Aqsa Iqbal

GSA Test 1

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Q# 3 (A) Write a short note on Vaccines.

A vaccine is defined as any substance which is used to stimulate the production of antibodies and in turn provide immunity against few diseases. Usually vaccine contain a weakened or killed form of the disease - causing agent, its surface proteins or toxins. When this preparation is introduced into the human body, the immune system recognizes the the threat and destroy it. Morever, if body comes into the contact with the disease again, it can initiate an appropriate response.

The process of administering the vaccine is called vaccination or immunisation. It is responsible for the eradication of many diseases - especially infectious diseases such as small pox and chicken pox. Edward Jenner poineered the first vaccine using cowpox virus, introducing the concept of vaccination.

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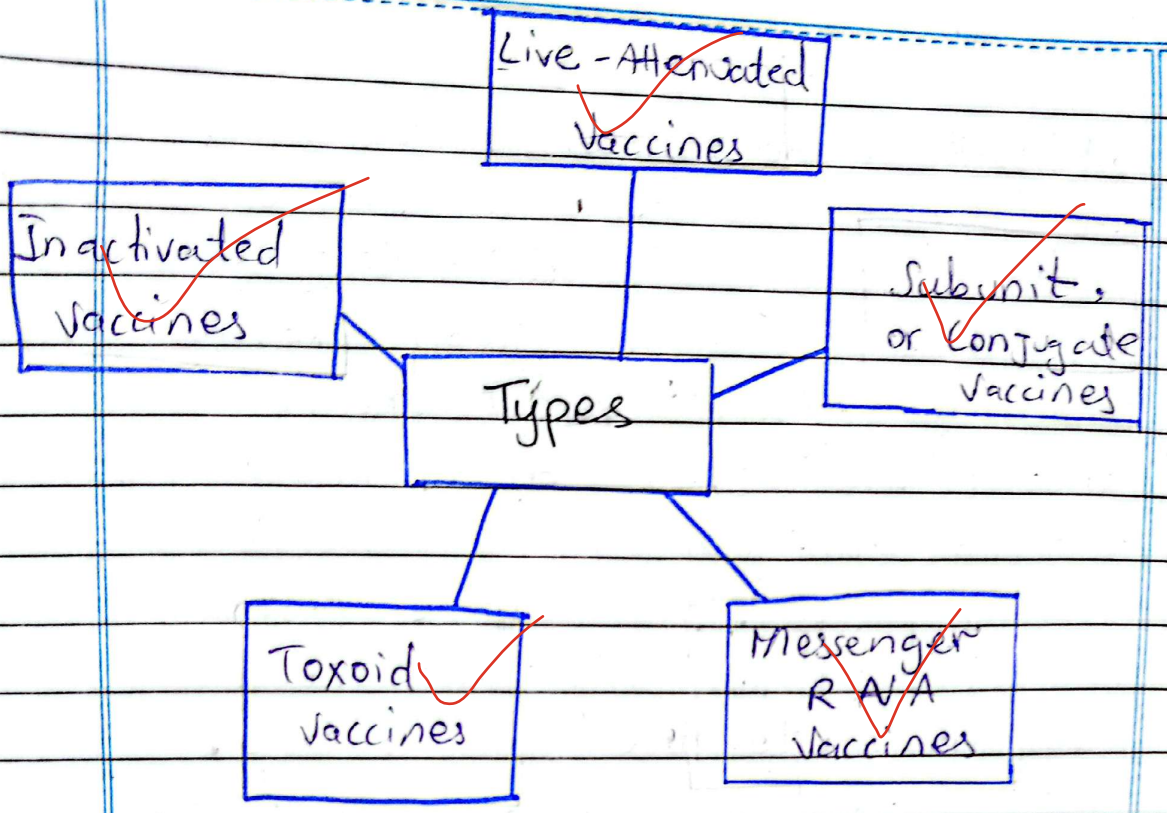

- Live-Attenuated Vaccines: These vaccines contain weakened versions of viruses or, less commonly, bacteria. They can produce a strong immune response which can mean both long term immunity and a higher chance of side effects. They may not be safe for people with impaired immune systems. Examples include polio (oral), small pox vaccines etc.

- Inactivated Vaccines: This contain killed pathogens. Manufacturers grow a large population of ~~those~~ germs and treat them with heat or chemicals to

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inactive them before putting them into vaccines. They cause fewer or less intense side effects but may require booster shots. Examples include: polio (injected), hepatitis A, rabies vaccine etc.

- Subunit Vaccines: In this type of vaccines, manufacturers use a part of the pathogen. These vaccines are safer for people with weakened immune systems. Examples include: Hepatitis B, HPV vaccines.

- Messenger RNA Vaccines: This type of vaccine provide genetic instructions for cells to produce an immune response. Messenger RNA is a molecule that tells the bodies to make proteins. COVID-19 vaccines like Pfizer and Moderna are the examples of mRNA vaccines.

- Toxoid Vaccines: These type vaccines contain a small amount of toxoid. It helps a person's immune system learn to fight the bacterium. Tetanus and diphtheria vaccines are the examples of toxoid vaccines.

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(B) What is balanced diet? Explain its merits.

Balanced Diet:

Balanced diet is a diet consisting of a variety of different types of food and provide adequate amounts of the nutrients necessary for good health. It includes eating a wide variety of foods in the right proportions.

A well-balanced diet provides all the nutrients one need for growth and repair. It helps to stay strong and healthy and effectively prevent diet-related illness.

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Deficiencies in some key nutrients such as vitamin A, B, C and E, and zinc, iodine and iron-weaken parts of our immune system. Therefore, a balanced diet containing all essential nutrients - carbohydrates, proteins, fats, vitamins, minerals, fiber and water-maintain health and ensures that body functions optimally and meets energy requirements.

Components of a Balanced Diet:

- Carbohydrates: Carbohydrates is a primary source of energy. It can be obtained from fruits and grains.
- Proteins: Proteins are essential for growth, repair and immunity. They are present in meat.
- Fats: Fats are also a source of energy. They can be obtained from nuts and oils.
- Vitamins and Minerals: Vitamins and minerals regulate body functions. For example vitamin C

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improves immunity and calcium protect the density of bones.

- Fiber:

Fiber improves digestion and can be found in whole grains and vegetables.

- Water:

Water is essential for hydration and metabolic proceses.

Merits of a Balanced Diet:

1- A well-balanced diet reduces the risk of chronic illneses like cardiovascular diseases, Type II diabetes and obesity.

2- A balanced diet strengthens immune system as it provides essential nutsients to combat infections.

3- It improves energy levels and helps in maintaining a healthy lifestyle.

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4- A balanced diet also helps in improving cognitive function. Nutrients like Omega-3 enhance brain health.

5- It may also help in reducing healthcare costs and it prevents life-style related diseases.

6- A diet rich in calcium keeps teeth and bone strong and help to slow bone loss associated with getting older.

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Conclusion:

A balanced diet supplies the nutrients our bodies need to work effectively. Without balanced nutrition, body becomes prone to diseases, infections, fatigue and lead to low performance. Therefore, a varied and healthy diet is necessary to stay healthy and keep our bodies from infections and diseases.

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(D) Write a short note on carbohydrates.

Carbohydrates:

Carbohydrates are macronutrients and is one of the ways by which human body obtain its energy. They contain **carbon, hydrogen** and **oxygen** at their chemical level.

They are essential nutrients which include sugars, fibers and starches. They are found in grains, vegetables, fruits and in milk and other dairy products.

The food containing carbohydrates are converted into glucose or blood sugar during the process of digestion by the **digestive system**. Human bodies, then, utilize this sugar as a source of energy for the cells, organs and tissues. The extra amount of energy or sugar is stored in liver and muscles for further requirement.

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The main function of carbohydrates is to provide energy and food to the body and to the nervous system. It is also involved in fat metabolism and prevent ketosis.

Classification of Carbohydrates

- **Simple Carbohydrates**

Simple carbohydrates have one or two sugar molecules, they digest and convert quickly resulting in a rise in the blood sugar levels. They are abundantly found in milk products, fruits, candies etc.

- **Complex Carbohydrates**

Complex carbohydrates have two or more sugar molecules, hence they are referred to as starchy foods. In complex carbohydrates, molecules are digested and converted slowly compared to

simple carbohydrates. They are found in lentils, beans, peanuts, potatoes, corn etc.

b

Q# 2

(A) Give importance of Renewable energy sources and explain solar energy.

Importance of Renewable Energy Sources:

Renewable energy sources produce significantly lower emissions throughout their entire lifecycle compared to fossil fuels. They do not emit greenhouse gases in energy generation processes. It makes them the cleanest and most viable solution to prevent environmental degradation.

There are different types of renewable energies including wind, solar, hydroelectric and biogas energy.

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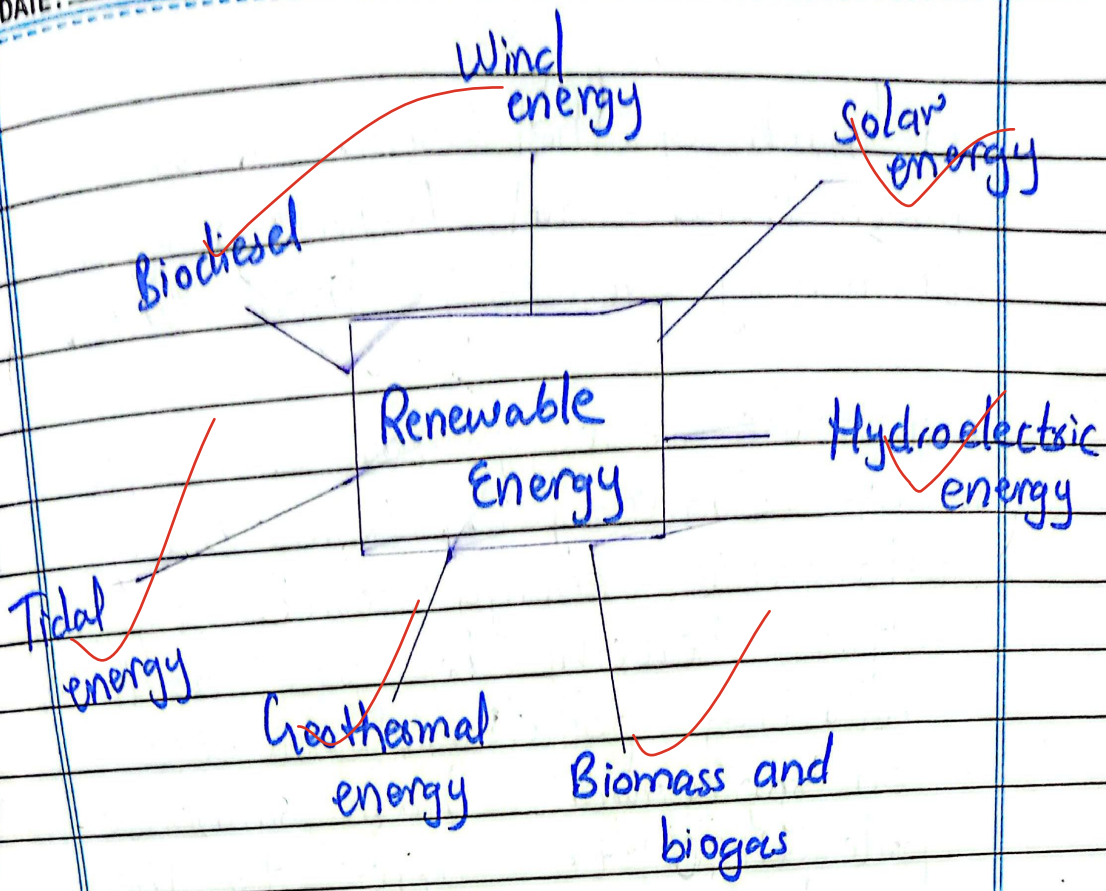

Renewable energy sources are **inexhaustible**, that makes them extremely environment friendly. Compared to conventional energy sources such as coal, gas, oil reserves clean energies are sustainable and they allow development without risking the future of next generations.

Renewable are increasingly competitive. Wind and photovoltaic are cheaper than conventional energies

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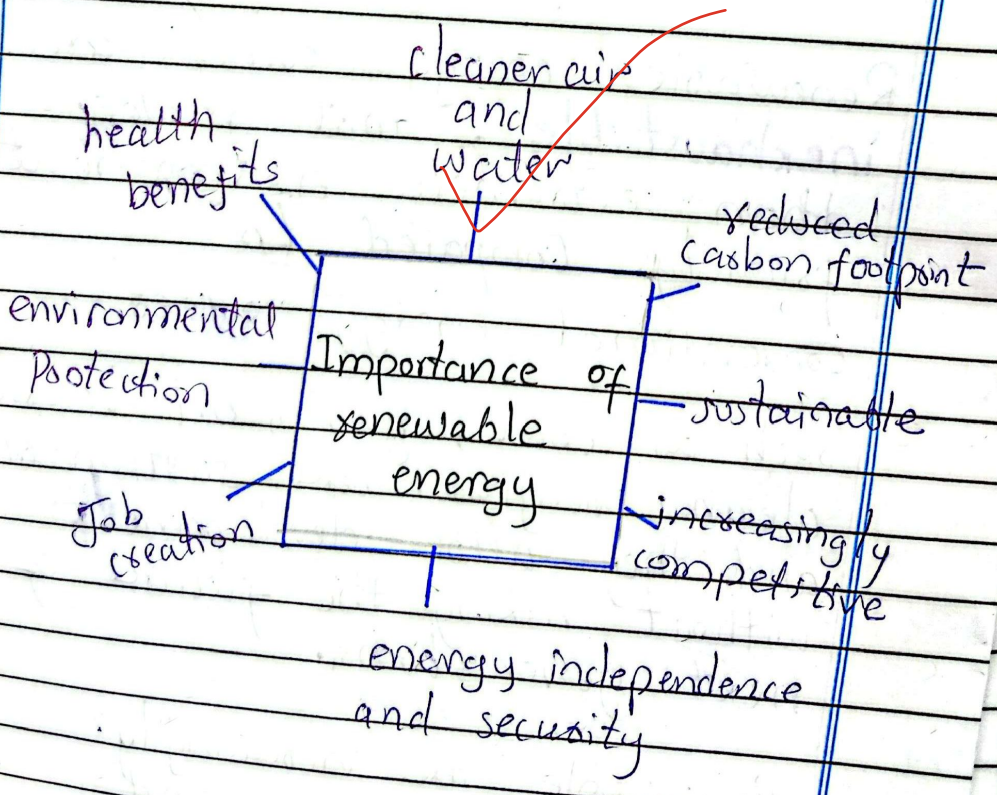
in much of the world. Solar photovoltaic are technologies are drastically reducing their costs.

Renewable energy sources offer many advantages. From being sustainable energy source to offer health benefits and reducing pollution, renewable energy sources have immense potential to offer to the world.



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- **Cleaner Air and Water:**
  Renewable energy sources do not produce air pollutants or greenhouse gases. That results in cleaner air. Similarly, they do not produce toxic waste or require large amounts of water for cooling. Therefore, keeping air and water sources clean.

- **Sustainable and endless:**
  Renewable energy sources are naturally replenished. Unlike coal, gas or other finite resources, renewables are infinite. They ensure a sustainable supply of energy for future generations.

- **Competitive source of energy:**
  The cost of solar panels and wind turbines is steadily declining. Their prices are less volatile than fossil fuels as they are not subject to market fluctuations and geopolitical tensions.

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- **Energy Independence:**
  By using renewables, the dependence on imported fuels can be reduced significantly. 2.5

- **Economic Growth and Job Creation:**
  The renewable energy sector creates jobs in manufacturing, installation, maintenance and research. This boosts economy and helps in job creation for local community.

- **Health Benefits:**
  Reduced air pollution would result in mitigation of asthma and other respiratory disease cases. According to **World Health Organization** more than **13 million** people die from preventable environmental causes such as air pollution, each year. Therefore, transitioning to clean energy can mitigate these health risks.

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- **Igneous Rocks:**

Igneous rocks are those that solidify from magma. Since their constituent minerals are crystallized from molten material, they are formed at high temperatures. They originate from deep within the earth about 50 to 200 kilometres. They are subdivided into two categories **intrusive** (inside earth's surface) and **extrusive** rocks.

- **Sedimentary Rocks:**

Sedimentary rocks are those that are deposited and compacted and cemented together at the Earth's surface, with the assistance of running water, wind, ice or living organisms. They often have layered structures and contain fossils.

- **Metamorphic Rocks:**

Metamorphic rocks are those rocks which are formed by changes in pre existing rocks under the influence of high temperature, pressure and chemically active solutions. They are harder and more compact than original rocks and can exhibit shiny surfaces due to recrystallization.

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3- Rock cycle

The rock cycle is a continous process through which rocks transform from one type to another due to geological proceses such as weathering, erosion, heat and pressure. It's stages include:

1- Igneous Rock Formation: Magma cools and solidifies to form igneous rocks.

2- Weathering and erosion: Igneous rocks are broken into sediments by weathering and erosion.

3- Sedimentary Rock Formation: Sediments are ~~igneous rocks~~ deposited, compacted and cemented into sedimentary rocks.

4- Metamorphic Rock Formation: Sedimentary or igneous rocks undergo heat and pressure to become metamorphic rocks.

5- Melting: Metamorphic rocks melt into magma, completing the cycle.

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(C) Differentiate between the saturated and unsaturated fats.

1. Saturated Fatty Acids: Saturated fatty acids refers to a type of fatty acid that has no linkages of unsaturated between carbon atoms. They cannot absorb more hydrogen due to lack of double bonds. They commonly exist in the fats of animals.

Unsaturated Fatty Acids: They refer to acids that are characterized by one or more double bonds. These acids are able to absorb additional hydrogen atoms. The American Heart Association (AHA) recommends that between 20% and 35% of daily total calories should consist of fat. Most of intake should be from unsaturated fat.

2- Difference between Saturated and Unsaturated Fats:

1- Saturated fats contain a single bond while unsaturated fats contains at least one double bond.

2- Saturated fats increases low density lipoproteins (LDL) while unsaturated

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fats increase high density lipoprotein (HDL).

3- Saturated fats have high melting point while unsaturated fats have low melting point.

4- Saturated fats have solid state in room temperature while unsaturated fats take liquid state in room temperature.

5- Saturated fats are soluble in vitamins while unsaturated fats are insoluble in vitamins.

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3- Importance:

Dietary fats are important for several health related aspects and for optimal functioning of the human body. They are not just the source of energy but function as structural building blocks of the body. Fat is also a carriers for the fat-soluble vitamins A, D, E and K and support their absorption in the intestine.

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(D) Water Soluble Vitamins

Water soluble vitamins are a group of essential nutrients that dissolve in water and are readily absorbed by the body. They are not stored in significant amounts and need to be consumed regularly through the diet.

They are easily absorbed in the small intestine. Due to limited storage, they must be consumed regularly as excess is excreted in urine.

They are important for metabolic processes, red blood cell production and overall health.

Deficiencies can lead to specific diseases, emphasizing the importance of a balanced diet. Vitamin B-complex group and vitamin C is the major water soluble vitamins.

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(B) What are rocks? Give its types and describe the rock cycle.

1- Rocks:

A rock is a naturally formed, non-living earth material. Rocks are made of collections of mineral grains that are held together in a firm, solid mass.

Rocks are identified primarily by the minerals they contain and by their texture. Each type of rock has a distinctive set of minerals. A rock may be made of grains of all one mineral type such as quartzite. Commonly, rocks are made of a mixture of different minerals. A rock may be made of grains of each mineral type.

Rocks are classified into three major types based on their origin.

2-

Types of Rocks

- Igneous Rocks
- Sedimentary Rocks
- Metamorphic Rocks