

Question NO 1

(A) Explain the enhanced GHE in context of Global warming?

The enhanced 'Greenhouse Effect' refers to the increase in the earth's natural heat-trapping process due to human activities. Natural greenhouse gases CO_2 , CH_4 , N_2O and water vapour keep the planet warm enough for life. However, due to rapid industrialization the amount of these gases in the atmosphere increase and cause serious threat to humans, ^{plants} and animals / biodiversity. Deforestation, burning of fossil fuels, rapid urbanization and increase in population has risen these harmful gases to unprecedented levels. According to IPCC Sixth Assessment Report (2023) human activities have increased CO_2 280 ppm (pre-industrial) to over 420 ppm resulting intensified heat-trapping. This strengthened GHE is the main driver of Global warming.

Factors responsible For Enhanced GHE in context of Global warming

1- Human-induced emissions:

After industrialisation human activities (industries, fossil fuels, Deforestation, transportation and vehicles have increased the emission of greenhouse gases CO_2 , CH_4 , N_2O beyond

natural limits. The UNFCCC explains global temperature raised approximately 1.1°C since 1880. Methane is 28 times while nitrous oxide 265 times trapping more heat than CO₂, which cause melting of glaciers, increase sea level and intense heatwaves and floods.

2. Deforestation

As plants are natural carbon sinks absorb CO₂ from atmosphere. But due to rapid urbanization withering of forests on large scale limit these natural sinks of CO₂ and increase in atmospheric temperature. According to the Forest Declaration Assessment (2024) in 2023, about 6.37 million hectares of forests were deforested globally. That 2023 deforestation caused around 3.8 billion tonnes of CO₂-equivalent emissions. According to UNFCCC forests globally store an enormous amount of carbon over 638 Gt of carbon in their biomass.

Factors showing Enhance GHE.

1. Melting glaciers:-

Due to increase in earth atmospheric temperature, cause melting of glaciers in Himalaya region. Melting increase the risk of glacial lake outburst floods (GLOFs) which are dangerous for downstream communities. According to 2025 study, from

2000 - 2023 the world's glaciers lost about 6.54 trillion tonnes of ice. A major study reported in Dawn ~~news~~ said, According to Pakistani government there 13032 glaciers in Pakistan's mountain regions. Rising temperature has formed 3044 glaciers lakes in Pakistan's high mountain regions. out of these 33, are volatile and pose a serious risk of GLOFs). The Hindu Kush-Himalaya region may lose up to 80% of its ice. According to Al-Jazeera glaciers in Pakistan are retreating at 10-30 meters per years depending on the range: Himalayas (10-30m), KHK (5-10m), Karakoram (2-3m) per year.

2- Heat waves and extreme weathers

Heatwaves are becoming more frequent due to excessive heat-trapping. In 2024 the WMO reported "unprecedented extreme weather events" globally displaced over 80,000 people. WMO underscored that July 2025 was the third warmest July ever recorded, behind those in 2023 and 24. In this record breaking July heatwaves especially impacted Sudan and Finland experienced usually long spells of temperatures above 30°C .

3- Sea Level Rise

According to IPCC / UN backed data global mean sea level rose at about 3.2 mm / years in recent decades (1993-2010). Along Karachi's coast, sea level rise upto 10cm over the past century (Dawn).

4- Food insecurity

According to FAO as of 2021, 2.3 bn people globally faced moderate or severe food insecurity. In Pakistan the IRC warns 8.6 mn people could face worsened food insecurity due to extreme heat.

5- Disasters (Floods)

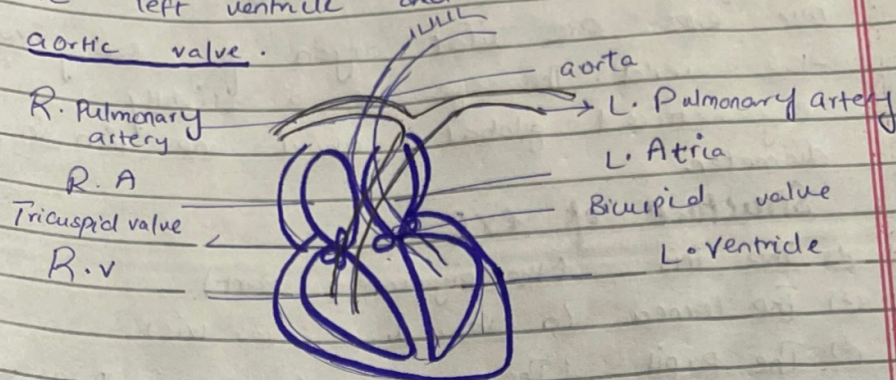
In 2024 more than 600 extreme weather events were reported globally displacing 824,500 people according to WMO data. ILO organization In Pakistan 2022 floods 33 mn people were affected and the economic loss was \$40 bn Per UNDP / WB Reports.

(B) Explain the role of heart in Human body.

Physiology Heart is a fist-sized, muscular organ that pump blood through the body. Everyday heart pumps about 2000 gallons of blood beating about 100,000 times

Anatomy: The human heart has four chamber. The upper two are called right and left atrium, while lower are called right and left ventricle. There are four valves within the heart. Two valves are called atrio-ventricular value between atrium and ventricles. Right atrio-ventricular value is called tricuspid while left atrio-ventricular value is called mitral / bicuspid value. The Right semi-lunar value, between right ventricles and pulmonary

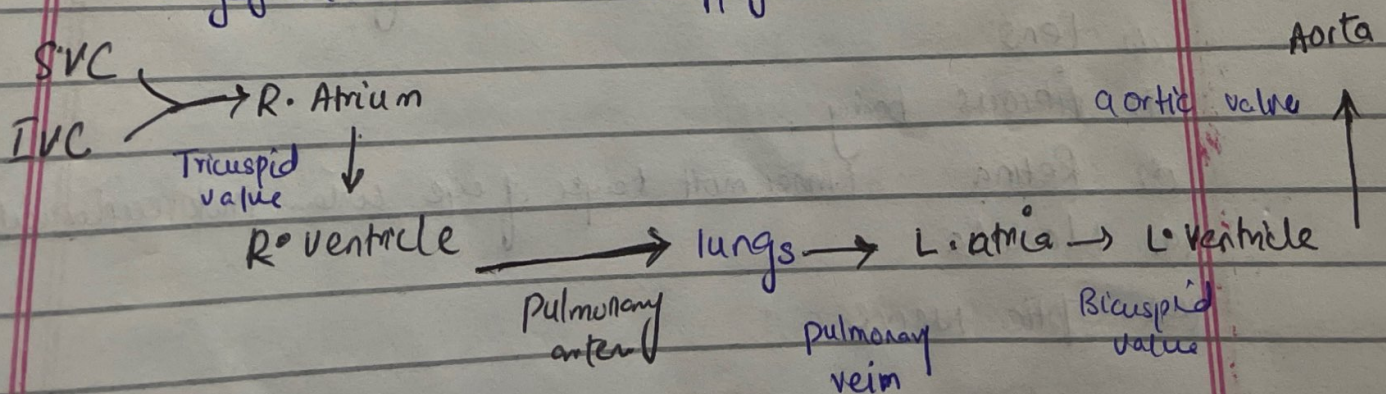
is called pulmonary valve.
 value while left semi-lunar valve between
 the left ventricle and aorta is called
aortic valve.



Human Heart

Function:

Heart pump the blood throughout the body as it receives deoxygenated blood through inferior vena cava (IVC) and SVC and enter into right atrium which moves into left ventricle through tricuspid valve and then through Pulmonary artery into lungs where in alveolar sac blood take oxygen and leaves carbon dioxide and then return back into heart through Pulmonary vein into left atrium and through bicuspid into left ventricle and then aorta to throughout the body. Oxygenated blood supply occurs.

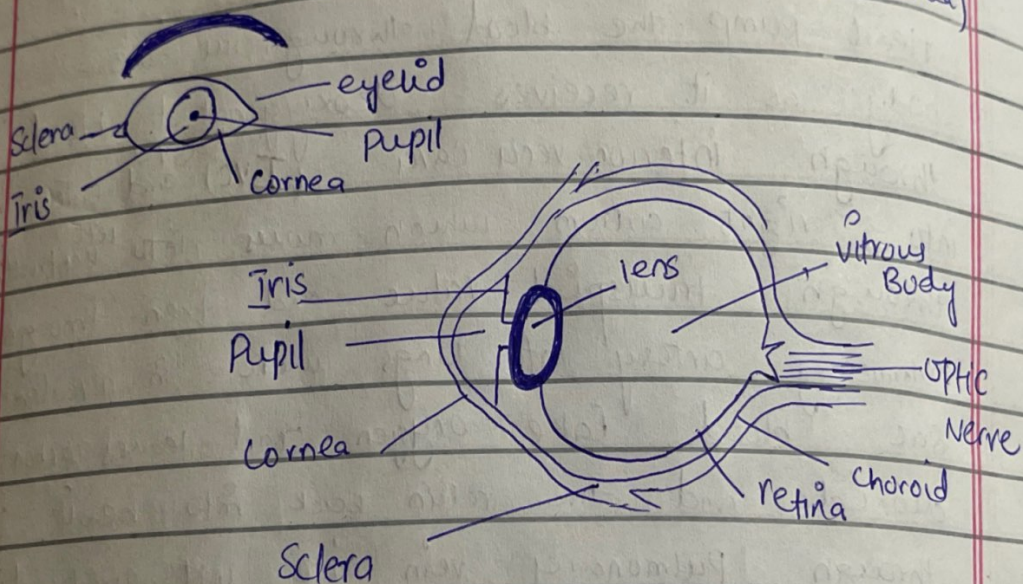


(C) Structure and working of Human Eye?

Our eyes are vital organ for seeing around the world. The eye is a slightly asymmetrical globe about one inch in diameter.

Structure of eye.

- (1) The Iris (the pigmented part)
- (2) The Cornea (a clear dome over iris)
- (3) The Pupil (The black circular opening in iris which lets light in)
- (4) The Sclera (The white part)
- (5) The conjunctiva (invisible layer of tissue covering the front of eye except cornea)



In the back of eye important items that we cannot see when we look in the mirror. This area consist of.

- (6) Lens
- (7) Vitreous body
- (8) Retina (inner most layer of eye contain photoreceptor cells)
- (9) Macula
- (10) Optic Nerve

Working of eye

The human eye works like a camera. It receives light, focuses it, and send signals to the brain to form an image.

Light enters the eye

Light from an object enters through the cornea. The cornea bends the light.

pupil control the amount of light.

After the cornea light pass through the pupil. The iris controls the size of the pupil.

Bright light (Pupil become small)

Dim light (Pupil become dilate).

lens focuses the light

The lens changes shape to focus light properly.

This process is called accommodation.

For near object $\rightarrow$ lens become thick

For distant object $\rightarrow$ lens become thin

Image formation on retina

Focused light fall on retina which contain

light sensitive cells called Rods and cones.

Rod $\rightarrow$ vision in dim light (120 mn in each eye)

cones $\rightarrow$ color vision (6-7 million in each eye)

The retina converts light into electric impulse

optic nerve send signals to brain

The optic nerve carries these signals to the

visual cortex of brain. The interprets

the signals and forms the final image.

Image is inverted

The retina forms an upside-down image

but the brain flips it upright.

(1) Explain the waste disposal technique?

Waste disposal is the method used to collect, treat and remove waste to protect environment, health and resources. The main techniques are:-

(1) Landfilling

Waste is buried in the ground that was collected from primary and secondary collection sites. Landfill use liners, gas collection and leachate control to prevent pollution.

(2) Incineration

Waste that is collected burned at high temperature. Reduces the volume of waste by 80-90%, and can be used as to produce energy.

(3) Recycling

Reprocessing of materials like plastics, papers, metals and glass and make a new products. Reduces material for new material or disposal and saves energy.

(4) Composting

Biological decomposition of organic waste (food, plants, leaves) produces nutrient-rich

Compost for agriculture.
(5) Waste to Energy (WTE).

Convert these waste into electricity or heat which can be used for industrial and municipal purposes.

Effective waste disposal requires modern landfills, recycling systems, composting, and safe treatment of hazardous waste. Sustainable disposal protects human health, conserves resources and reduce pollution.

Question No 3

(A) Explain the working of Nephron in Human body?

Nephron is the functional unit of kidney. It filters blood, remove waste and regulates water and electrolytes.

Structure of Nephron

- (1) Bowman's capsule (surrounds the glomerulus)
- (2) Glomerulus (network of capillaries where filtration occurs)
- (3) proximal convoluted tubules (reabsorbs glucose, amino acid + salt + water)
- (4) loop of Henle (concentrates urine by reabsorbing water and salts).
- (5) Distal convoluted tubules (fine-tunes salt and pH balance)
- (6) collecting duct. collect urine from multiple nephron and send it to renal pelvis $\rightarrow$ ureter $\rightarrow$ Bl

working of Nephron

(1) Filtration Blood enters the glomerulus under pressure. water, salts, glucose, and urea pass into Bowman's capsule. Blood cells and proteins remain in blood.

(2) Reabsorption

Useful substances (glucose, amino acids, water, salts) are reabsorbed into the PCT and loop of Henle.

(3) Secretion

Waste substances like H^+ ions, creatinine, drugs are secreted into tubules for excretion.

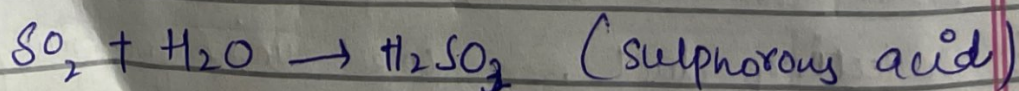
(4) Excretion

Final urine collects in collecting ducts and is transported to the bladder for storage and urine elimination.

(B) Give effects and Solution to Acid rain and Smog?

(1) ~~Definition~~ Definition of Acid Rain

Acid rain is a broader term referring to a mixture of wet and dry deposition from atmosphere containing higher than normal amounts of sulphur and nitric acids.



Effects of Acid Rain

(1) Damage to Buildings and Monuments

Acid rain corrodes marble, limestone and metal structure and reduce societal value of buildings.

(2) Soil Degradation

Acid rain removes essential nutrients like calcium, magnesium and reduce soil fertility.

(3) Water Pollution

Acid rain falls into lakes, streams, marshes, river kills fish and aquatic life cause water pollution.

(4) Damage to Forests

It also attacks tree by eating holes in the waxy coating of leaves causing brown dead spots.

(5) Human health Disrupts

Acid rain cause urban smog which irritate lungs and cause respiratory diseases and damaged our lungs.

(6) Agricultural losses

When acid rain falls on ground and the harmful chemicals in rain decrease the fertility of soil and effect crops.

Solutions to Acid Rain.

(1) Reduce Sulphur and Nitrogen Emissions by installing scrubbers in industries.

(2) Shift to Clean Energy, solar, wind, hydro, and geothermal.

(3) Promote Public Transport reduce (Nox).

(4) Use of catalytic converters in cars.

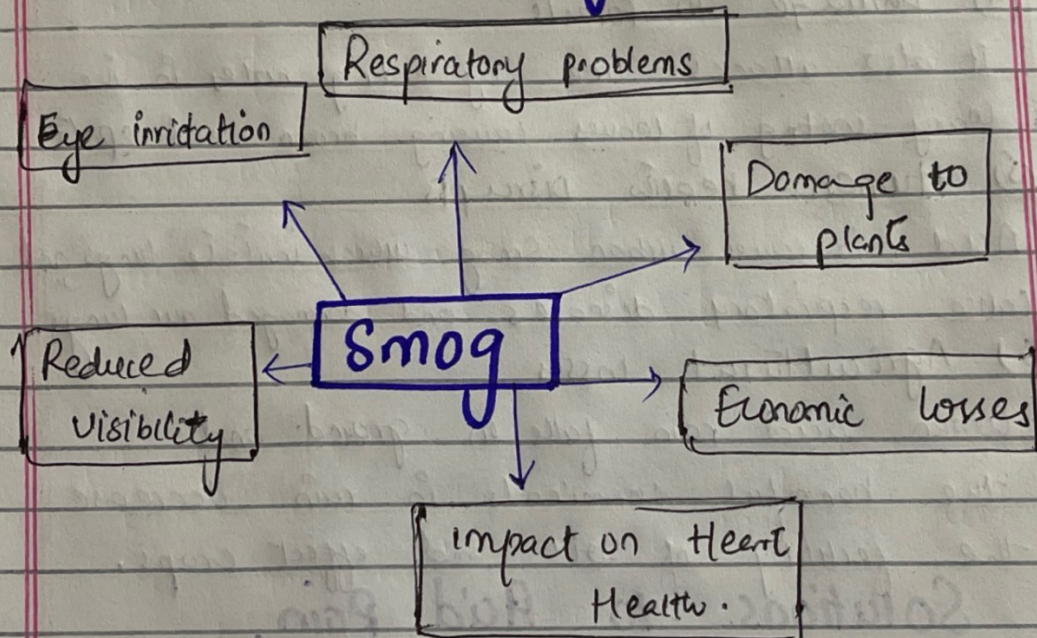
(5) Afforestation. (trees absorb pollutants and improve air quality).

2 Smog

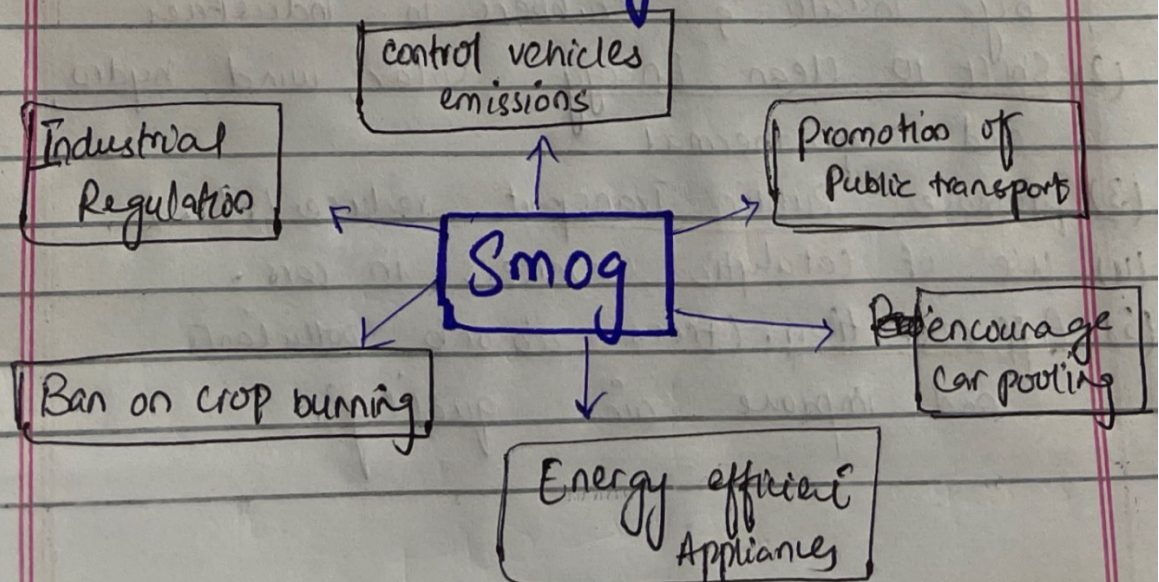
Smog = Smoke + Fog.

Smog is a type of air pollution formed when smoke dust industrial emissions mix with fog in the atmosphere. it contains harmful chemicals like nitrogen oxides (Nox) and sulphur dioxide (SO₂) and O₃.

Effects of Smog



Solutions for Smog



(C) Give the production and benefits of biofuels?

Definition of biofuels

Biofuels are renewable ~~energy~~ ^{fuels} produced from biological materials such as plants, animals, crops, algae and organic waste. They are used as an alternative to fossil fuels, petrol and diesel.

Example:-

Bio Ethanol (from sugarcane, corn)

Bio methanol (from vegetable oils)

Biogas (from manure, waste)

Production of Biofuels

(1) Fermentation of Biomass

Crops like sugarcane, corn, wheat are fermented to produce bioethanol.

(2) Anaerobic Digestion

Animal manure, kitchen waste, and sewage are decomposed without oxygen to produce biogas.

(3) Transesterification of vegetable oils.

Oils from soybean, canola, palm are used for cooking and are chemically processed to produce biodiesel.

(4) Gasification

Agricultural waste and wood are heated at high temperature to produce bio-oil and syngas.

(5) Agricultural Residue Processing

Crops residues like rice husk, sugarcane bagasse are used

to produce bioenergy.
Benefits of Biofuels

- (1) **Reduced greenhouse gas emission**
Biofuels emit 50-70% less CO_2 compared to fossil fuels which is a safe approach.
- (2) **Renewable and Sustainable**
As biofuels are renewable fuels produced from plants, animals, waste and organic matter they can be replenished every season.
- (3) **Energy security**
Shifting to renewable energy sources reduces dependence on imported oil, especially important for countries like Pakistan.
- (4) **Rural Development**
it creates jobs for farmers through crop cultivation and biofuel plants.
- (5) **waste utilization**
converts agricultural waste, manure and urban waste into useful energy.
- (6) **Biodegradable and safe.**
less toxic than non-renewable sources causing less harm to environment.

