials.

Question: 4

Q: (d) Draw and explain the structure of Ear. Also label its parts.



Structure of Ear:

The Ear is divided into three main parts

1. Outer Ear
2. Middle Ear
3. Inner Ear

1. Outer Ear:

a. Pinna:
The visible part of the ear that is one of the outside of the head. It helps to collect sound waves and directs them into the ear canal.

b. Ear Canal:
A tube that carries sound waves from the pinna to the eardrum. The ear canal also contains glands that produce earwax (cerumen) which protects the ear by trapping dirt and repelling water.

c. Eardrum:
A thin membrane that separates the outer ear from the middle ear. It vibrants when sound waves hit and these vibrations are transmitted to the bones in the middle ear.

2. Middle Ear:

Ossicles:

These are three tiny bones that transmitted Sound vibration from the eardrum to the inner ear.

These bones are;

i- **Malleus:**

Attached to the eardrum

ii- **Incus:**

The middle bone that connects the malleus

iii- **Stapes:**

The Smalles bone in the human body, which connects to the oval window of the inner ear.

iv. **Eustachian Tube:**

A canal that connects the middle ear to the throat. It helps to equalize the pressure between the middle ear and the atmosphere.

3. Inner Ear :

a. Cochlea :

A Spiral-shaped, fluid filled organ that is responsible for converting sound vibration into electrical signals that can be interpreted by the brain. It contains the organ of Corti, which is sensory organ of hearing.

Good!

b. Vestibule :

The central part of the inner ear, which contains the utricle and saccule. These structures helps with balance and spatial orientation.

c. Semicircular Canal :

Three looped tubes that are positioned at right angles to each other. They contain fluid and hair cells that help detect rotational movements of the head.

Question: 5

Q: (a) What is Artificial Intelligence and is it possible for artificial intelligence to outsmart humans?

Artificial Intelligence:

Artificial Intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think and learned. These machines can perform tasks that typically require human intelligence, such as

- Visual perception
- Speech recognition
- Decision - making
- Language translation.

AI systems achieve through various methods, including machine learning, natural language process and neural networks.

Types of AI:

AI is broadly categorized into two types.

1. Narrow AI (weak AI):

This type of AI is designed and trained for a specific task, such as virtual personal assistance. Narrow AI can perform a particular function very well but cannot generalize its knowledge to other tasks.

2. General AI:

This is a theoretical form of AI that possesses the ability to perform any intellectual task that a human can. General AI would have the flexibility and adaptibility of human intelligence across various domains.

Can Artificial Intelligence Outsmart Humans?

The potential for AI outsmart humans can be examined in different context.

1. **Task-Specific Outperformance:**
Narrow AI system already outsmart perform human in specific tasks.
Example: AI can possess vast amount of data and identify patterns much faster than humans.

2. **Complex problem Soluing:**
In areas like medical diagnosis, financial modeling and data analysis. AI System can offer insight and solutions that surpass human capabilities due to their ability to analyze large datasets and recognize intricate patterns that humans might miss.

3. Creative and Adaptive thinking :

AI has made strides in generating creative works (Art and music) and adapting a new information, human creativity and emotional intelligence remains areas where AI still lags. True outsmarting would require AI to surpass humans in these uniquely human traits.

Good!

4. General Intelligence :

General AI remains hypothetical. Creating an AI that matches or exceeds human intelligence across all domains is a profound challenge that involves not just computational power but also an understanding of consciousness, emotions and sense of reasoning.

In conclusion, while AI already outperforms humans in many specific tasks, the notion of AI completely outsmarting human in a general sense is still a matter of theoretical speculation and ongoing research.

Question: 5

Q(b): Define rock formation, rock cycle and different types of rocks.?

Rock Formation:

Rocks are formed through various geological processes. These processes include solidification of molten lava or magma, compression and sementation of sediments and alternation of existing through heat and pressure.

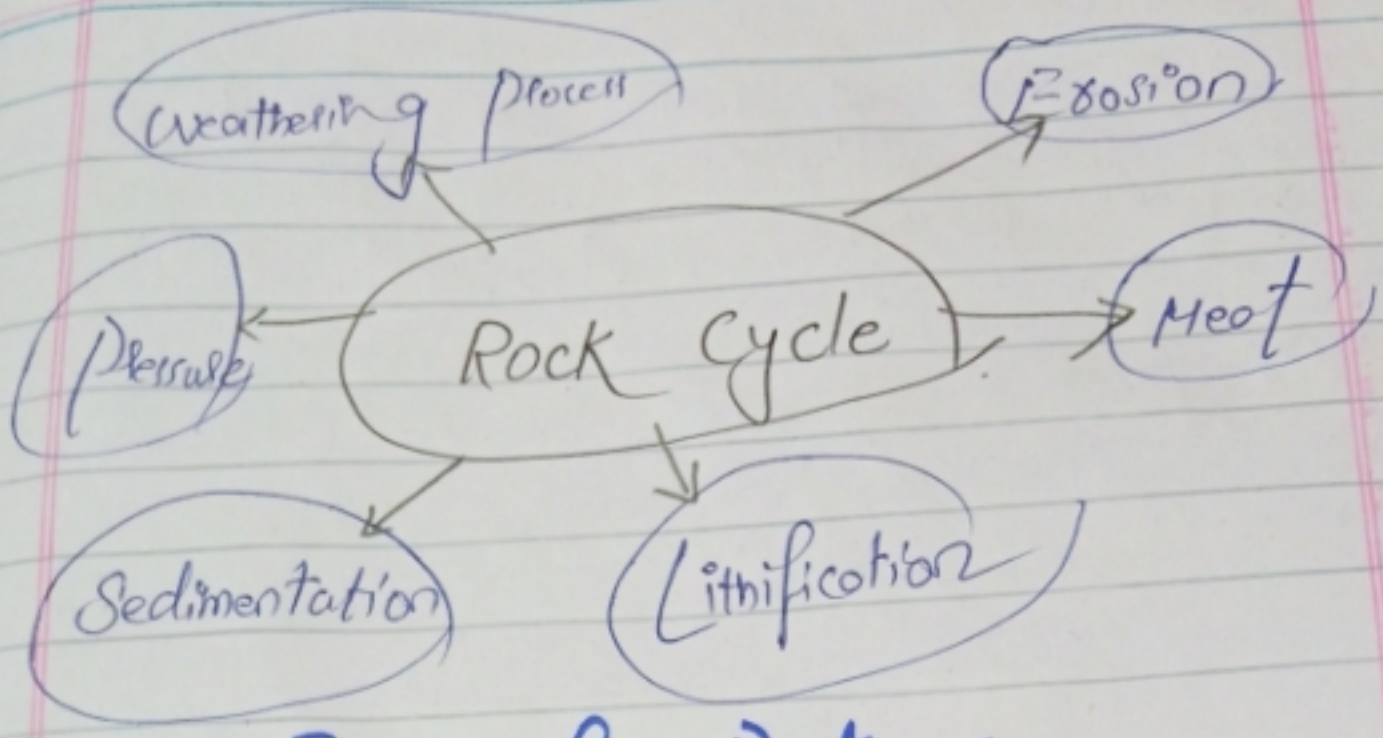
Rock Cycle:

The rock cycle is a continous process through which rocks are transformed from one type to another over geological type/ time scale.

It involves three main processes.

1. Weathering and Erosion
2. Sedimentation and Lithification
3. Heat and Pressure.

Make proper flowchart



Types of Rocks:

There are three main types of Rocks.

(A) **Igneous Rocks:**

Igneous rocks are formed from the cooling and solidification of molten material (magma or lava)

Examples: Granite, Basalt, and obsidian.

(B) **Sedimentary Rocks:**

Sedimentary rocks are formed the accumulation and Lithification of Sediments.

Examples: Sandstone, Limestone, Shale.

(c) Metamorphic Rocks :

This type of rocks are formed from the alteration of existing rocks through heat and pressure.

Examples : Marble, Schist, and gnesis.

Question: 5

Q: (c) Explain Carbohydrates and its types.

Explanation of Carbohydrates:

Carbohydrates are one of the major macronutrients that provide energy to the body. They are organic compounds made up of carbon, hydrogen and oxygen, typically in the ratio of 1:2:1.

Carbohydrates are primary found in foods like grains, fruits, vegetations and dairy products. They play a crucial role in the human diet by being the main source of energy, especially for the brain and muscles during exercise.

Types of Carbohydrates:

1. Monosaccharides:

The simplest form of carbohydrates, consisting of single sugar molecules.

Examples: glucose, fructose and galactose.

2. Dissacharides :
It is formed by the combination of two monosaccharides. Common disaccharides are sucrose, loctose and maltose.

Add structures

3. Oligosaccharides :
It consist of 3-10 linked monosaccharides. They are found in foods such as onions, garlic and bananas, and also play a role in gut health.

4. Polysaccharides :
This long chains of monosaccharides linked together. This includes.

a. Starch :
The storage form of energy in plants founds in foods like potatoes, rice and corn.

b. Glycogen :
The storage form of energy in animals, stored in the liver and muscles.

Add a pie chart

Question: 5

Q:- (d) What are the benefits of Balanced diet?

Benefits of Balanced diet:

1. **Optimal Physical Health:**

- **Energy:**
A balanced diet ensures adequate energy level of performance daily activities and support bodily functions.

- **Growth and Development:**
Essential for the growth and development of children, teenagers and maintaining health in adults.

2. **Diseases Prevention:**

- **Reduced Risk of Chronic Diseases:**
A diet rich in fruit vegetables, whole grains and lean proteins can lower the risk of chronic diseases such as heart, diabetes and cancers.

- **Boost Immune System:**
  Nutrients such as Vitamin C and Vitamin E, Zinc and omega-3, fatty acids, strengthen the immune system.

3. **Mental Well-Being:**
- **Improved Mood:**
  Proper nutrition can help regulate mood and reduce symptoms of depression and anexity.
- **Cognitive Function:**
  A diet that includes antioxidants, vitamins and minerals support cognitive function and reduces the risk of neurodegenerative disease.

4. **Digestive Health:**
- **Regular Bowel Movement:**
  A diet high in fiber promotes regular bowel movements and prevents constipations.
- **Healthy Life** A balanced diet supports a healthy gut microbiome, which is essential for digestion and overall health.

SECTION - II
General Ability

Question: 6 (a)

Solution:

The population increased from 18,000 to 22,500 in a decade 10 years. To find the percentage increase per year.

We use the formula of Compound annual growth rate

$$CAGR = \left(\frac{\text{Final value}}{\text{Initial value}}\right)^{\frac{1}{n}} - 1$$

Initial value = 18,000

Final value = 22,500

Number of years = (n) = 10

Now, putting the values in the formula

$$CAGR = \left(\frac{22500}{18000}\right)^{\frac{1}{10}} - 1$$

$$CAGR = (1.25)^{\frac{1}{10}} - 1$$

$$CAGR = 1.022474 - 1$$

$$CAGR = 0.022474$$

CAGR = 1.022474 - 1

CAGR = 0.022474

To express this as a percentage we multiply by 100

CAGR = 2.25%

Question 6: (b)

Solution:

First, determine the daily production rate per machine

Daily production rate per machine

$$= \frac{600 \text{ units}}{9 \text{ days} \times 20 \text{ machines}}$$

$$= \frac{600}{180}$$

$$= \frac{10 \text{ units}}{3} / \text{machine} / \text{day}.$$

Now, calculate the total production in 12 days with 18 machines:

Total production = 12 days × 18 machines × $\frac{10}{3}$ units

$= 12 \times 18 \times \frac{10}{3}$

$= 12 \times 6 \times 10$

Total production = 720

Question: 6 (d)

Solution:

In each side of Pentagon is 15cm, then the Perimeter P is calculated by

$P = 5 \times$ side length

$P = 5 \times 15$

$P = 75\text{cm}$

So, the Perimeter of Pentagon is 75cm

Question 8: (b)

Solution:

The Sequence given is

1, 2, 6, 21, ____

Let's look for a pattern

$2 = 1 + 1^2$

$6 = 2 + 2^2$

$21 = 2 + 3^2$

Following the same pattern

Next term = $21 + 4^2 = 21 + 16$

$= \boxed{37}$

So, the missing term is $\boxed{37}$

Question 8: (c)

Solution:-

1) From Point A to B (East)
= 10 feet

2) Turned right and walked
3 feet (South)

3) Turned right again and walked
14 feet (west)

So, his final position relative to point A

East direction: 10 - 14 = -4 feet

South direction = 3 feet

Now, Using Pythagoras theorem:

$$\text{Distance} = \sqrt{(-4)^2 + (3)^2}$$

$$= \sqrt{16 + 9}$$

$$= \sqrt{25}$$

$$= 5 \text{ feet}$$

Question: 8 (d)

Solution:

The average temperature of the week = 33°C

Let the Temperature of seven days be

$T_1, T_2, T_3, T_4, T_5, T_6, T_7$

$$\frac{T_1 + T_2 + T_3 + T_4 + T_5 + T_6 + T_7}{7} = 33$$

$$T_1 + T_2 + T_3 + T_4 + T_5 + T_6 + T_7 = 231$$

Average of 1st three days

$$\frac{T_1 + T_2 + T_3}{3} = 30$$

$$T_1 + T_2 + T_3 = 90$$

Average of the Last three days:

$$\frac{T_5 + T_6 + T_7}{3} = 35$$

$$T_5 + T_6 + T_7 = 105$$

Therefore:

$T_4 = 231 - (90 + 105)$

$T_4 = 231 - 195$

$\boxed{T_4 = 36}$

So, the temperature on the fourth day of the week is $\boxed{36^\circ C}$

Question 8: (a)

Solution:

In the language, the word BROTHER is equivalent ODGSNDA. on observing it closely. one may find pattern.

BROTHER ODGSNDA

Reverse order method is used.

Similarly:

SISTER ODGSRUR