

Question 3

(1)

Short note on Carbohydrates:

"Carbohydrates are the organic compounds which composed of oxygen (O₂), hydrogen (H), and carbon (C) atoms. It follows a general formula $C_n(H_2O)_n$."

- primary energy source for living organisms.
- It is found in foods such as "grains, fruits, and vegetables".

Types: Three types

(i) Monosaccharides

- simplest form.
- consists of a single sugar unit.
- structure is based on the number of carbon atoms, they contain

Example:

Glucose, Fructose, Galactose

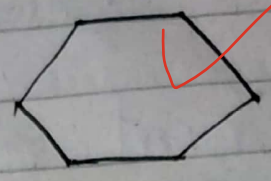
(ii) Disaccharides

- formed by the two of monosaccharides.
- results in the loss of water molecule.
- structure: two monosaccharides are linked by a glycosidic bond.

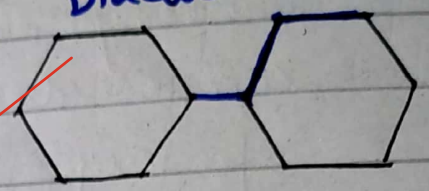
Example: Sucrose.

Polysaccharide
 → complex, long chain of monosaccharides
 → linked by glycosidic bond.
 → structure: linear or branched
 classified based on their function.
Example: starch, Glycogen, cellulose.

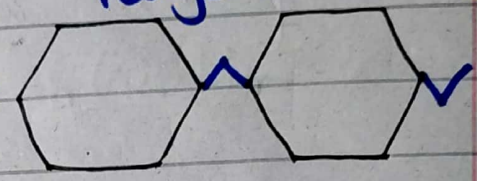
Monosaccharides



Disaccharides



Polysaccharides



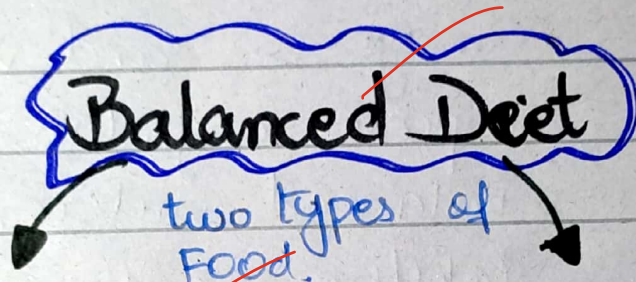
Functions of Carbohydrates?

- (i) sources of energy.
- (ii) plays an important role in the formation of nucleic acid (DNA)
- (iii) synthesis of supporting material e.g., (cell wall in plants)
- (iv) necessary in the formation of lubricants.

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(B) Balanced Diet:

"A diet which contains right amount of carbohydrates, proteins, vitamins, minerals, and water, and defined as a balanced diet"



organic nutrients
⇒ carbohydrates, vitamins, minerals, fats, dietary fibre.

Inorganic nutrients
⇒ H₂O and minerals.

Merits of a Balanced Diet:

(i) Health Benefits

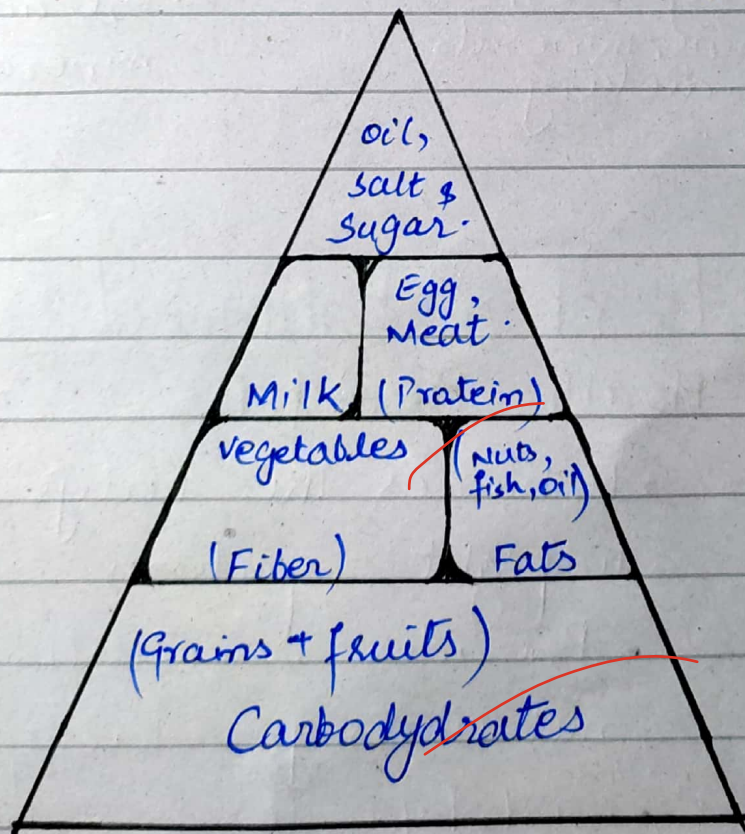
- Enhances the body's ability to fight infections.
- Provides essential nutrients for development.
- Carbohydrates and fats fuel daily activities.

(ii) Disease Prevention:

- Reduces chronic diseases such as obesity, diabetes, and heart diseases.
- Maintains body weight through proper nutrition.

(iii) Mental Well-being:

- Omega-3s and vitamins improve cognitive functions.
- Balanced nutrients stabilize mood and reduce anxiety.



∴ Balanced Diet.

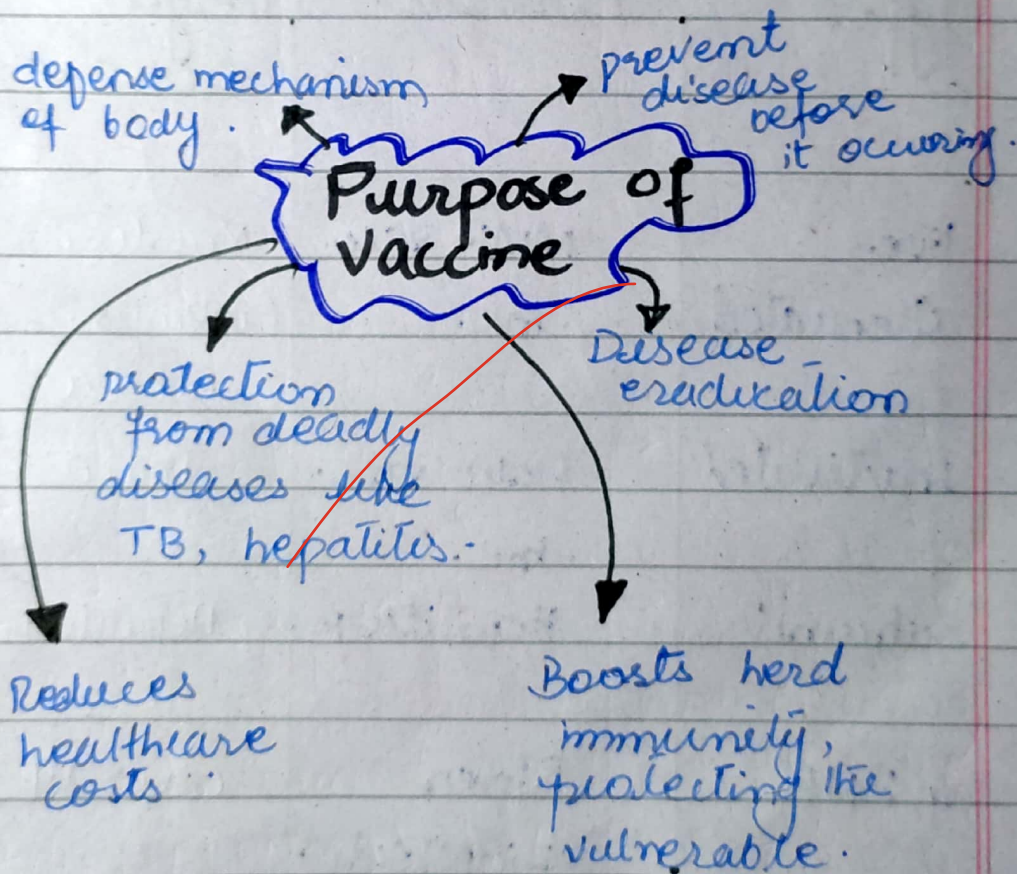
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(A) Short note on

Vaccine:

"Vaccines are biological preparations that provide immunity against specific diseases by stimulating the immune system."

- contains weakened or inactive forms of pathogens



Manufacturing Process:

- (i) Antigen Generation
- (ii) Isolation and purification of unwanted impurities of generated antigen.
- (iii) Stabilization and formulation to enhance the vaccine efficiency
- (iv) Quality control to ensure safety
- (v) Distribution under controlled conditions

Types	Example	Target Disease.
live attenuated	MMR vaccine.	Measles, mumps, subella.
Inactivated	Polio vaccine.	Polio.
Subunit	Hepatitis B.	Hepatitis B.
mRNA.	Pfizer-BIONTECH.	COVID-19.

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(C) Disaster Risk

Management (DRM):

Disaster Risk Management is a systematic process that involves

- Planning
- Organizing
- Effectively managing after effects of a disaster.

Weaknesses in Pakistan's

DRM:

(1) Lack of Institutional coordination:

- Weak collaboration among federal, provincial, and local levels.

- Fragmented roles among National Disaster Management Authority (NDMA), Provincial Disaster Management Authority (PDMA), and District Disaster Management Authorities (DDMA).

(ii) Inadequate Funding:

- Insufficient resources for preventive measures.
- Funds are often released post-disaster, hindering timely action.

(iii) Weak Legal Framework:

- Lack of enforcement of disaster risk reduction (DRR) laws.
- Policy gaps to address modern challenges like climate change.

(iv) Vulnerable Infrastructure:

- Non-compliance with building codes in disaster-prone areas.
- Poorly planned urban expansion increases risks.

(v) Climate Change Challenges:

- Rising frequency of floods, droughts, and heatwaves due to climate change.
- DRM strategies fail to incorporate adaptive measures.

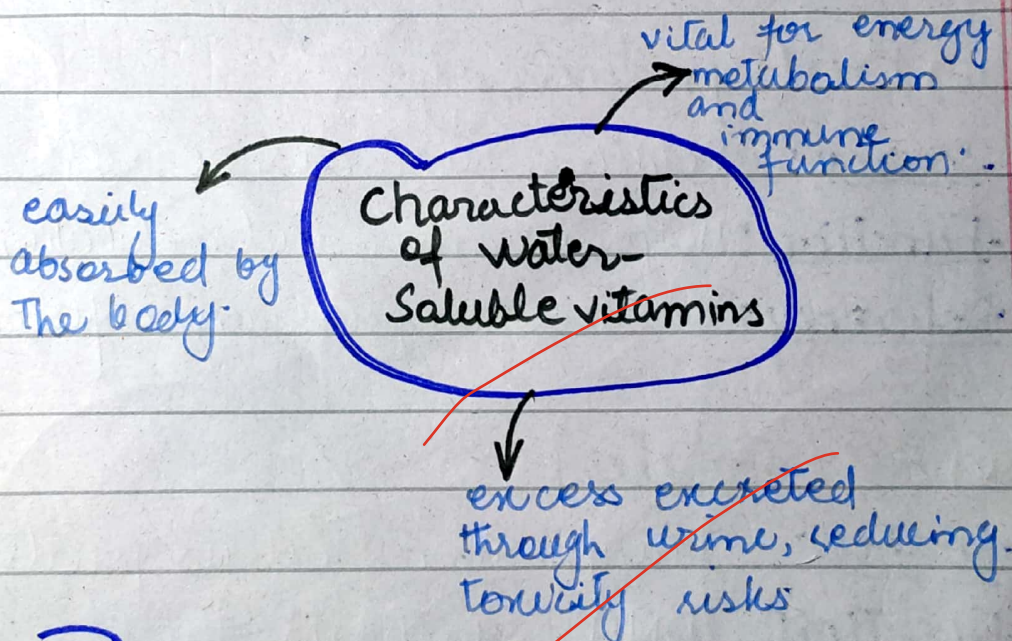
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Question 2

(1) Water-soluble Vitamins:

"Water-soluble vitamins dissolve in water and are not stored in the body, requiring regular replenishment through diet."

- These include The B-complex vitamins and vitamin "C".



B-complex Vitamins:

(1) B1 (Thiamine):

- Source: Whole grains, nuts, seeds.
- Function: Converts food into energy, supports nerve health.
- Deficiency: Leads to Beriberi.

(ii) B2 (Riboflavin):

- Source: Dairy, eggs, green vegetables.
- Function: Promotes skin health,
- Deficiency: Causes sore throat.

(iii) B3 (Niacin):

- Source: Meat, poultry, fish, legumes.
- Function: Support metabolism, DNA.
- Deficiency: Leads to diarrhea, dermatitis.

(iv) B6 (Pyridoxine):

- Source: Potatoes, bananas, cereals.
- Function: Helps in amino acid metabolism.
- Deficiency: Causes depression, confusion.

(v) B9 (Folate):

- Source: Leafy greens, citrus fruits.
- Function: DNA synthesis, fetal.
- Deficiency: Anemia, neural tube defects in pregnancy.

(vi) B12 (Cobalamin):

- Source: Meat, fish, dairy.
- Function: Produces red blood cells.
- Deficiency: Anemia, nerve damage.

Vitamin C (Ascorbic Acid):

- source: Citrus fruits, bell peppers, Tomatoes.
- Function: strengthens immunity, an antioxidant.
- Deficiency: Scurvy.

(B)

Rock, its types, and the Rock cycle:

"Rocks are solid, natural masses of minerals that make up the Earth's crust. They are classified based on their formation processes"

- It has three types:

Types of Rock:

Igneous Rock

→ formed from cooled magma.

Example: Granite, Basalt.

Sedimentary Rock

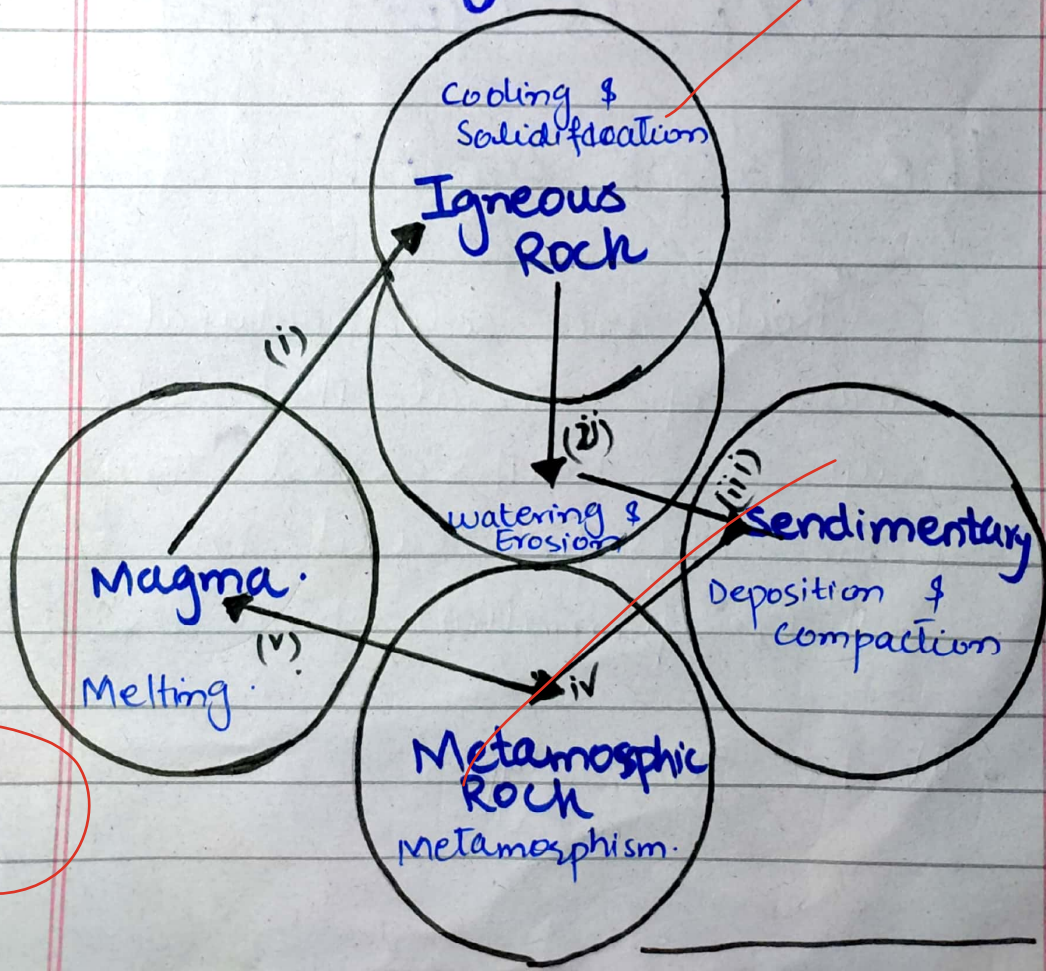
→ formed from compressed layers of sediment.

Metamorphic Rock

→ formed when existing rocks undergo heat and pressure.

Example: Marble and slate.

The Rock cycle:



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(A) Importance of Renewable Energy Resources with respect to Environment:

- (i) Reduction in Greenhouse Gas Emission: Renewable energy sources like wind, solar, and hydropower produce little to no greenhouse gases, helping reduce global warming and mitigate climate change.
- (ii) Reduction in Air and Water Pollution: These resources do not release harmful pollutants into the air or water, improving public health and ecosystem stability.
- (iii) Conservation of Natural Resources: This energy does not deplete finite resources like coal, oil, and natural gas, promoting sustainability.
- (iv) Energy Independence: It supports local renewable resources.

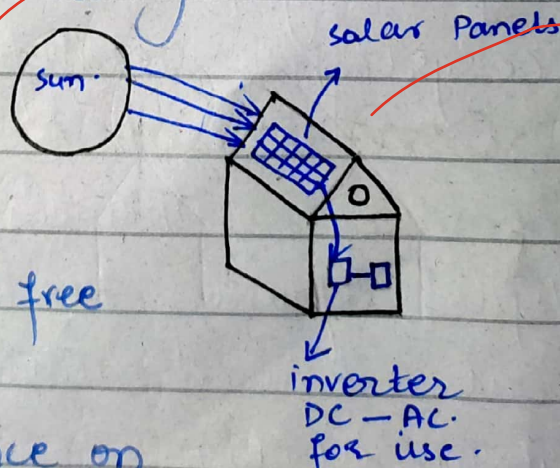
countries can reduce their dependence on foreign energy, improving energy security.

Solar Energy:

The energy is harnessed from the sun using photovoltaic cells or solar thermal systems.

Types:

- (i) Photovoltaic cells: convert sunlight directly into electricity.
- (ii) Solar Thermal Systems: use sunlight to heat a fluid, which can then generate electricity or providing heating.



Benefits:

- Abundant and free resource.
- Reduces reliance on fossil fuels.

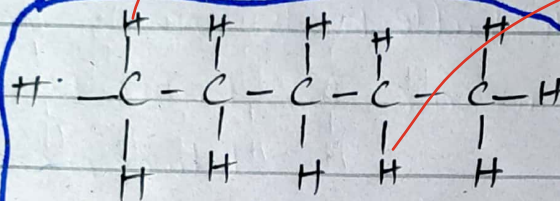
(c) Difference between

Saturated and Unsaturated Fats:

Aspect	Saturated fats	Unsaturated fats
(i) Chemical structure	No double bonds between C-atoms	One or more double bonds between C-atoms
(ii) State at Room Temp.	Solid	Liquid
(iii) Source	Animal fats (e.g., butter, lard), some plants oil	Plants oil (e.g., olive oil, canola oil), fish oil
(iv) Health Effects	Increases cholesterol levels, risk of heart disease	Reduces cholesterol levels, heart-healthy
(v) Example	Butter, cheese, red meat	olive oil, avocado, nuts

Importance of Saturated fats:

- (i) Provide energy and essential fatty acids.
- (ii) Important for cell membrane structure.
- (iii) Excessive intake can lead to health risks like heart disease and high cholesterol.

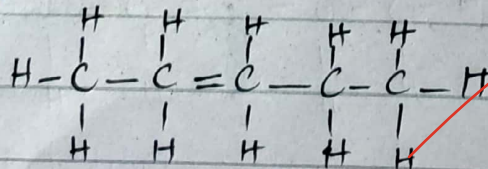


∴ chemical structure of saturated fats

Importance of Unsaturated fats:

- (i) Improve heart health by lowering bad cholesterol levels.
- (ii) Essential for brain function and cell growth.

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∴ chemical structure of unsaturated fats