05/06/21
Saturday

ASSIGNMENT-01

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Ans:- Different leaf damages occuring to air pollution are;

- Damage to leaf structure by air pollutants can occur through contaminants in which ground-level ozone turly harms leaves by causing chlorosis ((unusual) yellowing) of the leaves due to inadequacy of chlorophyll.
- chlorophyll II is crucial for photosynthesis.
- Photosynthesis energizes the food-production process by catching vitality from the sun.
- Damage to leaf structure by air pollutants causes damage to chlorophyll II and without chlorophyll II, a plant can't produce food (energy.
- In zones with broad groupings of ozone, portions of the leaf will bite the dust because of presentation.
- Other than damage to leaf structure by air pollutants causes are de-flowering, root damage, fading and stomata damage.

Ans:- Global warming is the increase in the average temperature of the world's atmosphere and oceans since the pre industrial age.

What are the causes of Global warming?

- Greenhouse effect, CO_2 and other greenhouse gases trap the sun's heat radiation and reflect it back to earth. Due to this the increase in CO_2 has led to over 15-20%.
- Industries, so many large and small/medium scale industries produce unregulated harmful gases to the atmosphere. Thus increasing the heat level and damaging the ozone layer.
- Transportation, this sector is equally responsible for increase in global warming. Exhaust from the automobiles produces harmful pollutant which settles into the atmosphere and hence leading to global warming.
- Other fields like electronics, mining, agriculture etc. have few effects on the atmosphere.

What are the effects of Global warming?

- Extreme Weather, in July 2018, heat waves set new temperature records all over the world. Uneven rain

causing floods, uneven drought having less water source.

- Health Risks; Global warming contributes to 150,000 death each year. One in every nine people face hunger caused by crop failure. Health care costs are higher for 50 million asthma and allergy sufferers.

- Sea level Rise; In 2020, Artic sea ice reached the second lowest level on record. That has led rising sea levels and flooding of costal cities. In Antartica, glaciers have been losing their mass at an "unsually rapid" rate.

- Flood Inflation; due to rise in sea levels and unsual rainfall, farm lands gets flooded due to this many harvesting crops gets destroyed.

3 Sol:- Air pollution is considered as the major environmen risk factor in the incidence and progression of some diseases. Which may cause [redacted] psychological complications, autism, fetal growth and low birth weight.

i) carbon mono-oxide:

- Its colorless and odorless gas, which is produced by fossil fuel, when the combustion is not appropriate in I.C. engine.

- Poisoning in the blood may occur due to mixing of CO and heamoglobin in the blood cells.

- Symptoms of CO poisoning may include; headache, dizziness, weakness, nausea vomiting and finally loss of consciousness and the end may be death.

ii) Sulphur dioxide :-

- SO_2 is a colorless, highly reactive gas, which is considered as an important air pollutant. Mostly emitted from fossil fuel, natural volcanic activities and industries.
- People with lung disease, children, older people and those who are more exposed to SO_2 are at higher risk of skin and lung diseases.
- Exposure of SO_2 can cause damage to the eyes, mucous membranes, skin and respiratory tracts.

iii) Nitrogen oxide :-

- Nitrogen oxide are important ambient air pollutants which may increase the risk in human health.
- Mainly emitted from the motor engines and thus are traffic related air-pollutants.
- Coughing and wheezing are the most common symptoms but the eyes, nose or throat irritations, headache, chest pain, fever may also occur.

v) Lead :-

- Lead is a toxic heavy metal that is widely used in different industries. Lead pollution can occur from both indoor and outdoor sources, and from the petrol engines which has high amount of lead

in the fuel of lead tetraethyl.

- Fetuses and children are highly suspectible to even low doses of lead. It accumulates in the body in blood, bone and soft tissue, also in kidneys, liver, nervous system and other organs.
- The symptoms are like memory loss, mental retardation hyper activity and antisocial behaviours. Also effects the reproductive organs, cardio-vascular, renal are the main targets.

v) Particle pollutants :-

- These are the major parts of air pollutants, its a mixture of particle found in air.
- It's linked with most of pulmonary and cardiac-associated morbidity and mortality.
- They are directly associated with the onset and progression of the lungs and heart disease.

4 Mark - Air pollution is considered as the major environment risk factor in the incidence & progression of diseases.

The pollutants which cause harms to animals are like;

i) Nitrogen Oxide :-

- NO_x are important ambient air pollutant, which may increase the risk in animal health.
- mainly emitted by motor engines.
- causes direct irreversible damage to bird's lungs. lung failure, poor immune system, population decline.

ii) Poly aromatic hydrocarbons (PAH's) :-

- Toxic chemicals emitted by traffic and industries.
- causes reduced egg production and hatching.
- increased brood abandonment, and growth impairments in birds.

iii) carbon monoxide :-

- colourless & odorless gas produced from incomplete combustion of fuels.
- Leads to poisoning in the blood and mixing of this toxic gas lead in the haemoglobin cells.
- Blindness and weak impairness to the animals.

iv) Acid Rain :-

- chemicals from the industries combine with the air react with water (which is neutral) makes acidic and forms acid rain.
- This kills the aquatic life and vegetation and soils.

v) Sulphur dioxide :-

- It is colorless, highly reactive gas which is considered as an important air pollutant.
- causes respiratory damages to the animals, eye damage, skin disease and sometimes death.

Sol:- Reason of NO_x production :-

- High temperature combustion of fuels : where the temperature is hot enough (about 1300°C) to oxidise some of the nitrogen in air to NO_x gases. This includes burning hydrogen, as it burn in very high temperatures

- Burning plant material : It releases NO_x, as all plant contain nitrogen.

- Chemical & Industrial Process : They use nitric acid, nitra which release NO_x gases.

Mechanism of NO_x production.

- Diesel engine operates at a higher temperature and pressure than petrol engines.
- These conditions favour the production of NO_x gases.
- The quantity depends on the volume and duration of the hottest part of the flame.
- $NO + H_2O \rightarrow NO_2 + H_2$.

  $NO + O_2 \rightarrow NO_2 + O$.

NO_2 back to NO formation is quenched in diesel engines.

$\therefore \quad NO_2 + O \rightarrow NO + O_2$.

6 Soln UBHC emissions from engine.

↳ Few amount of combustion mixture gets entrapped in "crevice volume" where the flame cannot reach during combustion, so this way they remain unburnt.

↳ In case when "flame extinguishes" before reaching cylinder wall, a quench layer containing unburnt mixture is left at the wall.

↳ Engine oil layers on the wall can absorb fuel H-C components before combustion, and desorb them after combustion.

↳ Incomplete combustion due to "bulk quenching" i.e incomplete fuel oxidation in particular regions of combustion chamber where the concentration of local temp., equivalence ratio & charge dilution is insufficient for full oxidation.

↳ Emissions from the fuel tank, due to improper shape of the tank and position of the tank.

↳ Emissions from the carburettor causes UBHC, due to improper A/F ratio.

7 Soln Evaporative losses;

- It's the loss of a stored volatile liquid mixture by evaporation.
- It is account for 15-25% of total hydrocarbon emissions from the I.C. engine. The two main sources are the fuel tank and the carburetor.
- Fuel tank :-

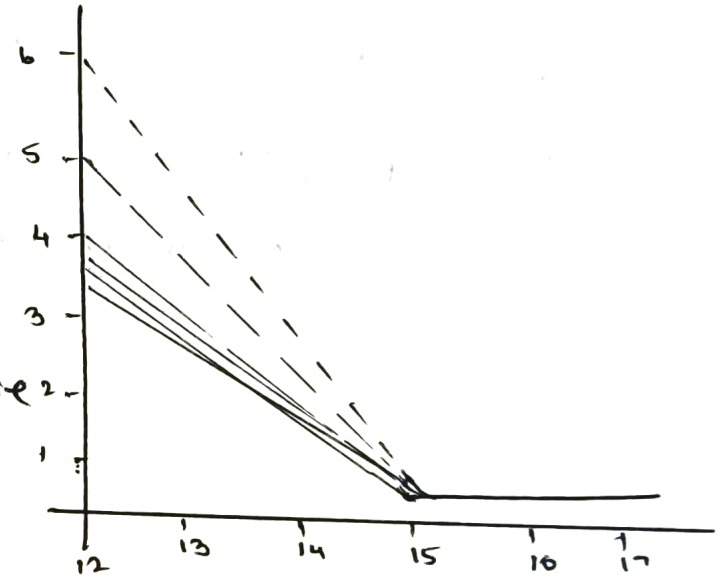
  Occurs by displacement of vapour during fillings of petrol tank, & by vapourization of fuel in the tank, forcing vapour through a breather vent to the atmosphere. Also due to temp. increase vapour loss occurs.

- carburetor :-

  Due to external venting of the float bowl relieving the internal pressure as the carburetor heats and "hot soak" losses occurs which has stopped, as a result evaporation of petrol stored in the bowl, loss being through vent pipe / air cleaner.

Sol:- CO Emissions :-

- Produce of I.C engines and are controlled primarily by the A/F ratio.
- Figure shows that in the exhaust in a conventional spark ignition engine for several different fuel consumption.
- The data is plotted against relative A/F ratio, they are co-related in a single curve.



- For the fuel mixture co-concentn in the exhaust increase steadily with increase in A/F ratio as the amount of excess fuel is increased.
- Concentrations in the exhaust vary with A/F ratio and are in order 10^{-3} mole fraction

Flame Quenching :-

- Flame propogates through unburned charge when the energy released on rapid combustion reactions.
- Flame approaches combustion chamber walls and more heat is lost from flame to walls.
- The flame reaches inclose proximity of the walls, the gas temperature ahead of flame falls hallow ignite on point & the flame get extinguished.
- This phenomeon is known as flame quenching.

Crevice losses.

- crevice influence the fuel losses under different A/F mixtures and engine load.
- The real fuel losses are larger than H-C concentration measured in exhaust gases.
- There losses reduced significantly engine efficiency.
- It is possible to reduce there losses with lean mixture & with stratified charge.