SUSTAINABLE DEVELOPMENT (2.5 MARKS)

Sustainability is development that satisfies the needs of the present without compromising the capacity of future generations, guaranteeing the balance between economic growth, care for the environment and social well-being.

- **Solar Energy:** The greatest advantages of solar energy are that it is completely free and is available in limitless supply. Both of these factors provide a huge benefit to consumers and help reduce pollution. Replacing non-renewable energy with this type of energy is both environmentally and financially effective.
- **Wind Energy:** Wind energy is another readily available energy source. Harnessing the power of wind energy necessitates the use of windmills; however, due to construction cost and finding a suitable location, this kind of energy is meant to service more than just the individual. Wind energy can supplement or even replace the cost of grid power, and therefore may be a good investment and remains a great example of sustainable development.
- **Crop Rotation:** Crop rotation is defined as "the successive planting of different crops on the same land to improve soil fertility and help control insects and diseases." This farming practice is beneficial in several ways, most notably because it is chemical-free. Crop rotation has been proven to maximize the growth potential of land, while also preventing disease and insects in the soil. Not only can this form of development benefit commercial farmers, but it can also aid those who garden at home.

GLOBAL WARMING

Global warming is the mainly human-caused rise of the average temperature of the Earth's climate system and has been demonstrated by direct temperature measurements and by measurements of various effects of the warming.[5] It is a major aspect of **climate change** which, in addition to rising global surface temperatures,[6] also includes its effects, such as changes in precipitation.[7] While there have been prehistoric periods of global warming,[8] observed changes since the mid-20th century have been unprecedented in rate and scale

The **greenhouse effect** is the process by which radiation from a planet's atmosphere warms the planet's surface to a temperature above what it would be without this atmosphere

Human activity since the Industrial Revolution, mainly extracting and burning fossil fuels,[67] has increased the amount of greenhouse gases in the atmosphere. This CO_2, methane, tropospheric ozone, CFCs, and nitrous oxide has increased radioactive forcing. As of 2011, the concentrations of CO_2 and methane had increased by about 40% and 150%, respectively, since pre-industrial times.[68] In 2013, CO_2 readings taken at the world's primary benchmark site in Mauna Loa surpassing 400 ppm for the first time.[69] These levels are much higher than at any time during the last 800,000 years, the period for which reliable data have been collected from ice cores.[70] Less direct geological evidence indicates that CO_2 values have not been this high for millions of years.[71]

Global anthropogenic greenhouse gas emissions in 2018 excluding land use change were equivalent to 52 billion tonnes of carbon dioxide. Of these emissions, 72% was carbon dioxide from fossil fuel burning and industry, 19%

was from methane, 6% was from nitrous oxide, and 3% was from fluorinated gases.[72] A further 4 billion tonnes of CO 2 was released as a consequence of land use change, which is primarily due to deforestation.[73] Current patterns of land use affect global warming in a variety of ways. While some aspects cause significant GHG emissions, processes such carbon fixation in the soil and photosynthesis act as a significant carbon sink for CO2, more than offsetting these GHG sources. The net result is an estimated removal (sink) of about 6 billion tonnes annually, or about 15% of total CO 2 emissions.[74] Using life-cycle assessment to estimate emissions relating to final consumption, the dominant sources of 2010 emissions were: food (26–30% of emissions);[75] washing, heating, and lighting (26%); personal transport and freight (20%); and building construction (15%).[76] Agriculture emissions were dominated by livestock.[77]

The long-term effects of global warming include further ice melt, ocean warming, sea level rise, and ocean acidification

The ocean has heated more slowly than the land, but plants and animals in the ocean have migrated towards the colder poles as fast as or faster than species on land.[174] Just as on land, heat waves in the ocean occur more due to climate change, with harmful effects found on a wide range of organisms such as corals, kelp, and seabirds.[175] Ocean acidification threatens damage to coral reefs, fisheries, protected species, and other natural resources of value to society.[176] Higher oceanic CO_2 may affect the brain and central nervous system of certain fish species, which reduces their ability to hear, smell, and evade predators.[177]

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