

Q3.

### (A) Vaccines:

A biological preparation that offers acquired immunity to a specific disease is called vaccine.

#### Characteristics:

- A vaccine comprises of an agent that has resemblance to disease causing microbe.

#### Types of Vaccines:

① Inactivated Vaccine - created by ~~path~~ inactivating pathogen using heat or chemical substance. e.g Measles and Mumps Vaccine (MMV)

② Attenuated Vaccine - Virus passed through series of cell cultures disabling its ability to replicate but will provoke an immune response against future infection. e.g Polio vaccine

③ Toxoid Vaccine - Toxin produced by the ~~bacteria~~ bacterium that cause infection is inactivated e.g Tetanus and Diphtheria Vaccine

④ Conjugate Vaccine - made using combination of 2 vaccines using pieces of coats of bacteria which are chemically linked to a carrier protein e.g Hib Vaccine

⑤ Subunit Vaccine - created by isolating a protein from pathogen to produce an immune response while presenting it as its own antigen.

#### ⑥ Valence Vaccine

6a. Monovalent vaccine - designed to immunize against a single antigen

6b. Polyvalent vaccine - designed to immunize against two or more strains of same or different microorganism

⑦ Heterotypic Vaccine / Heterologous Vaccine - contain pathogens of other animals that either do not cause disease or cause mild disease in the organism being treated.

⑧ mRNA Vaccine - Novel type of vaccine composed of nucleic acid ~~of~~ RNA packaged with a vector e.g lipid nanoparticles.

#### Effectiveness of Vaccine

- ① Vaccines work really well.



② Childhood vaccines cause 90% - 100% immunity

Vaccines are ineffective if they are not manufactured, stored, <sup>or</sup> handled properly.

Side Effects:

- Weakened components may cause mild reactions including soreness, fever but serious reactions are rare.

Vaccines are best means of protection e.g polio vaccine against poliomyelitis and Anthrax vaccine against anthrax.

### ③ Balanced Diet:

A diet which contains all essential nutrients required for the growth, development and proper functioning of the body.

Balanced diet is necessary for meeting the energy requirements of the body along with health and growth of the body.

Components of the Balanced Diet:

- ① Carbohydrates - Main source of energy
- ② Proteins - Essential to growth and repair of muscles and tissues
- ③ Fats and Lipids - Source of energy and essential for fat soluble vitamins (A, D, E, K)
- ④ Vitamins - Water and Fat soluble - role in chemical processes
- ⑤ Minerals - Inorganic elements necessary <sup>and</sup> ~~for~~ critical <sup>for normal</sup> functioning of body
- ⑥ Water - Essential for body being carrier of many nutrients - 60-70% water in body
- ⑦ Dietary Fibre - Fibrous indigestible portion of our diet essential for digestive system health

Sources of Balanced Diet:

Meat, Fresh green vegetables, cereals, yogurt, fruits, oats, oils, beans, ground nuts, fish, dairy products etc.

## Functions of Balanced Diet

- ① Normal functioning of body
- ② Growth and Development
- ③ Meeting energy requirements
- ④ Reproduction

## Conditions in case of an unbalanced diet:

- ① Stunted growth
- ② Diseases: Arthritis, eye diseases, heart diseases
- ③ No energy in the body etc.

## ③ Weaknesses of DRM of Pakistan

National Disaster Management Authority (NDMA) - Pakistan acts as the Disaster

Risk Management Authority in Pakistan. It works alongside District and Provincial Disaster Management authorities.

## Weaknesses in DRM system of Pakistan:

- ① Revolves around flood disasters

Though NDMA was established after 2005 earthquake, yet it designs all of its policies and recommendation strongly around flood disasters of Pakistan. The system is lacking in outlining necessary measures required before managing other disasters and natural hazards. Authority basically lacks in Preparedness.

- ② Primary Focus: Rescue and Relief

The disaster risk management system has its flaws in the first two steps of the disaster management process i.e. Preparedness which involves prevention, protection and mitigation, and Response - the actions / measures to be taken to



protect lives and property of people in the face of disaster. The system has its strategies designed basically and mostly for the relief and recovery from the disaster.

③ Aim: Protecting infrastructure rather than communities

The system has its priorities set for protection and recovery of locations and infrastructure rather than communities. People evacuated ~~are living at~~ lived in wester conditions even in the floods of 2022 with zero availability of basic <sup>facilities</sup> ~~needs~~ and for government and higher authorities aim to protect the roads, locations and infrastructure already built.

④ No long-term, inclusive arrangements to address disaster issues with a long-term vision  
Pakistan, being the 5th most vulnerable country to climate change had already suffered a great loss in the floods of 2022 <sup>and</sup> yet the authorities have failed to devise and implement necessary required measures to address this issue. Being unprepared beforehand had already struck the economy of the country highlighting immediate need to address this issue.

⑤ Under-resourced and untrained

The authority has an untrained staff and are under-resourced which puts the system within the financial constraints to implement the devised strategies to address the issue.

## ⑩ Carbohydrates:

Carbohydrates are macronutrients and the main source of energy consisting of (H), (O), (C) and (N) elements. They provide 3-9 cal of energy 1g.  
Carbohydrates are broken to produce glucose molecules.

### Classification

① Monosaccharides → ~~They are~~ Simple sugars containing a molecule of glucose.

② Disaccharides They can not be hydrolyzed.



② Oligosaccharides - Yield 2 or more same or different monosaccharides on ~~hydrolysis~~ <sup>hydrolysis</sup>.

e.g. Sucrose

③ Polysaccharides - Yield more than 10 same or different types of monosaccharides

e.g. Amylose

Formula:  $C_n(H_2O)_m$

Functions:

1. Chief source of energy - Broken to form ATP
2. Aids in regulation of nerve tissue and a energy source for brain.
3. Gets associated with lipids to form surface antigens and cell receptors.
4. Form structural and protective components of plants and microorganisms - cell walls.
5. In animals, it is an important constituent of connective tissue and participates in cell-to cell communication and activation of growth factors.

Sources:

Cereals, Fruits, honey, milk, potato, sugarcane

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### ① Renewable Energy Resources:

Renewable energy resources comes from a natural source that won't run out. It is completely a natural and self-replenishing.

e.g. Wind power, Hydropower, Solar Energy, Biofuel Energy and Geothermal Energy

Importance with respect to environment

- Renewable energy resources being completely natural is a primary source of energy consumption.
- It will have positive environmental impacts with lesser green house gases emission and low or zero carbon footprint reducing the global warming; a main challenge for the world.



- There will be no danger of getting these sources extinct unlike fossil fuels.

### Solar Energy:

- Sunlight is the planet's most freely available energy, which is used in the production of electricity today through solar panels.
- Solar powered electricity generation make use of photovoltaic cells ~~and~~ <sup>or</sup> heat engine to capture the sunlight and convert it into a form of energy ready to be distributed.

### Solar Technology Types:

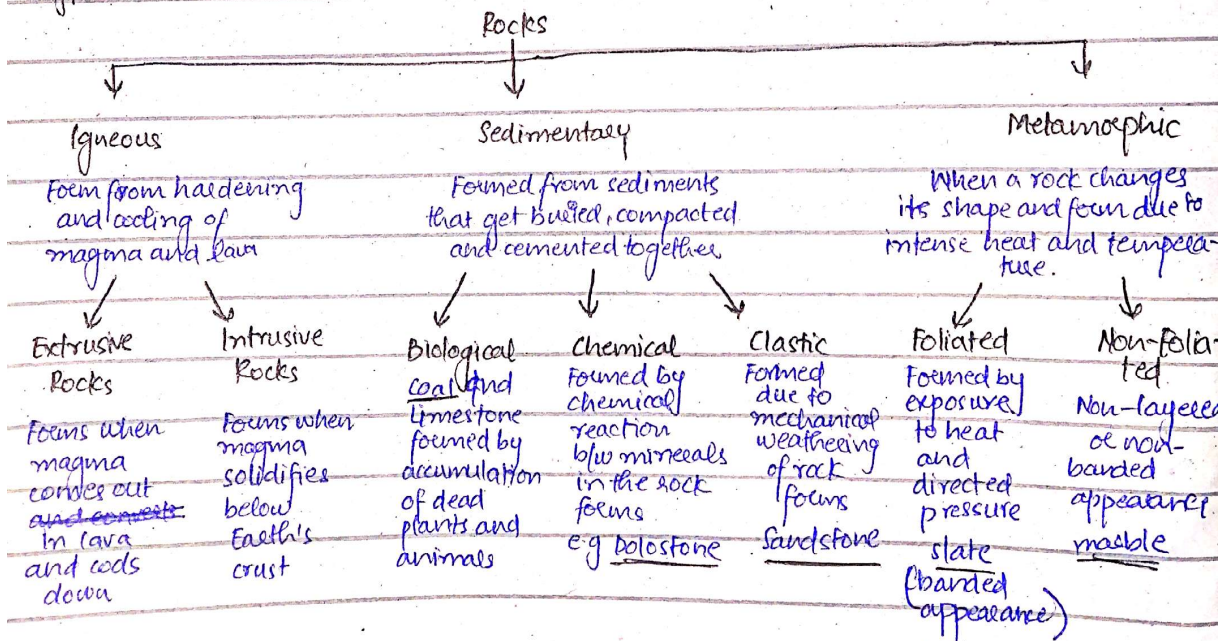
On the basis of capturing, converting and distributing solar energy, following are the main types:

- ① Active - consist of photovoltaic cells and <sup>solar</sup> thermal collectors to harness energy
- ② Passive - involves orienting a building to sun, selecting material with favourable thermal mass or light dispersing properties with spaces that circulate air.

### ⑤ Rocks:

Any coherent, naturally occurring solid material consisting of one or more minerals.

### Types:





Rock Cycle : Entire journey rocks make as they change

- 2 Driving Forces :
- ① Earth's internal Heat
  - ② Hydrological Cycle (movement of ice/water/air on Earth's surface because of sun)

Starting from magma

① Magma can either cool down within the crust forming intrusive igneous rocks

OR

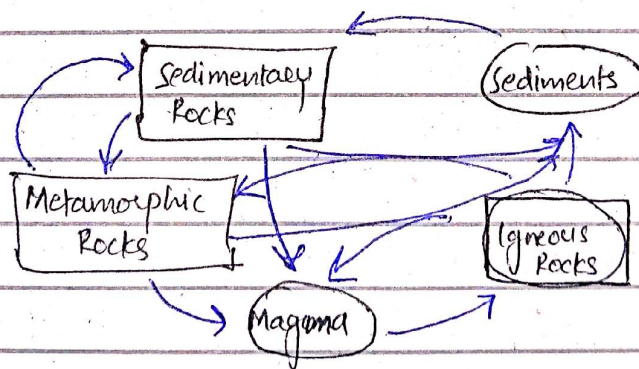
Erupt onto surface and cool down forming extrusive igneous rocks.

② Intrusive rock crystallizes below the Earth's surface. To change its position in rock cycle they have to be exposed by erosion of overlying rocks.

③ Through various plate-tectonic movements all rocks are uplifted and weathered physically or chemically forming sediments buried by more sediments and cemented to form sedimentary rocks.

④ Tectonic plate forces uplift different kinds of rocks to be re-eroded or buried deeper within the crust where they are heated to form metamorphic rocks.

⑤ Rock cycle goes on changing from one to another.



### ① Saturated Fats

- Solid at room temperature
- Solid fat mostly in animal foods  
milk, cheese, red meat, tropical oils, margarine and shortenings

### Unsaturated Fats

- Liquid at room temperature
- Found in avocado, nuts, vegetable oils and sea food.



• Raises cholesterol.

• lowers cholesterol

### Importance of fats:

- Storage compounds for reserve energy
- Component of cell membrane in eukaryotes
- Regulates membrane permeability
- Source of fat-soluble vitamins
- Acts as electrical insulators to nerves fibres
- Maintain body temperature by brown fat.
- Protect vital organs e.g. heart and lungs
- Act as cellular metabolic regulators

### ① Water Soluble Vitamins:

• Vitamins that are dissolved in water and are not stored in the body. They pass out through the body with urine. ~~at~~ Their intake should be increased when body is deficient.

Consist of Vit C - Ascorbic Acid and Vit B.

Vit B: Composed of 8 vitamins grouped together in vit B complex

B1 (Thiamine), B2 (Riboflavin), B3 (Niacin), B5 (Pantoic Acid), B6, B7, B9 (Folic Acid), B12 (Cobalamin)

Functions: Carbohydrate metabolism, Cellular respiration, ~~the~~ redox reaction in cellular respiration, Energy metabolism, Amino acid metabolism, Fat synthesis and cofactor, Nucleic acid metabolism, DNA production respectively

Vit C - Collagen formation in connective tissue and antioxidant.

Sources: Meat, milk, legumes, cereals, vegetables, eggs, dairy products, green vegetables etc.